Nonnuclear Consolidation
Environmental Assessment

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Executive Summary

Introduction

Complex 21. The Department of Energy (DOE) is developing a proposal, known as Complex 21, to reconfigure the Nation's Nuclear Weapons Complex (Complex). The Complex is a set of interrelated facilities that design, manufacture, test, and maintain this country's nuclear weapons. The Complex also produces and/or recycles the nuclear materials used in building weapons and stores nuclear materials for future use. DOE also dismantles the weapons retired from the stockpile. In addition, DOE conducts surveillance and maintenance activities to ensure the reliability and safety of the stockpiled weapons throughout their operational life.

Many of the Complex facilities, constructed over the past 50 years, were sized to meet stockpile requirements substantially larger and more diverse than those expected in the future and were designed and built to environmental and safety standards very different from, and less stringent than, those of today. In view of improving international relationships, the Presidential initiatives of September 27, 1991 and January 20, 1992, and the Strategic Arms Reduction Talks II (START II) agreement of January 1993, the requirements for the number and types of nuclear weapons will substantially decrease from current stockpile levels. Additional changes are possible in the future which cannot be foreseen at this time. Therefore, the Complex must provide the flexibility to respond to emerging and future changes. To meet these challenges, the Secretary of Energy (Secretary) has proposed to reconfigure the present Complex. The future Complex that is the subject of DOE's proposal is called Complex 21. Complex 21 would be smaller, less diverse, and less expensive to operate than the Complex of today.

Nonnuclear Consolidation. The development of Complex 21 has been divided into two parts: (1) the consolidation of the nonnuclear manufacturing, storage, and surveillance functions of the Complex, which is the Proposed Action addressed in this Environmental Assessment (EA); and, (2) reconfiguration of the nuclear and the research, development, and testing (RD&T) elements of the Complex.

The nonnuclear component of the Complex manufactures nonnuclear parts of nuclear weapons and tests individual components. The nonnuclear consolidation proposal is designated as such because the vast number of activities to be transferred under the proposal are manufacturing activities associated with the nonnuclear components of nuclear weapons. Nonnuclear components include electronics, batteries, wiring, and firing systems. Although small amounts of tritium, a radioactive material, are involved with some of these components, transfer of tritium-handling activities from the Mound Plant (Mound) and the Pinellas Plant (Pinellas) is included as part of the proposal in order to achieve the greatest possible savings from such consolidation. In addition, leaving tritium operations at Pinellas would be technologically impractical because the neutron generators now being produced at Pinellas are substantially different from those under development at Sandia National Laboratories, New Mexico (SNL) that will be used to meet future stockpile requirements.

In contrast to high-volume industrial factories, the nonnuclear plants generally produce relatively small quantities of technologically sophisticated products which have a long shelf life. Certain limited-life components are also produced. This type of production results in a large infrastructure with relatively high fixed costs, irrespective of the production rate.

The nonnuclear manufacturing storage, and surveillance activities discussed in this EA have been grouped into six different categories. These include:

- Electrical/Mechanical . This category includes the majority of the activities that will be moved to or remain at the proposed consolidation site and consists of 28 items from the Kansas City Plant (KCP), 5 each from Mound and Pinellas, and 1 from the Rocky Flats Plant (RFP).

- Tritium-Handling . This category includes four specific tritium-handling activities of which three are currently located at Mound and one is at Pinellas.

- Detonators . This category consists of the high-power detonator work that is currently at Mound.

- Beryllium Technology and Pit Support . These two items are currently located at RFP.

- Neutron Generators, Cap Assemblies, and Batteries . This category includes four specialized items, including two types of batteries, currently located at Pinellas.

- Special Products . This category consists of six unique products (four from RFP and two from Mound) that do not easily fall into any specific category.

The locations of sites involved in the nonnuclear consolidation proposal are illustrated in figure ES-1. The key element of the Proposed Action is consolidation of electrical and mechanical functions at KCP. The No Action alternative and alternatives for consolidating the majority of electrical and mechanical functions at Mound, Pinellas, and RFP were also investigated.

National Environmental Policy Act. The National Environmental Policy Act (NEPA) of 1969, as amended, requires Federal agencies to consider the environmental consequences of proposed projects and their alternatives before decisions are made. In complying with NEPA, DOE follows Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508) as well as DOE's own NEPA implementation regulations 57 FR 15122, April 24, 1992 to be codified at 10 CFR 1021.

The DOE approach for implementing NEPA requirements for the reconfiguration program has three phases. The first phase involves this EA, which addresses nonnuclear consolidation. The second phase is preparation of a Programmatic En-vironmental Impact Statement (PEIS), which addresses reconfiguration of nuclear and RD&T elements of the Complex. The third phase consists of preparation of site-specific EISs and/or EAs for the nuclear and RD&T reconfiguration.

If the analysis in this EA supports a final finding of no significant impact (FONSI), DOE plans to proceed with nonnuclear consolidation and incorporate the nonnuclear consolidation decisions into the Reconfiguration PEIS analysis as actions common to all alternatives. However, if any significant environmental impacts due to the Proposed Action are identified during the public comment period on the proposed FONSI, then the assessment of environmental impacts for consolidating nonnuclear functions would be incorporated into the Reconfiguration PEIS. In this case, no actions would be taken to consolidate the nonnuclear manufacturing activities unless they were included in the Reconfiguration PEIS Record of Decision (ROD).

Time Frame. If DOE issues a FONSI in mid-1993, building modifications and equipment installation would begin immediately and proceed through 1995. Operations of most functions at receiver sites would be phased in over a 3-year period beginning in late 1994, with full operations achieved around 1997. However, some validation activities could continue beyond this date; therefore, for the purposes of environmental analysis, the year 2000 has been assumed as the year of full validation of operations following consolidation. It is assumed that operations would continue until the middle of the 21st century.

Issue Identification. Issue identification for this EA was accomplished as part of the larger scoping process for the reconfiguration program. Scoping activities consisted of both internal DOE scoping and public scoping. Public meetings were conducted between March and August 1991 at 15 locations across the country to allow interested parties to speak and present related information. Meetings occurred in the vicinity of all sites that could be affected by nonnuclear consolidation. All comments received through public scoping were systematically organized and reviewed for consideration during the preparation of both the PEIS and this EA. An extensive summary of all comments received during the public scoping process was published in the Implementation Plan for the Nucle ar Weapons Complex Reconfiguration Programmatic Environmental Impact Statement , February 1992.

During the public scoping process, DOE received comments from members of the public; from representatives of interest groups; and from Federal, state, and local officials. DOE received 432 comments specifically related to consolidation of nonnuclear functions. Comments covered a range of environmental and policy-related issues including environmental health, economic impacts of plant closures to local communities, worker and public health and safety, hazardous materials management, surface and groundwater contamination, population encroachment, and privatization of nonnuclear functions.

A review of the comments received was conducted to identify issues to be analyzed in this EA and, issues that are either not relevant or outside the scope of this EA. This review, along with internal DOE studies and the CEQ and DOE requirements for implementing NEPA requirements, establishes the scope of study.

Purpose of and Need for Nonnuclear Consolidation

Purpose. The purpose of nonnuclear consolidation is to effect better management of nonnuclear manufacturing activities within the Complex, and to decrease the long-term operating costs of this aspect of the Complex. In addition, consolidation would provide DOE with a mechanism to maintain the specialized skill base, and retain critical technologies necessary to produce and test the nonnuclear components.

Need. Consolidation of nonnuclear functions is necessary because it would scale future nonnuclear manufacturing activities to the foreseeable workload and reduce operating costs. To provide a sufficient workload for maintaining a well-trained and qualified workforce, functions that use similar technologies would be combined. Continued operation of the existing large Complex would require maintaining nonnuclear expertise at multiple sites with little or no workload, which is already resulting in a loss of technical skills. Consolidating similar nonnuclear manufacturing operations and collocating some nonnuclear manufacturing capabilities with similar RD&T capabilities at the national laboratories would serve as mechanisms to maintain or enhance critical skills.

Proposed Action and Alternatives

In the Nonnuclear Consolidation Plan (NCP) with addendum of September 1991, DOE considered all sites that currently perform nonnuclear manufacturing functions as candidates for the consolidated nonnuclear mission: KCP, Mound, Pinellas, RFP, the Oak Ridge Y-12 Plant (Y-12), and the Pantex Plant (Pantex). DOE assessed nonnuclear manufacturing functions in three groups:

- Candidates for transfer to a primary consolidation site.
- Candidates for transfer to other sites.
- Candidates for privatization.

Each of the 6 potential consolidation sites was rated using 10 performance measures within 4 categories (table ES-1) that involved environment, safety and health (ES&H) risks; technical risks; consolidation costs; and consolidation time. Through this analysis, KCP ranked first in each of the 4 categories, and was selected as the preferred consolidation site (i.e., the Proposed Action). Pinellas ranked second in 2 categories; Mound ranked second in 1 category; and Pinellas, Mound, and RFP tied for second in 1 of the 4 categories. Y-12 and Pantex ranked last in all 4 categories.

As a result of the analysis in the NCP, Y-12 and Pantex have been eliminated from further study as primary consolidation sites. Mound, Pinellas, and RFP have been retained for analysis in this EA, along with No Action, as alternatives to the proposed consolidation at KCP.

Figure ES-2 illustrates the Proposed Action, and table ES-2 provides a comparison of Proposed Action and the three alternatives. The Proposed Action and alternatives are discussed in more detail below.

Kansas City Plant Consolidation. DOE proposes to terminate the Complex missions at Mound and Pinellas, and the nonnuclear manufacturing mission at RFP. Enhanced RD&T and prototype fabrication capability at the laboratories would be provided to replace certain weapon production capabilities now located at Mound, Pinellas, and RFP. The remaining nonnuclear manufacturing functions would be consolidated at KCP, and the weapons manufacturing workload currently at KCP would be reduced.

The Proposed Action would result in: the consolidation of the nonnuclear electrical/mechanical manufacturing capabilities of the Complex at KCP; tritium-handling capabilities at Savannah River Site (SRS) and Los Alamos National Laboratory (LANL); high power detonator capabilities at LANL; and beryllium technology and pit support functions at LANL or, as an option, at Y-12. The existing RD&T and prototyping capability at SNL, would be augmented to provide the necessary fabrication capability for future neutron generators, cap assemblies, and other nonnuclear components.

Mound Plant Alternative. The Complex missions at KCP and Pinellas, and the Complex nonnuclear manufacturing mission at RFP would be terminated. Mound would retain all of its existing nonnuclear manufacturing capabilities and receive additional nonnuclear manufacturing capabilities from the other sites.

The Mound alternative would result in the consolidation of: the nonnuclear electrical/mech-anical manufacturing capabilities of the Complex at Mound; Pinellas' tritium-handling capabilities with similar functions at LANL; and beryllium technology and pit support functions at LANL. The existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for future neutron generators, cap assemblies, and other nonnuclear components.

Pinellas Plant Alternative. The Complex missions at KCP and Mound, and the Complex nonnuclear mission at RFP would be terminated. Pinellas would retain all of its existing nonnuclear manufacturing capabilities and receive additional nonnuclear manufacturing capabilities from the other sites.

The Pinellas alternative would result in the consolidation of: the nonnuclear electrical/ mechanical manufacturing capabilities of the Complex at Pinellas; Mound tritium-handling capabilities with similar functions at SRS; high power detonators at LANL; and beryllium technology and pit support functions at LANL. The existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for other nonnuclear components.

Rocky Flats Plant Alternative. The Complex missions at KCP, Mound, and Pinellas would be terminated. RFP would retain all of its existing nonnuclear manufacturing capabilities and receive additional nonnuclear manufacturing capabilities from the other sites.

The RFP alternative would result in the consolidation of: the nonnuclear electrical/mechanical manufacturing capabilities of the Complex at RFP; tritium-handling capabilities at SRS and LANL; and high-power detonator capability at LANL. The existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for future neutron generator work, cap assemblies, and other nonnuclear components.

No Action. Under No Action, the consolidation of nonnuclear functions would not occur. Planned upgrades, renovations, repairs, and maintenance activities necessary to improve Complex compliance with all environment, safety and health (ES&H) and environmental restoration standards would continue irrespective of future Complex configurations. Mound, Pinellas, and RFP would retain their current nonnuclear manufacturing missions.

Alternatives Eliminated from Further Study. As previously stated, alternatives for consolidation at Y-12 and Pantex were examined in the NCP, but eliminated from further evaluation. In addition, alternatives that would: consolidate nonnuclear manufacturing activities at any two of the current three dedicated nonnuclear plants (i.e., Mound and Pinellas; KCP and Mound; or KCP and Pinellas); consolidate such activities at a nucl ear site or a national laboratory; or, consolidate all tritium maintenance, processing, and storage activities presently performed at Mound and SRS at Mound instead of SRS were also considered during the course of preparing this EA but were eliminated from further study.

The Two-Site Nonnuclear Consolidation Study, with addendum, released in December 1992, estimated and compared the annual operating and long-term costs for the two-site alternatives with the Kansas City consolidation alternative addressed in the NCP. With regard to long-term cost comparisons, the Two-Site Study supports the conclusion that the preferred alternative of consolidating most nonnuclear manufacturing activities at Kansas City would save between 1 1/2 billion dollars and several billion dollars in life-cycle costs over the two-site consolidation alternatives examined. This conclusion alone renders all of the two-site options unreasonable. Therefore, they have been eliminated from further analysis in this EA.

In addition, as explained in the addendum to the Two-Site Study, one of the results of the START II agreement has been to reduce further the cost effectiveness and increase the technical risks involved in retaining neutron generator production at Pinellas. Thus, the KCP-Pinellas two-site consolidation option (which was the least costly of the two-site options evaluated in the study) has become even less attractive compared to single-site consolidation at KCP.

Further, as a result of recent workload and budget reductions, the Complex has been forced to significantly reduce personnel levels, jeopardizing technical competence in many areas. Consolidating similar activities at a single site will ensure sufficient work to support a core workforce of technical and production personnel. This will enable utilization and retention of key skills and technical capabilities needed to maintain the enduring stockpile. Consolidation at two sites will provide substantially less assurance that this programmatic objective will be achieved.

The environmental impacts of alternatives for consolidating nonnuclear manufacturing activities at a national laboratory or at a nuclear site (other than RFP) are not evaluated in this EA, because the technical risk, cost and time to consolidate render these alternatives unreasonable. As described above, the NCP considered the alternative of consolidating nonnuclear manufacturing activities at RFP, Pantex and Y-12, all nuclear sites. For the reasons discussed, neither Y-12 or Pantex represents a reasonable alternative for such consolidation.

Although the laboratories have experience with many of these technologies, and have designed the components and subsystems to be produced, they do not have recent practical experience manufacturing production quantities of many of these components and subsystems. Thus, the technical risk involved in consolidating all activities at the laboratories would be significantly greater than for the other alternatives considered in this EA. In addition, given the large number of technologies to be transferred, the transfer cost (including con-struction of new facilities) and time involved before such a transfer could be effected would render this alternative unreasonable. This is particularly true in view of the need for near-term consolidation to prevent the loss of technical competence in the Complex.

A number of tritium-handling functions are currently performed at Mound and SRS. DOE has assessed the comparative costs and long-term cost savings of consolidating these functions at either one of the two sites in the Tritium Consolidation Comparison Study: Cost Analysis, December 1992. It was estimated that consolidation of tritium-handling functions at Mound would involve life-cycle costs nearly 2 billion dollars greater than consolidation at SRS. As a result, DOE has concluded that Mound is an unreasonable location for such consolidation. In addition, DOE believes that it would not be prudent to place additional large tritium inventories in a densely populated urban area such as that surrounding Mound. This is especially so when there exists the alternative of consolidating this material at SRS, a large site which is not near a heavily populated area.

Environmental Consequences

Proposed Action. DOE has identified no significant environmental impacts associated with the proposal to consolidate nonnuclear activities at the KCP. The conclusions of the environmental analyses are as follows:

- Land Use . No additional undisturbed land would be required to implement the project. At KCP, SRS, LANL, and SNL, changes and modifications to existing buildings would be compatible with existing land use plans and policies.

- Air Quality and Acoustics . The same sites would experience short-term increases in air emissions and noise during building renovations. During operation, minor increases in air emissions and noise would not exceed applicable air quality standards or guidelines. At Mound, Pinellas, and RFP, local air quality and noise improvements could occur due to the close out of weapons complex missions at these facilities.

- Water Resources . No disturbance of wetlands, floodplains, or surface water features would occur at any sites. Increased water usage would not exceed available supplies at any of the sites. At KCP, SRS, and LANL, increases in water usage would be less than 1 percent of current usage. At SNL the increase would be less than 4 percent. Water use would decrease due to mission close outs at Mound, Pinellas, and RFP.

- Geology and Soils . No significant impacts to geologic resources or soils would occur at any sites.

- Biotic Resources . No permanent disturbance of any biotic resources is anticipated from building renovations or operations at any site. No adverse impacts to threatened and endangered species or wetlands are expected since no undeveloped land would be required at Proposed Action sites.

- Cultural Resources . No adverse effects to NRHP-eligible prehistoric or historic resources at KCP, SRS, LANL, or SNL are expected. There would be no adverse effect on important Native American resources at LANL and SNL.

- Socioeconomics . Changes to socioeconomics and community services at KCP, SRS, LANL, and SNL are expected to be minor. Approximately 425 jobs would be created at KCP; 45 at SRS; 115 at LANL; and 385 at SNL. Adverse economic consequences would occur at Mound, Pinellas, and RFP due to the closeout of Complex missions activities at these facilities. Approximately 1,070 direct jobs would be lost at Mound, 1,050 direct jobs at Pinellas, and 750 direct jobs at RFP. As a result of ongoing planning and the proposed Fiscal Year 1994 budget projections, DOE has revised its workforce numbers. These revisions are slightly different than the original numbers used for analysis. The revised estimates do not affect any of the conclusions based on the analysis of the original workforce numbers.

- Waste Management . Nonnuclear manufacturing activities associated with the Proposed Action would have minor waste management effects at KCP, SRS, LANL, and SNL. Only small increases in hazardous waste volumes (less than 7 percent) would occur. Sanitary/industrial wastewater effluent would increase less than 2 percent. Solid nonhazardous waste volumes would increase by 1 percent or less at KCP, SRS, and SNL, and by approximately 3 percent at LANL. At Mound, Pinellas, and RFP, nonnuclear production waste streams would be eliminated.

- Human Health . No significant adverse human health effects to workers and the public due to radiological or chemical exposure are expected from im-plementation or operations activities associated with the Proposed Action at any of the sites. Activities relocated to SNL would result in an annual excess cancer risk to workers due to the introduction of small amounts of chemical solvents, but these risks would be within acceptable guidelines. Mitigation measures to minimize these risks such as substituting less toxic solvents or modifying the production processes would be implemented. The frequency and consequences of potential accidents would not increase appreciably at any of the sites.

Alternatives. If either the Mound, Pinellas, or RFP alternatives were selected, substantial new construction would be required. For these alternatives, additional site-specific NEPA documentation would be required.

No Action. The No Action alternative would not result in any significant adverse environmental impacts. However, the No Action alternative would not satisfy the DOE need to size the future nonnuclear manufacturing functions to the foreseeable workload, reduce operating costs, and provide adequate expertise to satisfy the future work assignments.

Environmental Permits and Regulations

Federal regulations have been established to protect the environment and to control the handling, emission, discharge, and disposal of waste substances. At the Federal level, these environmental regulations are promulgated and enforced primarily by the Environmental Protection Agency (EPA). Compliance with these national requirements must be met by all Federal agencies whether they are enforced directly by the Federal government or the enforcement is delegated to the states. Many environmental requirements are enforced through review, approval, and permitting programs that control the release of pollutants or minimize other impacts on the environment. This EA provides an extensive list of permitting and other regulatory requirements that would be observed at each site involved in nonnuclear consolidation.

1 INTRODUCTION

1.1 The Reconfiguration Proposal: Complex 21

The Department of Energy (DOE) is developing a proposal, known as Complex 21, to reconfigure the Nation's Nuclear Weapons Complex (Complex). The Complex is a set of interrelated facilities that design, manufacture, test, and maintain this country's nuclear weapons stockpile and dismantle the weapons retired from that stockpile. The Complex also produces and recycles the nuclear materials used in building nuclear weapons, stores materials for future use, and conducts surveillance and maintenanceactivities to ensure the reliability and safety of the stockpiled weapons throughout their operational life.

Congress, in the Atomic Energy Act of 1954, declared, as a matter of national policy, that the development, use, and control of atomic energy shall be directed so as to:

- Make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security.
- Promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise.

In that law, Congress assigned the nuclear weapons manufacturing and stockpile sustainment role to the Atomic Energy Commission (AEC). Today, that role resides with DOE. The Complex designs, builds, tests, maintains, and dismantles the weapons that constitute the Nation's stockpile, as directed by the President and approved by Congress. The Complex also conducts surveillance and maintenance activities to ensure the reliability and safety of the stockpiled weapons throughout their operational life. The size of the nuclear weapons stockpile is determined on a year-to-year basis through a joint recommendation by the Secretaries of Defense and Energy for approval by the President.

The Complex is administered by the DOE Office of Defense Programs (DP) through its Albuquerque, Nevada, Oak Ridge, Rocky Flats, San Francisco, and Savannah River Field Offices, and consists of government-owned, contractor-operated facilities located at 11 sites around the country. The size, location, and functions of the 11 DOE sites that make up the current Complex are illustrated in figure 1.1-1. The functions shown are the nuclear, nonnuclear, and research, development, and testing (RD&T) roles that these sites have carried out in the recent past. Figure 1.1-1 also shows two sites that were formerly part of the weapons complex: Hanford Site and the Idaho National Engineering Laboratory (INEL).

Many of the facilities, constructed over the past 50 years, were sized to meet stockpile requirements substantially larger and more diverse than those expected in the future, and were designed and built to standards very different from, and less stringent than, those of today. In view of improving international relationships, the Presidential initiatives of September 27, 1991 and January 20, 1992, and the Strategic Arms Reduction Talks II (START II) agreement of January 1993, the requirements for the number and types of nuclear weapons will substantially decrease from current stockpile levels. Additional changes are possible in the future which cannot be foreseen at this time. Therefore, the Complex must provide the flexibility to respond to emerging and future changes. To meet these challenges, the Secretary of Energy (Secretary) has proposed to reconfigure the present Complex.

Complex 21 would be smaller, less diverse, and less expensive to operate than the Complex of today. The goal of Complex 21 would be to safely and reliably support whatever nuclear weapons objectives are set by the President and funded by Congress. As stockpile requirements decrease, fewer weapons would be built, which in turn means less manufacturing capacity would be needed. Accordingly, the thrust would be to maintain key capabilities in Complex 21 that, if lost, would cause significant and rapid degradation of the overall Complex effectiveness. DOE would continue to purchase some weapons components from the private sector (privatization) where it would be cost effective. However, with recent reductions in the stockpile level, the opposite has been occurring, i.e., component manufacturing activities are being returned to the government from the private sector because the workload does not make it cost-effective for these private suppliers to continue manufacturing such small quantities.

Complex 21 would employ state-of-the-art technology and, to the extent practical, facilities flexible enough to accommodate fluctuations in capacity. The number and size of waste streams would be kept to a minimum and would fully comply with environmental laws and regulations. New facilities would be constructed and existing facilities would either be phased out or upgraded to comply with all applicable Federal, state, and local laws, regulations, and orders. Complex 21 would be fully operational early in the 21st century and would sustain the Nation's nuclear deterrent through the middle of that century.

The development of Complex 21 has been divided into two parts: (1) the consolidation of the nonnuclear component; and, (2) the reconfiguration of the nuclear and RD&T components. The following sections summarize the nonnuclear consolidation component and describe DOE's strategy for meeting the requirements of the National Environmental Policy Act of 1969, as amended (NEPA).

1.2 Nonnuclear Consolidation

The nonnuclear consolidation proposal is part of the Secretary's larger proposal to downsize the entire Complex. Key elements of this proposal are: termination of weapons complex activities at the Mound Plant (Mound) in Miamisburg, OH, the Pinellas Plant (Pinellas) in Largo, FL, and nonnuclear manufacturing activities at the Rocky Flats Plant (RFP) near Golden, CO; consolidation of the majority of electrical and mechanical functions at the Kansas City Plant (KCP) in Kansas City, MO; and transfer of other functions or technology bases to Los Alamos National Laboratory (LANL) in Los Alamos, NM, Sandia National Laboratories (SNL) in Albuquerque, NM, and the Savannah River Site (SRS) near Aiken, SC. The Y-12 Plant (Y-12) near Oak Ridge, TN is an option for a small part of the proposal. Proposed construction activities would be limited almost exclusively to renovation of existing facilities at consolidation sites. The environmental impacts associated with the No Action alternative and alternatives for consolidating the majority of electrical and mechanical functions at Mound, Pinellas, and RFP are also evaluated in this EA.

The products and services produced by the nonnuclear element of the Complex are used to manufacture nuclear weapons and test individual components. The components of a nuclear weapon and basic design features are shown in figure 1.1-2.

The nonnuclear consolidation proposal is designated as such because the vast number of activities to be transferred under the proposal are manufacturing activities associated with the nonnuclear components of nuclear weapons. Nonnuclear components include electronics, batteries, wiring, and firing systems. Although small amounts of tritium, a radioactive material, are involved with some of these components, transfer of tritium-handling activities from Mound and Pinellas is included as part of this proposal in order to achieve the greatest possible savings from such consolidation. To achieve these maximum benefits from the consolidation proposal, all overhead costs from Complex activities at Mound and Pinellas must be eliminated. Leaving small amounts of tritium at these sites (compared to amounts already at the proposed receiver sites) would require the continued expenditure of substantial overhead costs associated with Complex functions. In addition, leaving tritium operations at Pinellas would be technologically impractical because the neutron generators now being produced at Pinellas are substantially different from those under development at SNL that will be used to meet future stockpile requirements.

In contrast to high-volume factories, the nonnuclear plants generally produce relatively small quantities of technologically sophisticated products that have a long shelf life. Certain limited-life components are also produced. This results in a large infrastructure with relatively high fixed costs, irrespective of the production rate.

1.3 National Environmental Policy Act Considerations

NEPA requires a Federal agency to include environmental considerations in its decision-making process. The Council on Environmental Quality (CEQ) regulations (40 CFR 1500) require Federal agencies to consider the environmental consequences of an overall program before subsequent projects or activities are implemented. To comply with NEPA, DOE must follow its own implementing regulations 57 FR 15122, April 24, 1992 to be codified at 10 CFR 1021 as well as the CEQ regulations.

The DOE approach to implementing NEPA requirements for the reconfiguration program has three phases. The first phase involves this Environmental Assessment (EA), to determine if nonnuclear consolidation can be completed without significant environmental impact. The second phase is preparation of a Programmatic Environmental Impact Statement (PEIS), which addresses reconfiguration of nuclear and RD&T functions of the Complex. The third phase consists of preparation of site-specific Environmental Impact Statements (EIS) and EAs for the nuclear and RD&T reconfiguration. These documents will support construction-level decisions that result from the Record of Decision (ROD) associated with the PEIS. If the EA for nonnuclear consolidation does not support a finding of no significant impact (FONSI), the first two phases will be combined.

DOE's phased NEPA approach is derived from CEQ regulations that encourage tiering of environmental documents to eliminate repetitive discussions of the same issues and to focus on the actual issues ready for decision at each level of environmental review (40 CFR 1502.20). Tiering allows agencies to proceed from a program, plan, or policy EIS to a site-specific statement or analysis.

Recent Presidential initiatives to reduce the nuclear weapons stockpile and the START II Treaty have provided an opportunity to accelerate nonnuclear consolidation without affecting national defense or the remainder of the reconfiguration program. To help achieve early decisions, DOE has decided to conduct an environmental analysis of nonnuclear consolidation separate from the programmatic review of the remainder of the Complex. DOE believes that the NEPA review of the nonnuclear consolidation proposal can and should be separated from the PEIS, because: (1) nonnuclear consolidation has benefits independent of the rest of the reconfiguration proposal; and (2) nonnuclear consolidation decisions would neither affect, nor be affected by, the reconfiguration decisions that will be made after the PEIS is published. In this regard, important benefits of accelerating nonnuclear consolidation would be an earlier and greater cost saving as well as preservation of technical competence within the Complex (DOE, 1991f).

Accordingly, the environmental consequences of the nonnuclear consolidation aspects of Complex 21 have been analyzed in this EA prior to completion of the PEIS. Proceeding with nonnuclear consolidation will require programmatic decisions about where nonnuclear functions would occur as well as project level decisions regarding nonnuclear consolidation. The costs associated with implementing nonnuclear consolidation, although a factor in the decision process, are utilized in this EA only to determine the reasonableness of alternatives for evaluation. DOE is evaluating costs through a separate process, the results of which are described in the Cost Effectiveness Report (DOE, 1993a).

Decontamination costs for facilities that are already contaminated are not included as part of the cost of reconfiguration. Decontamination costs are considered to be a liability (or mortgage) incurred at the time contamination is introduced into a facility. The majority of identified decontamination expenses would begin to be incurred by DOE on approximately the same schedule irrespective of whether plant operations continue or are permanently shut down. DOE plans to begin significant environmental restoration at sites along with continued operations: hence, the majority of decontamination costs should not be associated with costs of relocation of nonnuclear activities. The only exception would be facilities that are not yet contaminated, but would become contaminated as a result of reconfiguration. No facilities were so identified in this study. The Replacement Tritium Facility (RTF) at SRS has not yet been contaminated but is projected to be utilized in two of the alternatives considered.

If the EA analysis supports a final FONSI, DOE plans to proceed with nonnuclear consolidation and incorporate the nonnuclear consolidation decisions into the PEIS analysis. However, if any significant environmental impacts resulting from the Proposed Action are identified during the public comment period on the proposed FONSI, then the assessment of environmental impacts for consolidating nonnuclear functions would be incorporated into the PEIS. In this case, no actions would be taken to consolidate the nonnuclear manufacturing activities unless they were included in the PEIS ROD.

Nonnuclear consolidation could involve consolidating certain nonnuclear functions at Y-12 and SRS in facilities that could possibly be phased out during the larger reconfiguration program. The scope of these nonnuclear functions would be very small compared to existing missions at Y-12 and SRS. If the PEIS ROD results in the phaseout or transfer of the Y-12 or SRS DP missions, then the nonnuclear activities discussed in this EA would be included in that subsequent relocation. The cost savings gained by accelerating nonnuclear consolidation would be much greater than the costs of relocating these missions again should host facilities be closed as part of the larger reconfiguration program (DOE, 1991f). DOE has not identified any future reconfiguration decisions that would be limited by nonnuclear consolidation.

A project plan will be prepared to provide a framework for proceeding with any final decisions on nonnuclear consolidation. The project plan will include an overall master plan, plus plans for activity transfer and privatization, facility modifications, human resources, and decontamination and decommissioning (D&D) transitions.

1.4 Related Actions

The Nuclear Weapons Complex Reconfiguration Programmatic Environmental Impact Statement Implementation Plan (PEIS Implementation Plan) (DOE, 1992d) discussed several DOE actions and associated NEPA activities that have some relationship to both the PEIS and this EA. Of primary importance among these is the PEIS currently being prepared by the DOE Office of Environmental Restoration and Waste Management (EM).

On January 12, 1990, the Secretary decided that DOE would prepare two PEISs: one on reconfiguration and one on DOE's EM program. The EM PEIS will analyze alternative strategies and policies for conducting DOE's EM program, which not only includes the environmentally responsible management and restoration of nuclear facility sites, but also the protection of worker and public health and safety through the safe disposal of radioactive, hazardous, and mixed (i.e., radioactive and hazardous) wastes. The environmental analysis will support DOE decisions on how to manage processes or facilities for treatment, storage, or disposal of radioactive, hazardous, or mixed wastes; approaches to be used to remediate contaminated sites; treatment technology application or development; land use; and technology and policy considerations for D&D of DOE facilities at the end of their useful lives. A Notice of Intent (NOI) to prepare the EM PEIS was published in the Federal Register on October 22, 1990 (55 FR 42633). The results of the scoping process, as well as public comments on a draft EM PEIS Implementation Plan (DOE, 1992a), will be documented in the final EM PEIS

Implementation Plan, along with a discussion of alternatives to be evaluated.

The DOE decision to conduct separate NEPA analyses for the reconfiguration and EM programs was based on the separate sets of decisions that each program must address. Among other things, the reconfiguration program will help determine those sites that will carry out the nuclear weapons mission in the long term. The EM program, on the other hand, is directed at alternative strategies and policies for conducting DOE-wide EM waste management and environmental restoration activities. The volume of wastes to be generated by future operation of the Complex is a relatively small portion of the waste to be considered in the EM PEIS. The volume associated with nonnuclear activities is even smaller.

For a short time after generation, DP wastes are managed by the generating facility, while longer-term management of wastes is performed under the auspices of EM. The DP mission provides for the management of wastes, including finding means to minimize waste generation, until DOE either disposes of the wastes or places them in long-term storage. Consequently, this EA provides waste management assessments based on the projected waste types and waste volumes resulting from the implementation and operation of the Proposed Action and alternatives; the waste treatment, storage, and disposal facilities required to manage these wastes; the current waste types and waste volumes generated; and, the existing and planned treatment, storage, and disposal facilities.

1.5 Time Period Considered in Analysis

If DOE issues a final determination of a FONSI in mid-1993, building modifications and equipment installation would begin immediately and proceed through 1995. Operations of most functions at receiver sites would be phased in over a 3-year period beginning in late 1994, with full operations achieved around 1997. However, some validation activities could continue beyond this date; therefore, for the purposes of environmental analysis, the year 2000 has been assumed as the year of peak operations. It was also assumed that the useful life of the facilities would allow operations to continue until the middle of the 21st century.

1.6 Background

The proposal for Complex 21, including consolidation of nonnuclear activities, has been in development for several years. This section presents a summary of the plans and reports completed to develop the nonnuclear consolidation proposal, and details the foundation on which the nonnuclear proposal is based. Section 1.6.1 summarizes the background of Complex reconfiguration beginning with the direction from Congress to complete a study and plan for modernization of the Complex through the preparation of the Nonnuclear Consolidation Plan (NCP). Section 1.6.2 describes the basis for nonnuclear consolidation as presented in the NCP and the modifications that have been made due to changing world events and additional detailed studies. The resulting revised basis for nonnuclear consolidation is then described. This is the basis for the activities that make up the nonnuclear consolidation proposal which is assessed in the EA.

1.6.1 Summary of Reconfiguration Planning

Recognizing that a comprehensive approach was needed to address current problems of the Complex, Congress directed, in the National Defense Authorization Act for Fiscal Years 1988/1989 (P.L. 100-180), that a study be conducted and a plan be prepared for modernizing the Complex, taking into account the overall size, productive capacity, technology base, and investment strategy necessary to support long-term security objectives. The product of that study, entitled the Nuclear Weapons Complex Modernization Report (Modernization Report) (DOE, 1989), was submitted to Congress on January 12, 1989. It called for extensive modernization of facilities over a 15- to 20-year period. The report also called for a major environmental restoration and waste management program.

Fundamental changes in DOE policy direction and in the structure of international political and military forces raised questions about the continued validity of assumptions underlying the Modernization Report and the adequacy of proposed solutions for the more serious problems of the Complex. Consequently, in September 1989, former Secretary Watkins ordered the establishment of a Modernization Review Committee to reexamine the modernization issue. The committee was directed to review the assumptions and recommendations of the original Modernization Report; assess the capacity and capability requirements of the Complex; and review the processes by which immediate and future requirements for maintaining, updating, and cleaning up the Complex are developed.

In August 1990, the Secretary reviewed the progress of the study and issued additional guidance focusing the analysis on the realities of the emerging international security environment. This ensured flexibility to accommodate the likely range of deterrent contingencies and emphasized the objective of achieving a Complex that is smaller, less diverse, and less expensive to operate than the current Complex. Subsequently, the Modernization Review Committee was redesignated the Complex Reconfiguration Committee. The Committee's product, the Nuclear Weapons Complex Reconfiguration Study (Reconfiguration Study) (DOE, 1991e), was published in February 1991 and replaced the January 1989 Modernization Report.

The Reconfiguration Study presented an overview of problems within the Complex; outlined a vision of the future Complex, including potential configurations and transitional activities; and described a process for a future Secretarial decision on whether and how to reconfigure the Complex. In preparing the Reconfiguration Study, the Complex Reconfiguration Committee focused on six major areas: stockpile sizing criteria; environment, safety and health (ES&H); Complex configuration; management structure; capital asset management; and the PEIS. Separate study teams, formed for each major area, produced analyses and recommendations. The PEIS Study Team developed a NEPA strategy for reconfiguration, including investigation of the scope and proposed content of the PEIS and any subsequent project-specific EISs. This effort was coordinated with other DOE projects and activities that involve NEPA documentation pertinent to reconfiguration to avoid potential duplications and future conflicts. To assist with the reconfiguration planning process, DOE chartered several internal panels and work groups. Of primary importance to this EA were the activities of the Privatization Planning Panel and the NCP Work Group.

The Privatization Planning Panel was chartered in June 1990 to evaluate nonnuclear functions and identify those functions that could be provided more cost-effectively through the private sector. The panel completed the first phase of its activities and prepared a report describing the privatization potential of DOE's nonnuclear products and manufacturing processes used in the Complex (DOE, 1991b). This document includes a list of processes and products that are candidates for privatization, and reports on the associated costs, benefits, and risks. The panel concluded that most of the activities that could be accomplished more economically by the private sector had already been privatized. Consequently, large-scale privatization was considered inappropriate in the absence of other consolidation decisions. Upon completion of this phase, DOE formed the NCP Work Group to develop a plan for consolidation of nonnuclear functions.

1.6.2 Basis for Nonnuclear Consolidation

At the height of the "Cold War" in the 1960's and 1970's, the Complex was required to support a very large stockpile of weapons to meet nuclear deterrence requirements set forth in the annual Nuclear Weapons Stockpile Memorandum signed by the President. To support such a large number of weapons, in turn, required large facilities, utilizing multiple production lines and employing workers on multiple shifts to: keep up with the required new weapons manufacturing rate; perform surveillance on and repair or replace weapons components as necessary to maintain the stockpile; and retire the weapons and components that were being replaced. Thus, the capacity of these large facilities was fully utilized to meet the then-current requirements.

In the mid-to-late 1980's, the United States and the former Soviet Union reached agreement on the START I and Intermediate Nuclear Force Treaties, which contained substantial cuts in the nuclear forces of both sides. Then, with the fall of Communist governments in Eastern Europe and the breakup of the former Soviet Union, the tensions of the Cold War eased and United States and Russian leaders began to talk seriously about further significant cuts in the nuclear weapons stockpiles of each side. As a result of these events, Complex facilities in general, and nonnuclear manufacturing facilities in particular, were required to produce far fewer weapons components. This, in turn, resulted in a change from three-shift-per-day operations, which fully utilized the capacity of several production lines, to single-shift operations, which in some instances did not even fully utilize the capacity of a single production line.

It was against this background that the reconfiguration planning described in section 1.6.1 was completed, and the NCP Work Group was chartered to develop a plan with recommendations for consolidation of the nonnuclear manufacturing facilities at a single site as a first step in making the Complex smaller, less diverse, and less expensive to operate. The team began its effort in April 1991 and completed the NCP in September 1991 (DOE, 1991f). During the course of preparing its recommendations, the team identified the basic capabilities and technologies required to manufacture the great variety of nonnuclear components necessary to build the weapons that are part of the enduring nuclear weapons stockpile. These capabilities also support the Stockpile Evaluation Program, the periodic replacement of limited-life components, and the repair or replacement of weapons components or subsystems as needed to maintain and upgrade stockpile reliability, safety, and security.

At the time that the NCP was prepared, there were ten different types of nuclear weapons that were projected to remain in the enduring stockpile, and the production rate for each manufacturing facility was based upon the workload defined in the then-current Production and Planning Directive 91-0. A Production and Planning Directive is a document derived from the President's Nuclear Weapons Stockpile Memorandum that authorizes the production and retirement of nuclear warheads and components. In this regard, the workload content can vary significantly from one weapon type to another due to the complexity of the design and whether it is a warhead or a bomb. Production and Planning Directive 91-0, which was the basis for the NCP analysis, involved a workload that was substantially below the requirements of the recent past and did not fully utilize the space or personnel available in the nonnuclear manufacturing facilities.

At the time the NCP was written, 182 separate technology base capabilities were required at the primary consolidation site to maintain the ten weapons types in the stockpile at the time. Three million square feet of floor space were required to accommodate these capabilities. Technology base capabilities are comprised of the minimum necessary facilities, equipment, and skills to manufacture each weapon type in the stockpile, regardless of the specific number of individual weapons required. Thus, for example, a specific number of base capabilities is required for a particular weapons system. Many capabilities are common to more than one weapons type. However, if the production rate is low, the annual capacity of the facility to produce components on a single-shift basis may be much higher than the number of units the facility is actually required to build. When this situation occurs, it is said that the space and personnel requirements for the facility are "capability-driven" rather than "capacity-driven." Once the production rate drops below the single-shift capacity of the facility, further reductions in production requirements have very little effect on required floorspace and personnel. This is exactly the situation that existed in the Complex when the NCP was prepared.

Of the 182 required technology base capabilities, 165 of these were already located at the Kansas City facility. The other 17 would be transferred from Mound, Pinellas, and RFP to KCP if the preferred alternative were selected (DOE, 1993a). The NCP team estimated a post-consolidation workforce requirement at the primary consolidation site of approximately 6,000 workers. After an analysis of six different candidate sites for consolidation against the performance measures described in section 1.8 of this EA, the team's recommendation was that KCP represented the best consolidation alternative for the necessary technology base capabilities. This conclusion was reached primarily because no new construction was necessary and far fewer component/technology transfers were required for the KCP alternative, making the cost to consolidate, payback time, and technical risk substantially lower than at any of the other sites considered.

Following the completion of the NCP, the President announced unilateral arms reduction initiatives in September 1991 and in his January 1992 State of the Union address. These two initiatives resulted in significant reductions in the Nation's nuclear weapons stockpile, including a reduction of weapons systems in the stockpile from ten to six. Subsequent to these announcements, DOE prepared an addendum to the NCP to address the impact of these reductions in the stockpile on the conclusions in the NCP. Significantly, despite a 52-percent reduction in the production rate assumed in the NCP, total floor space requirements were reduced by only 5 percent (to approximately 2.9 million square feet), and only 3 of the 182 required technology base capabilities were rendered unnecessary as a result of the President's initiatives. [The complete current list of separate technology base capabilities required to maintain the six weapons systems in the enduring stockpile can be found in appendix C of the Cost Effectiveness Report] (DOE, 1993a). This is because, as described previously, the NCP had already been based upon a workload that resulted in the facilities being capability-driven rather than capacity-driven. Therefore, the further reductions announced by the President had only a very minor impact on the number of base capabilities and amount of manufacturing floorspace required.

With regard to personnel requirements, the addendum to the NCP indicated that the minimum required personnel level based upon lower production rates than those assumed in the NCP was 5,000 people, a 17-percent reduction from the level in the NCP.

Subsequent to the March 1992 publication of the NCP and the addendum, the nonnuclear consolidation proposal was further refined through the preparation of Conceptual Design Reports (CDR) for the sites that would be receiving relocated technology base capabilities if the consolidation proposal were adopted. After the CDR process was begun, the Bush/Yeltsin arms reduction agreement was signed in June 1992. This agreement became the basis for the recent START II Treaty signed by the two leaders in January 1993. START II will result in yet another significant reduction in the nuclear weapons stockpiles of both nations. As a result, there are certain components for which there will be few, if any, production requirements at all for a number of years following consolidation, e.g. neutron generators and high-power detonators. Nevertheless, as described below, the preferred alternative was modified to preserve these capabilities at the weapons laboratories, where the components are designed and prototyped and small quantities currently made for research and development purposes. Further, it was determined that certain components, for which there were little or no near-term production requirements, could be placed at SNL and private suppliers would be developed if and when new production requirements became identified.

The CDRs prepared for the receiver sites take into account the impact of START II on floorspace and equipment requirements, and on required personnel levels. Because START II represented yet another reduction in the production rate required for the consolidated facilities, the workload will be even further below the annual single-shift capacity of the facilities. However, because the number of weapons types in the stockpile remained at six, the number of technology base capabilities has also remained at 179. Therefore, START II has had only a very minor effect on the floorspace, equipment, and personnel requirements. Specifically, floorspace requirements for the primary consolidation site have been reduced only from approximately 2.9 million square feet to approximately 2.8 million. Workforce requirements for the primary consolidation site have been reduced from 5,000 to approximately 4,700.

The above floorspace and workforce numbers represent the minimum requirements regardless of which site is considered as the primary consolidation site. This is based upon the fact that, taking START II into account, the foreseeable requirements for nonnuclear manufacturing, stockpile evaluation, limited-life component periodic replacements, and repair and replacement of components and subsystems in the enduring stockpile will continue to require 179 technology base capabilities. This EA uses these requirements as the basis for analysis of each alternative. However, it is important to note that, given the already low production level that was the basis for the NCP, the analyses and conclusions in this EA are insensitive to, and do not depend upon, whether NCP or post-START II work levels are assumed.

The Proposed Action presented in this document differs somewhat from the Proposed Action published in the Federal Register of January 27, 1992. The changes resulted from an evaluation of options that emerged as the impact of future workload reductions became better defined and the advantages of utilizing the existing RD&T technology base and prototyping capabilities of the national laboratories became apparent. The Proposed Action changes, and the reasons for them, are as follows:

- Performing neutron tube target loading in existing tritium facilities at LANL, instead of the RTF at SRS, could be effected at a lower cost and would provide for the retention of critical skills in the RD&T technology base.
- Fabrication of high-power detonators in the existing prototyping facility at LANL, instead of developing production capability at the Pantex Plant, could be accomplished at lower cost due to no new construction and would ensure the retention of critical skills.
- Enhancing the existing beryllium technology and pit support capability at LANL has been added as the preferred action, due to potentially lower costs and the benefits of utilizing the existing RD&T technology base. As an option, the existing capability at Y-12 instead of at LANL would be enhanced for this purpose.
- The functions of cap assembly manufacture, thermal battery technology base, and milliwatt heat source surveillance activities have been added to the technology base at SNL. Calorimeter fabrication has been added to the existing technology base at LANL. These would reduce costs and capture the capabilities of the existing technology base for those items.

1.7 Issue Identification Process

Issue identification for this EA was accomplished as part of the larger scoping process for the reconfiguration program. Scoping activities consisted of both internal DOE scoping and public scoping. Internal DOE scoping began with expert working groups that produced the studies that led to the Modernization Report and continued through the Reconfiguration Study. Upon publication of the completed Reconfiguration Study, DOE published an NOI in the Federal Register (56 FR 5590) on February 11, 1991, to prepare the PEIS. The NOI, which was reproduced in the PEIS Implementation Plan (DOE, 1992d), marked the beginning of the public scoping phase, which ran through September 30, 1991.

Public meetings were conducted at 15 locations across the country (figure 1.7-1) to allow interested parties to speak and present information. Meetings occurred in the vicinity of all sites that could be affected by nonnuclear consolidation. All comments received through public scoping were systematically organized and reviewed for consideration during the preparation of both the PEIS and this EA. (A comment is defined as a single statement or point of discussion concerning a specific topic raised by an individual.) An extensive summary of all comments received during the public scoping process was published in the Implementation Plan (DOE, 1992d).

During the public scoping process, DOE received a total of 36,984 comments from 16,542 members of the public; representatives of interest groups; and Federal, state, and local officials. Most of the comments (98 percent) were provided by citizens or individuals affiliated with or representing more than 50 interest groups. Of the total comments received, 4,869 were spoken and recorded at public scoping meetings and 32,115 were written and submitted at scoping meetings or received by mail. The total number of comments includes 28,838 comments received via 19 different types of preprinted postcards, form letters, or petition campaigns involving a total of 13,401 participants.

DOE received a total of 432 comments specifically related to consolidation of nonnuclear functions. Comments covered a range of environmental and policy-related issues including environmental health, economic impacts of plant closures on local communities, worker and public health and safety, hazardous materials management, surface and groundwater contamination, population encroachment, and privatization of nonnuclear functions. A review of the comments received was conducted to identify issues to be analyzed in this EA and issues that are either not relevant or outside the scope of this EA. This review, along with internal DOE studies and the CEQ and DOE requirements for implementing NEPA, established the scope of study.

The following issues are addressed in this EA through analyses for each potentially affected site:

- Land resources
- Air quality and acoustics
- Water resources
- Geology and soils
- Biotic resources
- Cultural resources
- Socioeconomics
- Waste management
- Human health

In addition to analyses conducted for each site, this EA also provides an overview of D&D requirements and discusses intersite transportation issues. However, D&D is not part of this Proposed Action. At such time as there is a specific proposal to decontaminate and decommission surplus facilities which may be closed out, separate NEPA documentation would be required.

1.8 Nonnuclear Consolidation Alternatives

In developing nonnuclear consolidation alternatives, the NCP considered all sites that currently perform nonnuclear manufacturing functions as candidates for the consolidated nonnuclear mission: KCP, Mound, Pinellas, RFP, Y-12, and the Pantex Plant (Pantex) near Amarillo, TX. The NCP assessed nonnuclear manufacturing functions in three groups:

- Candidates for transfer to a primary consolidation site (30 functions currently at KCP, 4 at Mound, 9 at Pinellas, and 3 at RFP).
- Candidates for transfer to other sites (7 functions currently at Mound, 3 at Pinellas, and 1 at RFP).
- Candidates for privatization (14 functions currently at KCP, 6 at Mound, 2 at Pinellas, 5 at RFP, and 1 at Y-12).

Each of the 6 potential consolidation sites was rated using 10 performance measures within 4 categories as shown in table 1.8-1. Through this analysis, KCP ranked first in each of the 4 categories and was selected as the preferred consolidation site (i.e., the Proposed Action). Pinellas ranked second in 2 categories; Mound in 1 category; and Pinellas, Mound, and RFP tied for second in 1 of the 4 categories. Y-12 and Pantex ranked last in all four categories.

Y-12 and Pantex have since been eliminated from further study as primary consolidation sites. Mound, Pinellas, and RFP have been retained for analysis in this EA, along with No Action, as alternatives to the proposed consolidation at KCP.

As described in section 1.6.2, the workload requirements have decreased since the NCP was prepared. Therefore, the alternatives evaluated in this EA vary somewhat from those presented in the NCP. The basic mission changes that would occur with the Proposed Action and alternatives are illustrated in figures 1.8-1 and 1.8-2, respectively. Complete descriptions of the Proposed Action and its alternatives, including the No Action alternative, are provided in chapter 3.

Many nonnuclear weapons components are manufactured and supplied by the private sector. Efforts to privatize certain activities now performed at Complex plants would continue with the Proposed Action and alternatives. Where practical and cost-effective, DOE may transfer the manufacture of some additional selected products to the private sector under existing procurement procedures. Several items now manufactured at Mound, Pinellas, and KCP will be included in DOE's Manufacturing Development Engineering Program and would be candidates for privatization rather than consolidation. The Manufacturing Development Engineering concept would allow weapons components to be manufactured by a private vendor with existing manufacturing capabilities. The DOE weapons design laboratories would provide backup technology support and limited prototyping capabilities as needed. The nonnuclear consolidation proposal does not include components currently manufactured by the private sector or those that will be privatized under the Manufacturing Development Engineering Program. In addition, certain nonnuclear manufacturing functions involving depleted uranium, currently performed at RFP, are scheduled to be phased out prior to 1995 and are not included. Nonnuclear functions currently at Y-12 and Pantex are also not included in this consolidation proposal because they are integral to other nuclear functions performed at these sites. Consolidation of these functions will be assessed in the PEIS as part of the larger reconfiguration program. Environmental restoration activities, other investigation and cleanup programs, and facility D&D activities conducted at nonnuclear consolidation sites under the DOE are not part of this proposal and are therefore not discussed in detail in this EA.

In addition to the NCP, DOE conducted a separate study (DOE, 1992b) to assess two-site consolidation alternatives. Because this alternative would not meet program objectives of reducing long-term costs and preserving technical competence that could be achieved by a single consolidation site, no further analysis has been performed in this EA. DOE also considered but eliminated, because of cost and proximity to a large population, an alternative to consolidate most tritium processing activities at Mound instead of SRS. Additional information about these alternatives is presented in chapter 3, section 3.1.4.

1.9 Method of Analysis

The study methodology used in this EA builds upon environmental analyses conducted for each of the potentially affected DOE sites. The affected environment is described for each environmental resource that may be disturbed by nonnuclear consolidation activities. The geographic study area evaluated is consistent with the requirements of each resource. In all cases, the area is large enough to include possible direct and indirect impacts of consolidation activities. For each environmental resource, the study area depends upon the nature of the resource and how it may be affected by the project.

The existing environmental conditions are described for each of the affected sites and their study area. However, the characterization of the affected environment is not limited to existing conditions. Rather, the environmental baseline includes reasonably foreseeable changes that would be expected with the No Action alternative. The basis for static or changing environmental conditions during the baseline period is discussed. For example, certain functions may go into standby mode under No Action as a result of reduced workloads. In this case, the environmental effects of existing operations would decrease for some resource areas such as air quality and water resources.

For all Proposed Action sites, the level of analytical detail provided in this EA is sufficient to support site-specific decisions. The descriptions are no longer than necessary to understand the effects of the alternatives on the environment (40 CFR 1502.15). To avoid repetition, those effects that are the same under multiple alternatives are discussed once and subsequently referenced.

For each site, the environmental consequences of the proposed consolidation actions (figures 1.8-1 and 1.8-2) were evaluated. Potential environmental consequences of nonnuclear consolidation were evaluated by first analyzing No Action conditions and then assessing environmental effects associated with the alternatives. Environmental consequences at consolidation and closeout sites could be driven by key aspects of the alternatives during either the implementation or operation phases, such as the following:

- Land area disturbances.
- Resource requirements, including water and construction materials.
- Project employment.
- Air emissions, wastewater effluent, and other waste streams.
- Process technologies and possible associated accidents that could have environmental effects.

For each site, parameters associated with these impact drivers were analyzed to represent the effects of the functions that could be located there.

1.10 Organization of the EA

This EA is divided into two volumes: Volume I contains the Executive Summary and EA. The Executive Summary summarizes the Nonnuclear Consolidation Proposal and alternatives, and the Proposed Action impacts on the environment. The EA, which in part relies on the more detailed information presented in the appendixes, discusses the Nonnuclear Consolidation Proposal, the alternatives, and the existing conditions and impacts of the Proposed Action and alternatives. The EA Executive Summary is also available as a separate publication.

Volume II contains the Nonnuclear Consolidation EA technical and support appendixes. These appendixes provide technical support for the analysis in Volume I and also responses to Federal agencies, states, and Native American comments received during the review period of the Preapproval Review Copy of the EA in December 1992.

This EA has been prepared in accordance with CEQ regulations 40 CFR 1501.4(b) and 1508.9(a) and the DOE NEPA regulations 57 FR 15122, April 24, 1992, to be codified at 10 CFR 1021. The organization of the remainder of this document is as follows:

- Chapter 2 describes the purpose of and need for the nonnuclear consolidation proposal.
- Chapter 3 describes the Proposed Action and consolidation alternatives and includes a summary of consolidation alternatives and current operations at existing sites.
- Chapter 4 discusses the affected environment at each site and the environmental consequences of the Proposed Action and alternatives. The analysis of the Proposed Action includes the effects of closing out the Complex manufacturing mission at Mound and Pinellas and the nonnuclear missions at RFP. This chapter also includes an analysis of the Mound, Pinellas and RFP consolidation site alternatives. A discussion of intersite transportation and a brief discussion of considerations related to D&D are presented at the end of the chapter.
- Chapter 5 presents environmental compliance and permit requirements associated with the nonnuclear consolidation proposal.

The remainder of this document includes a list of cited references, a glossary, a list of individuals who prepared the EA, and the persons and agencies consulted. The citations that appear in parentheses throughout the document correspond to the reference list on page R-1. These citations refer to the documents that provided information for this EA.

2 PURPOSE AND NEED

2.1 Purpose of and Need for Reconfiguration

The Department of Energy (DOE) has proposed to reconfigure the Nuclear Weapons Complex (Complex) to be smaller, less diverse, and less expensive to operate than the Complex of today. The Complex must be able to safely and reliably support whatever nuclear deterrent stockpile objectives are established in the future by the President and Congress.

Reconfiguration is needed because the Nation's nuclear weapons requirements are not as great as in the past, and maintaining the existing large, outdated infrastructure is not an effective use of national resources. The need for reconfiguration is driven by the smaller weapons stockpile sizes anticipated for the foreseeable future; the need to replace oversized, aging, or obsolete facilities; and the long-term savings to be achieved by terminating the Complex mission at sites where feasible.

With the DOE proposal to reduce the size of the Complex and produce fewer weapons comes the need to ensure that the Complex maintains a core of skilled, knowledgeable people and appropriate facilities. Technical competency-the ability to replicate and improve upon our national experience to design, produce, and maintain reliable nuclear devices-enables the U.S. to safely dismantle nuclear weapons; provide effective surveillance of weapons remaining in the stockpile; understand the weapons systems of other countries; and meet future design, testing, and production needs. The Nation has accumulated a storehouse of knowledge during the past 50 years regarding the physics of nuclear energy; the design, operation, and testing of nuclear weapons; the safe and reliable manufacture of weapons; the potential hazards associated with nuclear materials and their manufacturing processes and waste products; and the amelioration of these hazards. For the most part, that expertise rests within the Complex. Reconfiguration provides a means to ensure that this technical competency is maintained well into the next century.

Recent Presidential initiatives to reduce the number and types of nuclear weapons in the national weapons stockpile and the Strategic Arms Reduction Talks (START) II Treaty have resulted in a reduction in the number of weapon types in the stockpile, and a cessation of new weapons production. This means that there will be substantially reduced weapons workload requirements for the foreseeable future. Significant reductions in staffing at Complex facilities have already occurred and will continue, regardless of whether DOE proceeds with nonnuclear consolidation. Activities at some facilities might, within the next few years, be candidates for termination even without nonnuclear consolidation because there will be no production requirement for certain components for a number of years.

The production capabilities of Complex 21 facilities, including nonnuclear manufacturing, will be based upon future production rates and the requirement to maintain specific capabilities. Future weapons production rates have been developed by DOE and the Department of Defense (DOD), and approved by the Nuclear Weapons Council. At the low workload levels envisioned for Complex 21, the basic capability required for stockpile maintenance and new production would provide a capacity larger than required to meet the desired production rates. Therefore, plant size and workforce would be based on the technology base capabilities required in the Complex as discussed in section 1.6.2. The environmental analyses presented in this document were based on full use of these technology base capabilities.

2.2 Guiding Principles

The Secretary of Energy (Secretary) has directed that certain principles be used to guide the reconfiguration of the Complex (DOE, 1991d). These principles are to:

- Emphasize compliance with laws, regulations, and accepted practices regarding protection of the environment, health, and safety of the public and the Complex workers, and security.
- Safely and reliably maintain the weapons stockpile directed by the President and funded by the Congress.

- Minimize the costs associated with the weapons stockpile.
- Minimize the number of weapons production sites and the size of individual sites.
- Maximize transfer of nonnuclear materials production activities to the private sector, to the extent economically justified.
- Maintain redundancy in key capabilities that, if lost, could significantly and rapidly degrade the effectiveness of the Complex.
- Emphasize the use of modular construction to promote minimum environment, safety, and health (ES&H) impacts and maximum flexibility to increase Complex capacity should a requirement arise.
- Identify sites that may be transferred to the Office of Environmental Restoration & Waste Management (EM) for eventual decommissioning, or converted to inactive standby status, while ensuring flexibility to respond to potential arms control breakouts.
- Maintain the capability to decommission the large number of weapons expected to be retired during stockpile downsizing or replacement.

2.3 Purpose of and Need for Nonnuclear Consolidation

Nonnuclear consolidation is a subproposal of the larger reconfiguration proposal. As such, nonnuclear consolidation would serve the same purpose and be triggered by the same need as the reconfiguration proposal. More specifically, the purpose of nonnuclear consolidation is to effect better management of nonnuclear manufacturing activities within the Complex, and to decrease the long-term operating costs of this aspect of the Complex. In addition, consolidation would provide DOE with a mechanism to maintain the specialized skills base necessary to produce and test the nonnuclear components.

DOE proposes to accomplish this consolidation by closing out the Complex activities at two plants, Mound and Pinellas, together with certain nonnuclear work at the Rocky Flats Plant (RFP). The nonnuclear electrical and mechanical manufacturing functions would be consolidated at one site, the Kansas City Plant (KCP), and some specialized manufacturing activities would be combined with similar activities at other facilities within the Complex. The existing research, development, and testing (RD&T) and prototype fabrication capability at two of the national laboratories would be enhanced to provide certain weapons fabrication capabilities now located at Mound, Pinellas, and RFP. The current weapons manufacturing workload would be downsized to meet lower workload projections. The government-owned, contractor-operated Complex facilities at Mound and Pinellas and the nonnuclear facilities at RFP would be turned over to DOE EM for cleanup, restoration, or decontamination and decommissioning (D&D) as appropriate. As stated in chapter 1, the latter activities are not part of this proposal, but will be the subject of separate National Environmental Policy Act (NEPA) documentation when specific proposals for those activities are made.

Consolidating nonnuclear facilities at the preferred alternative site will accomplish three objectives: (1) it will size the nonnuclear manufacturing facilities to meet the requirements of the foreseeable workload; (2) it will combine functions that use similar technologies to provide a sufficient workload for maintaining a well-trained and qualified workforce; and, (3) it will reduce operating costs to achieve a near-term savings well in excess of $100 million a year and long-term savings in excess of one-quarter of a billion dollars annually (DOE, 1993a). Maintaining the existing large Complex would require maintaining similar nonnuclear expertise at multiple sites with little or no workload, which is already beginning to result in atrophy and attrition of technical skills and increased costs. Consolidating similar nonnuclear manufacturing operations could serve as a mechanism to maintain the skills and preserve the competencies of the workforce. Similarly, where workload projects are very low, collocating some nonnuclear manufacturing capabilities with similar RD&T capabilities at the national laboratories would serve as a mechanism to maintain or sharpen skills of the workforce.

2.4 Need for Nonnuclear Capabilities

The products and services of the Complex are needed to design and manufacture nuclear weapons and test individual components. The Complex needs to maintain a nonnuclear capability in order to be able to manufacture the nonnuclear components of nuclear weapons, and to test and monitor other components.

A typical nuclear device contains approximately 6,000 individual components. Of these, approximately 300 are considered "nuclear components." These nuclear components include the primary and secondary systems of a nuclear device and directly related subsystems. They are made of special nuclear materials (isotopes of uranium and plutonium) and other materials (such as beryllium, lithium salts, and high explosives). The remaining components are the nonnuclear components, some of which contain small amounts of tritium. Delivery systems for a nuclear device, such as the shell of a missile, are manufactured by DOD and its contractors and are not part of the proposal considered in this Environmental Assessment (EA).

The Complex has already attained a high degree of privatization. Most of the activities that could be accomplished more economically by the private sector are already being procured. The nonnuclear consolidation proposal does not include components currently manufactured by the private sector. The remainder of the nonnuclear components are manufactured in the government-owned, contractor-operated manufacturing facilities that make up the nonnuclear element of the Complex. Consolidating these manufacturing activities makes up the proposal analyzed in this EA. Where practical and cost effective, DOE may transfer the manufacture of some additional selected products to the private sector under existing procurement procedures; however, the nonnuclear consolidation proposal does not include any such speculative transfers since further privatization would likely be inhibited by the low manufacturing workload that is anticipated in the future.

The Complex also produces products at Mound for programs under the direction of other organizations within DOE. Those products utilized by the Complex, such as calorimeters, have been included in this EA regardless of the organization responsible for production. Those products that are not utilized for weapons manufacture, such as Radioisotopic Thermoelectric Generators and isotope separation and sales, are not part of this proposal. The removal of the weapons production mission from Mound will not necessarily result in a requirement to transfer manufacture of products sponsored by non-Defense Programs organizations to other sites since a support infrastructure would remain as DOE continues ongoing cleanup activities and D&D at these sites.

3 PROPOSED ACTION AND ALTERNATIVES

3.1 Summary of Consolidation Alternatives

The alternatives considered reasonable for consolidating the nonnuclear manufacturing capabilities of the Nuclear Weapons Complex (Complex) were introduced in section 1.8 and are summarized in this section. As shown in table 3.1-1, these alternatives include the Proposed Action-consolidation of nonnuclear functions at the Kansas City Plant (KCP); the alternatives for consolidation at either the Mound Plant (Mound), the Pinellas Plant (Pinellas), or the Rocky Flats Plants (RFP); and No Action-retain existing missions at current sites. Alternatives considered but eliminated from further analysis are also discussed.

3.1.1 Proposed Action-Kansas City Plant Consolidation

The Department of Energy (DOE) proposes to close out the weapons manufacturing missions at Mound and Pinellas, and the nonnuclear manufacturing mission at RFP. These activities would be relocated to KCP, Los Alamos National Laboratory (LANL), and Sandia National Laboratories, New Mexico (SNL) as described below. Enhanced research, development, and testing (RD&T) and prototype fabrication capability at the laboratories would be provided to replace certain weapon production capabilities now located at Mound, Pinellas, and RFP. The remaining nonnuclear manufacturing functions would be consolidated at KCP, and the weapons manufacturing workload currently at KCP would be reduced. The Proposed Action would result in: the consolidation of the nonnuclear electrical/mechanical manufacturing capabilities of the Complex at KCP; tritium-handling capabilities at the Savannah River Site (SRS) and LANL; detonator capabilities at LANL; and beryllium technology and pit support functions at LANL or, as an option, at the Y-12 Plant (Y-12). The existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for future neutron generator work, cap assemblies, and other nonnuclear components. Detailed explanations of all functions associated with nonnuclear consolidation are provided in section 3.2 within the existing site descriptions.

The following actions are proposed:

- Mission CloseoutsÄThe Complex missions at Mound and Pinellas and the nonnuclear Complex mission at RFP would be terminated.
- Electrical/MechanicalÄThe nonnuclear electrical/mechanical capabilities now at Mound, Pinellas, and RFP would be consolidated at KCP. KCP currently has manufacturing capabilities similar to those proposed for transfer and has adequate space in its existing facilities to accept them.
- Tritium HandlingÄAll tritium-handling capabilities now performed at Mound would be relocated to SRS and collocated with the tritium functions now performed there. The neutron tube target loading for the current design of neutron generators, now performed at Pinellas, would be completed and capability for future requirements would be provided at existing facilities at LANL.
- DetonatorsÄThe existing RD&T and prototyping capability at LANL would be enhanced to provide a limited manufacturing capability for high-power detonators, now done at Mound. (The existing RD&T technology base for low-power explosives components would be maintained at SNL; the existing capability at Mound to manufacture these components is no longer needed. This is the same as the No Action alternative.)
- Beryllium Technology and Pit SupportÄThe existing technology base and prototyping capability at LANL would be enhanced to provide limited manufacturing capability for beryllium technology and pit support work now done at RFP. As an option, the existing capability at Y-12 instead of at LANL would be enhanced for this purpose.
- Neutron Generators, Cap Assemblies, and BatteriesÄManufacture of the current design of neutron generators at Pinellas would be completed. The existing technology base for neutron generators would be maintained at SNL. Existing RD&T and prototyping capability at SNL would be augmented to provide the necessary fabrication capability for future advanced design neutron generators. Manufacturing capability for cap assemblies would be relocated from Pinellas to existing facilities at SNL. The technology base now housed at Pinellas involved in the manufacture of thermal batteries would be transferred to existing facilities at SNL; manufacture of the batteries would continue to be performed by the private sector. The assembly of lithium ambient batteries from commercially acquired lithium cells would be transferred to KCP.
- Special ProductsÄThe nuclear grade steels procurement and storage capability, safe secure trailer manufacturing capability, weapons trainer shop, and metrology services would be transferred from RFP to KCP. The calorimeter manufacturing capability and milliwatt heat source surveillance activities would be relocated from Mound to existing facilities at LANL and SNL, respectively.

If the Proposed Action were implemented, Mound and Pinellas would no longer have a DOE weapons mission, and the facilities used to house Defense Programs (DP) mission activities at these locations would be turned over to the DOE Office of Environmental Restoration & Waste Management (EM) for decontamination and decommissioning (D&D) or restoration, if appropriate, as discussed in section 4.4. The DP nonnuclear mission at RFP would also be terminated, and associated nonnuclear facilities turned over to EM for disposition. The capabilities transferred to KCP, SRS, LANL, Y-12, and SNL would, for the most part, be integrated into the existing plant facilities with appropriate plant modifications and renovations.

3.1.2 Other Consolidation Alternatives

Other alternatives considered in this Environmental Assessment (EA) include the consolidation of nonnuclear manufacturing activities at Mound, Pinellas, or RFP. Consolidation of the nonnuclear functions at any of these sites would differ from the Proposed Action in that the consolidation site would retain all of its existing nonnuclear manufacturing capabilities and would receive additional nonnuclear manufacturing capabilities from the other sites. The specific actions associated with each of the three consolidation alternatives are discussed in the following paragraphs and shown in table 3.1-1.

3.1.2.1 Mound Plant Alternative

The following actions would take place if Mound were the consolidation site:

- Electrical/MechanicalÄ The nonnuclear electrical/mechanical manufacturing functions performed at KCP would be consolidated with those of Pinellas and RFP at Mound. Construction of new facilities at Mound to accommodate these additional functions would be required. KCP, Pinellas, and the nonnuclear facilities at RFP would be turned over to EM for disposition.
- Tritium HandlingÄ The tritium-handling capabilities at Pinellas would be relocated to LANL and collocated with similar functions there. Tritium-handling functions at Mound would not be transferred.
- DetonatorsÄ The high-power detonator capabilities at Mound would remain and would not be moved to LANL.

- Beryllium Technology and Pit SupportÄ Same as the Proposed Action except that there is no option to transfer these activities to Y-12.
- Neutron Generators, Cap Assemblies, and BatteriesÄ No change from the Proposed Action except for lithium ambient batteries, which would be transferred to Mound instead of to KCP.
- Special ProductsÄ The nuclear grade steels, safe secure trailers, weapons trainer shop, and metrology capabilities from RFP would be transferred to Mound instead of to KCP. The calorimeter manufacturing capabilities and milliwatt heat source surveillance activities would stay at Mound instead of being relocated to LANL and SNL.

3.1.2.2 Pinellas Plant Alternative

The following actions would take place if Pinellas were the consolidation site:

- Electrical/MechanicalÄ The nonnuclear electrical/mechanical manufacturing functions performed at KCP would be consolidated with those of Mound and RFP at Pinellas. Construction of new facilities at Pinellas to accommodate these additional functions would be required. KCP, Mound, and the nonnuclear facilities at RFP would be turned over to EM for disposition.
- Tritium HandlingÄ The tritium-handling capabilities at Mound would be relocated to SRS and collocated with similar functions there. Tritium-handling functions at Pinellas would not be transferred.
- DetonatorsÄ No change from the Proposed Action.
- Beryllium Technology and Pit SupportÄ Same as the Proposed Action except that there is no option to transfer these activities to Y-12.
- Neutron Generators, Cap Assemblies, and BatteriesÄ These capabilities would remain at Pinellas and would not be relocated to SNL or KCP.
- Special ProductsÄ The nuclear grade steels, safe secure trailers, weapons trainer shop, and metrology capabilities from RFP would be transferred to Pinellas instead of to KCP. The calorimeter manufacturing capabilities and milliwatt heat source surveillance activities at Mound would be relocated to existing facilities at LANL and SNL, respectively.

3.1.2.3 Rocky Flats Plant Alternative

The following actions would take place if RFP were the consolidation site:

- Electrical/MechanicalÄ The nonnuclear electrical/mechanical manufacturing functions performed at KCP would be consolidated with those of Pinellas and Mound at RFP. Construction of new facilities at RFP to accommodate many of these additional functions would be required. KCP, Pinellas, and Mound would be turned over to EM for disposition.
- Tritium HandlingÄ No change from the Proposed Action.
- DetonatorsÄ No change from the Proposed Action.
- Beryllium Technology and Pit SupportÄ The beryllium technology and pit support capabilities located at RFP would remain and would not be moved to LANL.
- Neutron Generators, Cap Assemblies, and BatteriesÄ No change from the Proposed Action except for lithium ambient batteries, which would be transferred to RFP instead of to KCP.
- Special ProductsÄ The nuclear grade steels, safe secure trailers, weapons trainer shop, and metrology capabilities would remain at RFP. The calorimeter manufacturing capabilities and milliwatt heat source surveillance activities at Mound would be relocated to existing facilities at LANL and SNL, respectively.

3.1.3 No Action

Under No Action, the consolidation of nonnuclear functions would not occur. Planned upgrades, renovations, repairs, and maintenance activities necessary to improve Complex compliance with all environment, safety, and health (ES&H) and environmental restoration standards would continue irrespective of future Complex configuration. Mound, Pinellas, and RFP would retain their current nonnuclear manufacturing missions. However, because the projected workload would be substantially lower than requirements in the recent past (due to Presidential initiatives to downsize the weapons stockpile), many current facilities would be maintained in a standby mode due to lack of work. The existing missions at each site are described in detail in section 3.2.

Many nonnuclear weapons components are manufactured and supplied by the private sector. The nonnuclear consolidation proposal does not include components currently manufactured by the private sector. Where practical and cost effective, DOE may transfer the manufacture of some additional products to the private sector under existing procurement procedures.

Privatization of certain components would continue under all alternatives and is not analyzed in this EA. Certain new privatization actions would be taken under the Manufacturing Development Engineering concept being developed by SNL.

In the Manufacturing Development Engineering concept, SNL, as the laboratory responsible for the design of nonnuclear parts or components, would work directly with private sector production plants. This means that SNL would be responsible for identifying and developing private suppliers and maintaining technology transfer programs for nonnuclear components. SNL would take on increased involvement in process design and manufacturing engineering in addition to its traditional research, development, and design activities. SNL would also provide a backup fabrication capability in the event that the product could no longer be provided commercially. The Manufacturing Development Engineering concept has recently become much more attractive due to the latest workload reductions resulting from the President's stockpile reduction initiative of June 1992. This initiative has made the nonnuclear fabrication capacity requirements small enough so that backup capacity can be adequately provided in the laboratory development area rather than by maintaining a dedicated backup area at a government-owned, contractor-operated weapons production plant.

Several of the items being considered for privatization may be included in the Manufacturing Development Engineering program and would be privatized rather than consolidated. Activities now ongoing at KCP, Pinellas, and Mound that would be privatized through Manufacturing Development Engineering are listed in figure 3.1.3-1. No Action workforces at these sites would be further reduced if additional activities are added to the Manufacturing Development Engineering program.

3.1.4 Alternatives Considered But Eliminated From Further Analysis

The alternatives analyzed in this EA are based on the conclusions in the Nuclear Consolidation Plan (NCP). DOE considered a number of additional alternatives for nonnuclear consolidation, but eliminated them from further consideration because they are unreasonable from the standpoint of cost, technical risk, and time to implement. DOE considered and rejected as unreasonable alternatives that would: consolidate nonnuclear electrical/mechanical manufacturing functions at other sites (Y-12 and Pantex) previously evaluated in the NCP; consolidate nonnuclear electrical/mechanical manufacturing functions at any two of the current three dedicated nonnuclear plants (i.e., consolidation at Mound and Pinellas; KCP and Mound; or KCP and Pinellas); consolidate all nonnuclear manufacturing functions at a Complex nuclear site (other than those evaluated in the NCP) or at a national laboratory; and consolidate all tritium maintenance, processing, and storage activities currently performed at both Mound and SRS at Mound instead of at SRS.

In addition to the KCP, RFP, Mound, and Pinellas consolidation alternatives analyzed in this EA, the NCP also examined the alternatives of consolidation at Y-12 and Pantex. These sites conduct both nuclear and nonnuclear activities associated with the Complex. Y-12 and Pantex were evaluated based upon the same four categories and ten performance measures used to evaluate the other sites (see section 1.8). Based upon these performance measures, the overall ranking of these two sites as potential candidates for consolidation of nonnuclear manufacturing activities was well below any of the other sites examined in the NCP. This is because, for the performance measures evaluated, consolidation at either Y-12 or Pantex posed substantially greater technical risks, involved substantially greater consolidation cost, and resulted in substantially longer payback times than the other alternatives. Therefore, consolidation at either site would not meet the programmatic objectives of nonnuclear consolidation and are considered to be unreasonable alternatives.

To augment the evaluation of the single-site options discussed in the NCP, DOE prepared a Two-Site Nonnuclear Consolidation Study (Two-Site Study) (DOE, 1992b) to evaluate the option of consolidating nonnuclear electrical/mechanical functions at combinations of two sites. The two-site combinations considered were selected from the three dedicated nonnuclear manufacturing facilities. Thus, the site combinations evaluated were Mound and Pinellas, KCP and Mound, and KCP and Pinellas.

The annual operating and long-term costs for each of these combinations were compared with the costs of consolidating at KCP alone. Like the NCP, the Two-Site Study acknowledged that some individual manufacturing activities might be located at a site other than the primary consolidation sites (e.g., neutron generators at SNL).

In conducting the two-site cost comparisons, the study utilized not only the data from the NCP, but also more recent conceptual design report (CDR) data prepared to support nonnuclear consolidation activities. The Two-Site Study was completed in August 1992. In December 1992, an Addendum to the Two-Site Study was prepared to consider whether the revisions to the preferred alternative resulting from the Bush-Yeltsin arms reduction agreement (Strategic Arms Reduction Talks (START II)), which are discussed in this EA, affect the conclusions in the study. DOE concluded in the Addendum that the Bush-Yeltsin agreement makes the case for consolidation at KCP even more compelling.

DOE has determined that the two-site consolidation alternatives are unreasonable because of long-term costs and the difficulty in preserving technical competence in necessary technologies if single-site consolidation is not implemented. The Two-Site Study and its Addendum support the conclusion that consolidating most nonnuclear manufacturing activities at KCP would save from 1-1/2 billion to several billion dollars in life-cycle costs when compared to the two-site consolidation alternatives evaluated.

In addition to costs, an additional concern involves the preservation of specialized technical competence within the Complex in a time of shrinking workloads. National security considerations dictate that DOE maintain the capabilities necessary to ensure the viability of the enduring stockpile, even if no new weapons requirements are foreseen. These capabilities are needed to support the Stockpile Evaluation Program, limited life component exchanges, and the repair or replacement of weapons components to maintain and upgrade stockpile reliability, safety, and security. Experience has shown that even with no new weapons requirements, these activities must be maintained to deal with unanticipated design, production, or aging defects in stockpiled weapons requiring production of replacement components and subsystems.

Because the current and projected workload is substantially lower than that of recent years, technical competence is difficult to maintain because workers do not have the opportunity to apply their knowledge and skills to either components with which they have experience or components which require similar skills. This critical technical competence is already beginning to be lost, and the ability of the Complex to support, evaluate, and manufacture weapons is beginning to degrade. Low workload levels and resultant budget reductions have caused significant losses of skilled personnel and this reduced workload is dispersed in plants configured for large-scale production at previous "Cold War" levels, resulting in the loss of opportunities to exercise critical skills by the remaining workforce.

Consolidating like activities at a single site will ensure sufficient work to support a core workforce of technical and production personnel, enabling utilization and retention of key skills and technical capabilities needed to maintain the enduring stockpile. Consolidation at two sites would provide substantially less assurance that this programmatic objective would be achieved.

In addition, as the Addendum to the Two-Site Study explains, the Bush-Yeltsin arms reduction agreement has reduced even further the cost effectiveness involved in retaining neutron generator production at Pinellas, while increasing the technical risks. Thus, the KCP-Pinellas two-site consolidation option (which was the least costly of the two-site options evaluated in the study) has become even less attractive compared to single-site consolidation at KCP.

DOE has determined that, other than the sites considered in this EA, no other Complex sites would be reasonable for consolidating nonnuclear man-ufacturing activities. In order to maintain the viability of the enduring nuclear weapons stockpile, 179 discrete technologies are required, involving the manufacture of thousands of parts at the selected consolidation site. Of these, 162 technologies are already in use at KCP. Therefore, were consolidation to take place at KCP, very few technologies would have to be transferred from other sites. The technical risk, cost, and time to consolidate at a site where no nonnuclear manufacturing activities are now undertaken renders other site alternatives unreasonable.

The NCP also considered the alternative of consolidating nonnuclear manufacturing activities at each Complex site where nonnuclear manufacturing activities now occur, including RFP, Pantex, and Y-12, all of which are predominantly nuclear sites. For the reasons discussed above, neither Pantex nor Y-12 represents a reasonable alternative for consolidation of these activities. Consolidation at DOE nuclear sites other than Pantex or Y-12 would be subject to even greater technical risk, cost, and time-related obstacles, especially because consolidation at these sites (e.g., Idaho, Hanford, SRS) would require all nonnuclear manufacturing activities to be transferred. In addition, these sites have little or no experience in any of the technologies required for nonnuclear manufacturing activities.

Although the weapons laboratories (LANL, Lawrence Livermore National Laboratory (LLNL) and SNL) have experience with many of the nonnuclear manufacturing technologies and have designed the components and subsystems to be produced, they do not have recent practical experience manufacturing production quantities of most components and subsystems. In a few cases, DOE has determined that certain selected technologies can best be preserved at LANL or SNL as part of the Proposed Action (e.g., neutron generators and high-power detonators, for which there will be a long hiatus in production requirements due to workload reductions). However, the same reasoning does not hold true for the thousands of other parts that would have to be manufactured or procured if all nonnuclear manufacturing activities were consolidated at a laboratory. Manufacturing capability for these parts would have to be maintained on a continual basis to endure the viability of the enduring stockpile. This would require the transfer of a large number of technologies and the establishment of a base of experienced, trained, and skilled personnel where no such base now exists. Thus, the technical risk involved in consolidating at a laboratory would be significantly greater than for the other alternatives considered in the EA. In addition, given the large number of technologies to be transferred, the transfer cost (including construction of new facilities) would be much greater than consolidation at one of the sites analyzed in this EA. Transferring a large number of technologies and constructing new facilities would take more time, which would increase technical risk, particularly in view of the need for near-term consolidation to support the enduring stockpile and mitigate the loss of technical competence within the Complex. Consequently, DOE has determined that consolidation of all nonnuclear manufacturing activities at one of the weapons laboratories is an unreasonable alternative.

DOE has also assessed the comparative costs of consolidation at either Mound or SRS of tritium maintenance, processing, and storage activities now performed at these sites. These activities collectively involve hundreds of millions of curies of tritium. The cost study (DOE, 1992c) concluded that the life-cycle costs of consolidating such work at Mound would be nearly $2 billion greater than life-cycle consolidation costs at SRS.

In addition, DOE has assessed the comparative radiological risk to the public from consolidating the tritium activities discussed above at either Mound or SRS (DOE, 1992g). The assessment was based on a study of the quantitative risks of consolidated tritium activities for both normal operations and accident conditions. For both normal and accident conditions, the conclusion of the assessment is that the radiological risk to the population at either site from consolidated activities is very low.

Based on the conclusion of the cost study cited above, DOE has concluded that consolidation at Mound constitutes an unreasonable alternative for such consolidation. In addition, notwithstanding the low risk involved, DOE believes that it is not prudent to place hundreds of millions of additional curies of tritium in a densely populated urban area such as that surrounding Mound, especially when there exists the alternative of consolidating this material at SRS, a large site located away from a comparably densely populated area.

3.2 Current Operations at Existing Sites

This section discusses the current operations at each of the eight sites that could potentially be affected by the Proposed Action and alternatives. For each site, a brief description of the site and its location is presented. Discussions of each site's missions, facility/process description, waste management activities, and utility and resource requirements follow. Included under the facility/process description at each site is a discussion of safety and accident history. The activities conducted at each site involve unique applications of industrial processes utilizing hazardous, explosive, and, at some sites radioactive, materials. Both design and operating precautions are employed to reduce the probabilities of accidents and to mitigate the consequences of those which might occur. In developing the safety and accident sections, documents from each of the sites were reviewed for information on accidental releases of chemical or radioactive materials. The documents include "Unusual Occurrence Reports," "Annual Environmental Reports," and other sources providing accidental release information. Due to lower production levels, the time period of the review for the safety and accident sections (1986-1990) was chosen as being more representative of maximum future activity levels at the various sites. The results of these reviews are summarized for each site in subsequent sections.

3.2.1 Kansas City Plant

KCP is situated on approximately 141 acres of the 300-acre Bannister Federal Complex located within incorporated city limits 12 miles south of the downtown center of Kansas City, MO (figure 3.2.1-1). Of this area, 121 acres are allocated to DOE and 20 acres are on loan from the General Services Administration. The plant shares the Bannister Federal Complex site with other Federal agencies: the General Services Administration, the Department of Defense Finance and Accounting Service, the Federal Aviation Administration, the National Archives and Records Center, and the Internal Revenue Service, among others (KC ASAC, 1991a).

3.2.1.1 Kansas City Plant Missions

KCP is a government-owned, contractor-operated facility that produces and procures nonnuclear electrical, electronic, electromechanical, mechanical, plastic, and nonfissionable metal components for the DOE nuclear weapons program. Work is performed under a management and operating contract between AlliedSignal, Inc., and DOE (KC ASAC, 1991b).

KCP's primary missions are:

- Fabrication, assembly, and procurement of:
- Electrical and electronic components.
- Electromechanical and precision mechanisms.
- Rubber and plastics; foams and honeycomb components.
- Handling equipment and shipping containers.
- Telemetry equipment.
- Performance of:

- Product acceptance and field test equipment.
- Surveillance activities to ensure reliability of nuclear stockpile.
- Pollution prevention.
- Waste management.
- Maintenance of process capability program.
- Metal structures and general machining.
- Development and production engineering.

3.2.1.2 Facility/Process Description

KCP includes approximately 3.2 million square feet (ft 2) of various building space. The majority of this space is contained within four main buildings (figure 3.2.1-2).

The weapons-related operations at KCP covered by this EA are all electrical, mechanical, and plastic products. The specific manufacturing activities are presented in table 3.2.1-1. A more detailed discussion is presented in appendix A, section A.1.

KCP does not process special nuclear materials but does have a health physics program consistent with industrial radiography and electronic manufacturing.

The production workload at KCP has been declining over the past few years, and several reductions in the workforce have occurred. The workforce at the plant in September 1992 consisted of 4,473 employees (DOE, 1993c).

Effluents and Emissions. Operations at KCP discharge water containing trace amounts of unregulated naturally occurring radionuclide laboratory reagents. Pretreated industrial process wastewater and untreated sanitary wastewater are discharged to the Kansas City, MO, wastewater treatment plant. Wastewater effluent from current operations at KCP is discussed in section 4.1.1.3.

Operations at KCP result in the release of trace amounts of tritium resulting from broken tritium exit signs and gap tubes. KCP has multiple volatile organic compound (VOC) and fugitive sources from degreasing, cleaning, and surface-coating operations. KCP's four boilers are the primary sources of criteria air pollutants. Major hazardous air pollutant sources include the metal-plating facility, metal degreasing, wastewater treatment, and boiler operations. The concentrations of criteria and hazardous air pollutants (HAP) from current operations at KCP are discussed in section 4.1.1.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.1.

Safety and Accidents. The review of historical information at KCP indicated that during the period 1986-1990, three accidental releases occurred that resulted in hazardous material reaching offsite locations. However, these incidents resulted in no significant adverse impact. In 1987, about 10 to 15 gallons of perchloroethylene were released into the storm sewer system. This release was reported under the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Superfund Amendments and Reauthorization Act (SARA) because of the amount released. Analysis of samples at the affected outfall indicated perchloroethylene concentrations were less than the instrument detection limit of 0.005 milligrams per liter (mg/L). In 1990, 200-500 gallons of #6 fuel oil were discharged into an onsite drainage ditch; a small amount entered the outfall. This release was also appropriately reported under CERCLA regulations. A third incident involved radioactive contamination from a leaking promethium-147 sealed source used in a beta backscatter measuring system. This release was discovered in 1989. Surveys revealed contamination in other facility laboratories and adjacent areas, as well as the residence of one laboratory worker. Bioassays of personnel indicated no uptake of the promethium-147 and the minor contamination was cleaned up. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1992i) planned for start by the end of 1993 are:

- Replacement of the current KCP Emergency Notification System with an electronically supervised plant-wide system and a non-emergency public address system. Completion of this project is planned for 1997.
- A planned Chemical Sampling Facility upgrade will expand the Polymer Building to provide a dedicated area with required personnel protection and environmental controls to dispense hazardous and nonhazardous materials. Completion is planned for 1993.
- KCP plans to upgrade the heating, ventilation, and air conditioning (HVAC) system in the Foam Molding Area to comply with ventilation requirements for control of hazardous air contaminants in compliance with 29 CFR 1910.94. Completion is planned for 1994.
- Configuration Records Fire Protection is planned to upgrade a classified document storage area. Fire protection and life safety systems will be upgraded to provide personnel and document protection to ensure compliance with regulations. Completion is planned for 1993.
- An additional Air Monitoring Station is planned to house equipment to monitor ambient air quality to ensure compliance with state and national standards. Completion is planned for 1994.
- Explosive Actuated Device Storage Facility is planned to provide a segregated storage area for Class C Explosive Actuated Devices as required by DOE Explosives Safety Manual. Completion is planned for 1994.

3.2.1.3 Waste Management

Waste operations at KCP involve management of four broad waste types: low-level waste (LLW), low-level mixed waste, hazardous/toxic waste, and nonhazardous waste. KCP also generates small quantities of hazardous and mixed wastes which are considered classified for national security reasons due to the nature of the generating process or composition. The quantity of classified waste is included in the hazardous and mixed waste quantities that follow. Table 3.2.1-2 presents a summary of the 1991 waste generation at KCP. A detailed description of the waste stream generation processes/activities, onsite management, storage and treatment capabilities, and ultimate disposition is presented in appendix A, section A.1.

Radioactive Waste Streams and Management. KCP generates small quantities of LLW. Activities that generate LLW are the disassembly and testing of irradiated components, scheduled replacement of tritium exit signs, disposal of X-ray sources, and small amounts of contaminated cleanup towels, disposable gloves, and packing materials. Less than one gallon per year of LLW is generated. Periodically, the liquid LLW is solidified and mixed into concrete or plaster of paris for final handling and disposal.

The solid LLW is accumulated and stored in one controlled access facility used to store both LLW and mixed waste. LLW is stored onsite temporarily using Department of Transportation (DOT)-approved containers until sufficient quantities accumulate to warrant shipment to approved LLW disposal facilities at the Nevada Test Site (NTS). The last shipment of solid LLW took place in May 1985. The current inventory of LLW in storage is 245 cubic feet (ft^3), which includes waste produced annually and that generated from the cleanup of the leaking promethium-147 source. Approximately 15 ft^3 of LLW are generated annually.

Mixed Waste. Current low-level mixed waste inventories consist of printed circuit boards which contain gap tubes, equipment sources in lead shielding, and a small amount of clean-up materials that contain used solvents. Through process changes that have been made, KCP no longer routinely generates mixed waste. However, the potential exists for the generation of mixed waste from shielded equipment sources and future clean-up debris.

All KCP mixed waste is stored with LLW in one controlled access, Resource Conservation and Recovery Act (RCRA) storage facility. At the present time, there are no facilities available to DOE for the treatment and disposal of this waste. The current inventory of mixed waste at KCP is 195 ft^3.

Hazardous/Toxic Waste Streams and Management. Hazardous waste is generated by a number of activities at KCP and consists of wastes such as acidic and alkaline liquids, solvents, and oils and coolants. Processes such as plating, etching, electronic assembly, metals and plastics machining and forming, and wastewater treatment are the principal generators. Polychlorinated biphenyl (PCB) liquids and solids are generated due to remediation efforts and the removal of PCB transformers. KCP currently operates ten RCRA interim status waste storage areas for containerized nonradioactive hazardous wastes, one RCRA interim status waste storage area for containerized LLW and mixed waste, and six bulk storage tanks for nonradioactive hazardous wastes (appendix A, section A.1). These facilities are for temporary storage of wastes prior to disposal. The container storage and tank storage facilities have total design capacities of 44,000 gallons (gal) for liquid and 83,000 ft^3 for solid hazardous/toxic wastes.

No hazardous waste treatment, as defined under RCRA, is performed onsite at KCP. However, the plant operates a solvent reclamation/distillation unit and an industrial wastewater pretreatment facility, both of which are exempted from RCRA standards.

KCP does not dispose of waste onsite, although onsite disposal and leaks/discharges have occurred in the past. On March 6, 1989, the Environmental Protection Agency (EPA) requested DOE to enter into a RCRA section 3008(h) Administrative Order on Consent. On June 23, 1989, DOE and EPA Region VII signed the order. The provisions of the order require that DOE conduct all assessment and remediation activities regulated under the order in accordance with approved environmental restoration remediation schedules. The KCP Environmental Restoration Program serves to identify the nature and extent of environmental contamination at inactive waste sites. The site investigations conducted to date have indicated that hazardous waste constituents found in soil and groundwater at KCP are associated with past operations and are found at or near units now considered regulated hazardous waste management and solid waste management units.

Hazardous wastes generated at KCP are manifested and shipped under contracts with DOT-registered transporters to RCRA- or Toxic Substances Control Act (TSCA)-permitted incineration, reclamation, or disposal facilities. In addition, procedures have been developed by KCP to evaluate all prospective treatment, storage, and disposal sites to ensure that the facilities are operating in accordance with all applicable regulations. An annual reevaluation site visit is conducted by KCP environmental and waste management personnel for all treatment, storage, or disposal facilities utilized by KCP.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. The wastes are put in 8-, 20-, and 42-cubic yard (yd^3) metal roll-off boxes for tractor-trailer transport to a sanitary landfill. Industrial wastewaters are discharged to the Industrial Wastewater Pretreatment Facility or to the sanitary sewer in compliance with Kansas City, MO, sewer-use ordinance provisions and permit discharge limits.

3.2.1.4 Utility and Resource Requirements

The utilities at KCP include the following: electrical power; potable, process, and fire protection water; steam and condensate; natural gas and fuel oil; and, compressed air. The support systems include sanitary sewage disposal, drainage and storm sewers, chemical storage, and communications.

KCP has two primary energy needs: electricity and boiler fuel. Electricity is provided by the Kansas City Power and Light Company and the Missouri Public Service Company. Boiler fuel, natural gas, and fuel oil (for emergency backup only) is obtained from the Defense Fuel Supply Center contract. Table 3.2.1-3 lists KCP's existing resource requirements.

There are no onsite surface water withdrawals (KC DOE, 1989). The Kansas City, MO, municipal water supply system provides all drinking and process water for KCP. The present chemical storage capabilities are adequate for the existing KCP mission.

3.2.2 Mound Plant

Mound is located in the greater Dayton area in Montgomery County within the city limits of Miamisburg, OH (figure 3.2.2-1). Mound is a government-owned, contractor-operated facility operated by EG&G Mound Applied Technologies, Inc. Mound has been operating since 1948 on the 306-acre site.

Figure 3.2.2-2 shows the local setting and facilities of Mound. The site lies south and west of Mound Road in Miamisburg. Tracks of the Consolidated Rail Corporation (Conrail) roughly parallel the western boundary at distances ranging from approximately 50 to 200 feet. The Great Miami River flows 1,500 to 2,000 feet west of the site.

3.2.2.1 Mound Plant Missions

Mound manufactures nonnuclear components for nuclear weapons assembled at other DOE Complex sites. Work is performed under a contract between EG&G, Inc., and DOE. Mound's primary missions are:

- Fabrication, assembly, and procurement of:
- Detonators, firesets, and pyrotechnic devices.
- Flexible circuits.
- Explosively actuated timers.
- Powder and thermite processing.
- Explosive and reservoir surveillance testing.
- Design and production of calorimeters (non-DP mission).
- Stable isotope separation and sales (non-DP mission).
- Isotope heat source piece part fabrication (non-DP mission).
- Radioisotopic Thermoelectric Generator (RTG) heat source fabrication and qualification (non-DP mission).
- Commercial tritium sales/inertial confinement fusion target loading.
- Tritiated aqueous waste recovery.
- Savannah River Operations Contingency.
- Solid storage transfer systems.
- Nuclear materials safeguards.
- Performance of surveillance activities to ensure reliability of nuclear stockpile.
- Pollution prevention.
- Waste management.
- Storage of nuclear materials.
- Maintenance of process capability program.
- Development and production engineering support.
- Maintenance of a standards and calibration facility.

The majority of Mound's work is done for DP. However, it has a number of non-DP related activities that will be affected by this consolidation as indicated above. Some of these, such as calorimeters, which are required by DP for nuclear inventory control, would be moved as a part of this action and are covered in the EA. Other items such as RTGs, which are used as power sources for spacecraft, would not be moved. In addition, isotope separation and sales (except tritium and helium 3), which include development of isotope separation methods for biomedical applications and molecular science research, would not be moved.

Non-DP activities would continue to receive support related to security, non-destructive testing, waste disposal, public relations, finance, plant engineering and maintenance, and health and safety programs. Should there be a decision to terminate the Complex missions at Mound, an infrastructure would remain there for a number of years to support the ongoing D&D and site cleanup activities conducted by DOE EM. Therefore, the DOE Office of Nuclear Energy's commercial stable isotope separation and sales program will not be appreciably affected by termination of the Complex missions, and decisions regarding the future of the isotope program will be made independent of such termination.

Similarly, the decision whether the Office of Nuclear Energy's RTG activities remain at Mound or move to another DOE site will be unaffected by the nonnuclear consolidation decision. Whether these facilities will remain at Mound is driven by the decision on the production or procurement of plutonium (Pu)-238 and not nonnuclear consolidation.

3.2.2.2 Facility/Process Description

There are 158 buildings and facilities at Mound. Total floor area at Mound is approximately 1.4 million ft 2 (MD EG&G, 1991c).

The DP activities at Mound consist of both weapons and non-weapons activities and for the purpose of this analysis have been divided into electrical and mechanical products, special products, tritium handling, and high explosives. The specific manufacturing activities are presented in table 3.2.2-1. A more detailed discussion is presented in appendix A, section A.2.

The workforce at Mound in September 1992 was 1,719 employees (DOE, 1993c).

Effluents and Emissions. Normal operations at Mound release small quantities of tritium (less than 10 curies per year for the total site) to surface waters. Concentrations of these releases are discussed in section 4.1.6.3. Pretreated industrial process wastewater and sanitary wastewater are discharged to the Great Miami River through National Pollutant Discharge Elimination System (NPDES)-permitted outfalls. Wastewater effluents from current operations at Mound are discussed in section 4.1.6.3.

Normal Mound operations release fewer than 1,800 curies per year of tritium to the atmosphere for the entire site. Tritium releases are discussed in section 4.1.6.2 and the associated human health impacts are discussed in section 4.1.6.9. The major sources of criteria air pollutants at Mound are the two boilers associated with the steam plant and the Keystone heat exchanger. Other sources include fugitive particulate emission sources from process operations, and from laboratory and vehicle emissions. Hazardous/toxic air pollutants emission sources at Mound would be from the glass melter facility when operating and by various laboratory operations. Predominant hazardous/toxic air pollutant emissions include acetone, nitric acid, 1,1,1-trichloroethane (TCA), and isopropyl alcohol. The concentrations of criteria air pollutant and hazardous/toxic air pollutants from current operations at Mound are discussed in section 4.1.6.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.2.

Safety and Accidents. The review of historical information at Mound indicated that during the period 1986-1990, four accidental releases occurred that resulted in material reaching offsite locations. Three were chemical in nature and one involved radioactive material. The chemical incidents involved two releases of calcium chloride brine to the plant storm sewer in 1987 (one release was 2,100 gal and the other 475 gal) and one release of 2,250 gal of ethylene glycol to the sanitary sewer system in 1988. The radiological release occurred in 1989, when an estimated 37,000 curies, or 3.7 grams, of tritium gas were released. The maximum hypothetical offsite exposure from this estimated release was calculated to be 0.004 millirem (mrem). Compared to the EPA standard of 10 mrem, this release did not result in significant adverse impacts offsite. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1992i) planned for start prior to the end of 1993 include:

- Replacement of the current Emergency Notification System at Mound, including the existing fire alarm and radio system, with a new emergency paging and announcement system and a new personnel accountability system. Completion of this project is planned for 1998.
- A site drainage control project, planned for completion in 1998, would provide upgraded stormwater management facilities. This project would include stormwater containment basins, concrete-lined channels, piping, curbing, and berms which would increase stormwater containment capacity; reduce erosion, flooding, and pooling; reduce the amount of stormwater running offsite in an uncontrolled manner; and reduce the groundwater recharge from potentially contaminated stormwater.
- An offsite drainage containment project, planned for completion in 2001, would provide an impervious conduit to transport Mound's drainage to the Great Miami River. The purpose of this project is to protect the underlying Buried Valley Aquifer.
- Technical Building Life Safety Code upgrades are expected to be completed in 1998. This project would provide for the necessary upgrades to bring the Technical Building into compliance with the current Life Safety Code. The project includes providing new delivery access for the building, modifying the tunnel, constructing new corridors, and upgrading electrical, and fire protection systems.

3.2.2.3 Waste Management

Waste management operations at Mound consist of five broad waste types: transuranic (TRU), LLW, mixed waste, hazardous/toxic waste, and non-hazardous waste. Because there are no TRU wastes associated with any of the proposed activities that would be consolidated, there is no discussion in this EA of TRU waste generation and management. However, disposal of existing TRU waste and waste generated as a result of transition activities would be addressed in the EM transition plan. Further discussion of this issue can be found in section 4.1.6.8. Table 3.2.2-2 presents the 1991 waste generation at Mound. A detailed description of the waste stream generation processes/activities; onsite management, storage, and treatment capabilities; and ultimate disposition is presented in appendix A, section A.2.

Radioactive Waste Streams and Management. LLW consists of paper, wood, building debris, and soil contaminated with Pu-238, Pu-239, and thorium; and paper, wood, plastic, and scrap equipment contaminated with tritium. Currently, approximately 70 percent of the LLW generated at Mound is a result of ongoing D&D activities.

Liquid waste treatment at Mound is confined to Pu-238. This liquid waste is treated in the Waste Disposal Facility for the precipitation of Pu-238 and the solidification of the sludge with Portland cement. Low-level tritium-contaminated liquid wastes are transported in doubly-enclosed above-ground pipelines to the Waste Disposal Annex Facility where the liquids are solidified with cement in 55-gal steel drums. The remaining low-level liquid wastes are stored onsite. Additional low-level management facilities are described in appendix A, section A.2.

All solid LLW is transported by commercial carriers in closed vans to NTS for burial. Prior to shipment, solid LLW is staged in Building 31 (boxes) or Building 23 (drums). As of the end of September 1992, there were approximately 160,382 ft 3 of LLW at the plant awaiting shipment.

Mixed Waste. Mound's low-level mixed waste is generated from scintillation vials, lead residue and bricks, PCBs, and contaminated mercury. Low-level mixed waste is containerized and stored in Building 23 at Mound pending completion of waste characterization and identification of an acceptable waste treatment/disposal option by DOE.

Mound is now planning the construction of a 5,300-ft ^{2} radioactive waste storage facility. Conceptual design has been completed and the facility is scheduled to be operational by June 1994. This building will allow the use of Building 23 exclusively for mixed waste storage.

Mound is finding it difficult to comply with land disposal restrictions and waste storage time limits for its mixed wastes, since disposal options are not available. It is anticipated that Mound's glass melter thermal treatment unit, with a treatment capacity of 740 cubic feet per year (ft ^{3} /yr), would be available for treatment of much of this waste in 1995. The glass melter would be used to burn hazardous waste and mixed waste and vitrify the bottom ash. An RCRA Part B permit application and a Trial Burn Plan for the glass melter have been submitted for Ohio EPA approval. Mound has no current or planned onsite disposal facilities for radioactive wastes.

Hazardous/Toxic Waste Streams and Management. Hazardous/toxic wastes are generated in several production and laboratory facilities at Mound. The quantity of the wastes and the disposal methods for each are summarized in table 3.2.2-2

The current storage and treatment facilities at Mound are listed in appendix A, section A.2. Preconceptual design and budget planning is underway for construction of a new hazardous waste storage facility that would improve waste handling and loading operations and reduce chances of waste spills. The new facility would also permit better separation of incompatible wastes and provide climate-controlled storage of wastes to prevent container pressurization or rupture due to high or low temperatures. The addition of the new facility, which incorporates 7,800 ft ^{2} of storage space, when combined with the existing 2,400 ft ^{2} of Building 72, would result in 10,200 ft ^{2} of available hazardous waste storage area. Mound has submitted a revised RCRA Part A and B permit application which is currently being processed by the state.

There are no active onsite disposal facilities for hazardous wastes at Mound. The only wastes currently treated onsite are explosives and pyrotechnics. Several hundred pounds of these materials are treated annually by open burning and by use of a retort (a vessel or chamber in which substances are distilled or decomposed by heat). All other hazardous wastes are treated and disposed of offsite by RCRA-permitted commercial contractors. Prior to offsite shipment, all hazardous/toxic waste is packaged in DOT-approved containers, mostly 55-gal drums, manifested and shipped under contract with DOT-registered transporters to RCRA- or TSCA-permitted facilities for treatment or disposal depending on the waste form. Some lead-acid batteries and excess laboratory chemicals are also sent offsite for recycle or reuse. Mound has a program to monitor the offsite management of its hazardous wastes by commercial facilities on a regular basis. Records and manifests are maintained for all hazardous wastes picked up from Mound generators that are shipped offsite for treatment or disposal.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. Metallic and wood waste, stored in a salvage area, is sold periodically by lot sale as surplus. Trash is accumulated onsite and taken to the local sanitary landfill on a regular basis.

3.2.2.4 Utility and Resource Requirements

The P-Building at Mound serves both as a primary distribution center for natural gas, fuel oil, and electrical power and for providing other services such as: compressed air; ethylene glycol cooling; potable, process, and fire protection water; and, steam and condensate.

The support systems at Mound include: sanitary sewage disposal; drainage and storm sewers; and communications.

Mound's electrical distribution system consists of a "dual primary selective" 13 kilovolt (kV) system with three service entrances supplied by the Dayton Power and Light Company. An automatic transfer scheme is used to prevent prolonged facility outages. Mound's primary electric service is meeting current demands.

The Dayton Power and Light Company supplies natural gas to Mound. Annual consumption at Mound is approximately 3 million ft ^{3} .

Mound furnishes its own potable water, cooling water, firewater (sprinklers and hydrants), stormwater drainage, and sanitary sewage system. Water is distributed to the entire plant through two separate underground networks, one for fire protection and the other for potable/process water. The current water usage at Mound ranges from 18 to 25 million gallons per month and water consumption averages about 700 gallons per minute (gpm) during peak periods. Nearly 75 percent of the water consumed at Mound is process water. Fewer than 100,000 gallons per day (GPD) are for domestic water usage (MD EG&G, 1988).

The present chemical storage area is sufficient for current Mound missions. Existing resource requirements are summarized in table 3.2.2-3.

3.2.3 Pinellas Plant

Pinellas, located in Pinellas County in Largo, FL, and operated by Martin Marietta Specialty Components, Inc., manufactures specialized products for nuclear weapons and their associated systems. Martin Marietta took over operation of this plant from General Electric Neutron Devices in June 1992. Plant operations include the manufacture of neutron generators, lightning arrestor connectors, neutron tube loading, thermal and lithium ambient batteries, capacitors and super capacitors, encapsulated magnetics, frequency devices, neutron detectors, optoelectronics, and others.

The plant site consists of approximately 100 acres with 24 buildings. The plant is located in Pinellas County between the cities of Clearwater and St. Petersburg (figure 3.2.3-1). Pinellas County is located on a peninsula bordered by the Gulf of Mexico to the west and Tampa Bay to the east and south.

3.2.3.1 Pinellas Plant Missions

The mission of Pinellas is mainly devoted to DP activities and involves small volume production of nonnuclear components of selected technologies that require strict control of materials and processes in an ultraclean environment. This includes process development, design, production, testing, and laboratory functions for these components.

Pinellas' primary missions are:

- Fabrication and assembly of:
- Neutron generators.
- Cap assemblies.
- Magnetics.
- Optoelectronics devices.
- Frequency devices.
- Neutron detectors.
- Transducers.

- Support pads.
- Ceramics.
- Lightning arrestor connectors.
- Specialty capacitors and switches.
- Product testers.
- Other small electronic components.
- Fabrication and procurement of thermal batteries.
- Performance of surveillance activities to ensure reliability of nuclear stockpile.
- Pollution prevention.
- Waste management.
- Storage of low-level radioactive material.
- Maintenance of process capability program.
- Development and production engineering support.

3.2.3.2 Facility/Process Description

The plant facility contains more than 700,000 ft 2 of manufacturing space, laboratories, offices, and support space. Figure 3.2.3-2 shows the Pinellas layout. Specific nonnuclear manufacturing activities at Pinellas are presented in table 3.2.3-1 A more detailed discussion of these activities is presented in appendix A, section A.3.

The workforce at the plant in September 1992 was 1,575 employees (DOE, 1993c).

Effluents and Emissions. During operations at Pinellas, small quantities of tritium (less than 1 curie per year) are discharged to the Pinellas County Sanitary Sewer System along with industrial and sanitary wastewater. The Industrial Wastewater Permit allows the plant to discharge up to 5 curies per year (PI DOE, 1992a). These releases and measured concentrations are discussed in section 4.1.7.3. Pretreated industrial process wastewater and sanitary wastewater are discharged to the Pinellas County wastewater treatment facility in compliance with the Pinellas County Sewage System permit discharge limits. Wastewater effluents from current operations at Pinellas are discussed in section 4.1.7.3.

Normal operations at Pinellas release small amounts of tritium (less than 100 curies per year) to the atmosphere (PI DOE, 1992a). The tritium releases are discussed in section 4.1.7.2 and the associated health impacts are discussed in section 4.1.7.9. The main sources of criteria air pollutants at Pinellas are the manufacturing processes in Building 100. Buildings 500, 700, and 1040 are also sources. Hazardous/toxic air pollutants include acids, resin compounds, and common industrial solvents. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at Pinellas are discussed in section 4.1.7.2. The potential emission rates for these pollutants are discussed in appendix D, section D.2.1.3.

Safety and Accidents. The review of historical information at Pinellas indicated that, during the period 1986-1990, seven minor accidental releases occurred which resulted in material reaching offsite locations. These incidents caused no significant adverse impact. The chemical incidents involved the release of high pH industrial wastewater to the public sewer system on three occasions in 1990: 10,000 gal, 305 gal, and 400 gal. Neither CERCLA nor SARA regulate pH. Therefore, none of these releases was required to be reported under CERCLA or SARA. The radiological incidents were of a minor nature with no public impact. These incidents involved the release of 1.45 curies of gaseous tritium, 39 curies of radioactive Krypton gas, 27 curies of unidentified airborne radioactive material, and approximately 1 curie, or 1.1 cubic centimeter, of tritiated water. These incidents were reported and investigated in accordance with DOE procedures. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1992i) planned to start prior to the end of 1993 include:

- Renovation of the health physics drain system is planned for completion in 1993.

3.2.3.3 Waste Management

Waste operations at Pinellas involve management of three waste types: LLW, hazardous/toxic waste, and nonhazardous waste. Table 3.2.3-2 presents a summary of the 1991 waste generation at Pinellas. A detailed description of the waste stream generation processes/activities; onsite management, storage, and treatment capabilities; and ultimate disposition is presented in appendix A, section A.3.

Radioactive Waste Streams and Management. All radioactive waste generated at the plant is LLW. Systems and supporting equipment used to load neutron generators and other materials with tritium gas and laboratory analytical equipment are sources of tritium gas waste streams. Tritium is managed as aqueous, gaseous, and solid material.

The Tritium Recovery System is the onsite treatment facility that reduces gaseous tritium discharges. The primary source of tritium is from pumps in tritium processing systems. These are closed systems piped to the Tritium Recovery System. Since 1989, the Tritium Recovery System has converted residual tritium to tritiated water for disposal using a high-temperature converter that oxidizes the tritium gas and captures the resulting water in molecular sieve columns. The seive columns are shipped as solid LLW to SRS for disposal. Prior to 1989, the plant was equipped with a stack effluent control system that performed the same function as the current system.

Areas using tritium are provided with drains connected to a storage tank facility consisting of three 10,000-gal tanks. Prior to releasing wastewater from these tanks, sampling and analysis are performed to verify that the contents are below the plant's as-low-as-reasonably-achievable level of 3,000 picocuries per liter (pCi/L) prior to discharge to the Industrial Wastewater Neutralization System. During the plant's operating history, this self-imposed level has never been exceeded.

Solid LLW is generated in small quantities and consists of scrapped equipment and by-products of decontamination, effluent control, analytical procedures, and scrapped product. Tritium-contaminated compactible solid waste consisting mostly of paper products and protective clothing are compacted directly in DOT Specification 17C 55-gal steel drums with a hydraulic drum compactor. Because Pinellas does not have a long-term storage capacity, solid LLW generated at the plant site is shipped to the SRS burial site for final disposal. As of November 1992, the current inventory of LLW at Pinellas was 1,345 ft^3 or 183 drums (PI DOE, 1992d). The holding period for this waste at Pinellas is less than one year. Solid LLW generation volumes are shown in appendix A, section A.3.

Mixed Waste. Pinellas does not routinely generate mixed waste. Controls are in place to minimize the potential for generation of such waste.

Hazardous/Toxic Waste Streams and Management. Hazardous/toxic waste generated at Pinellas consists of: halogenated and nonhalogenated solvents, both ignitable and toxic; spent plating bath solutions; spent electroplating strippers; flammable solids and liquids; lithium silica and thermal batteries; aqueous and solid wastes contaminated with heavy metals; off-specification new materials; sludges; and lab packs.

Pinellas has an approved RCRA Part B permit composed of two separate permits administered by the Florida Department of Environmental Regulation and EPA. Each of the hazardous waste storage and treatment activities described below are covered by the RCRA permit.

Hazardous waste operations consist of storage and treatment units. Appendix A, section A.3 describes in detail the hazardous waste container and tank storage units at Pinellas. Included are two 5,000- and one 2,000-gal storage tanks, and a container storage building. Hazardous wastes are not permanently stored or disposed of at Pinellas.

Annually, Pinellas manifests and ships approximately 400 drums of hazardous/toxic waste (including laboratory wastes) and 3,500 gal of ignitable hazardous waste, under contract with DOT-registered transporters for offsite disposal at commercial RCRA-permitted disposal facilities and DOE sites (PI DOE, 1992d). Appendix A, section A.3 shows the offsite disposition of the hazardous wastes, and provides quantities of hazardous wastes shipped offsite in 1992.

Pinellas has a program to monitor the offsite management of its hazardous wastes by commercial facilities on a regular basis. The contractor facilities are inspected by Pinellas waste management personnel.

There are no approved commercial facilities available to treat Pinellas' explosive wastes; therefore, RCRA-permitted onsite open burn thermal treatment is provided for the chemical and thermal treatment of reactive and Class C explosive materials. Pinellas is currently operating in accordance with the plant's hazardous waste operating permit and interim status under 40 CFR Subpart X for open burning/open detonation of heat powder, heat paper, and small charge Class C explosives. The materials undergoing thermal treatment include heat powder (iron shavings and potassium perchlorate), heat paper (metallic zirconium and barium chromate), and explosive primer components.

The heat powder, heat paper, and squibs are generated from production of thermal batteries. They are burned in a specially designed stainless steel pan. The powder or pellets are burned in 2-lb batches using a small amount of petroleum to initiate the burn. The residue from this process is disposed offsite as nonhazardous waste. Heat paper is treated in the same manner as heat powder, except the residue which contains barium and chromium is collected and disposed of offsite as hazardous waste. Annually, fewer than 100 lb of explosive wastes are burned onsite.

The Reactive Metals Treatment facility is used for the reaction of calcium metal, calcium bimetal and lithium-contaminated solids, which are hazardous because of reactivity. The calcium metal and bimetal are off-specification materials from laboratory and production areas. The lithium-contaminated solids (finger cots, paper wipes, and gloves) are generated from the production and inspection of thermal batteries. The metal residue from the reaction vessels is nonhazardous and is disposed of as solid waste at the local sanitary landfill.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes such as scrap metal and cardboard are segregated and recycled whenever possible. Trash is accumulated onsite and taken to the local sanitary landfill. In Pinellas County, the burnable trash is incinerated at the "Refuse-to-Energy Plant" while recyclable trash is separated and recycled.

3.2.3.4 Utility and Resource Requirements

Pinellas resource requirements are summarized in table 3.2.3-3. Electric power is purchased from Florida Power Corporation. Emergency service is provided by four diesel-engine-driven generators. One-third of the emergency power is used for emergency lighting and the balance serves critical building services and process loads (PI GE, 1986).

The only water used at the plant is supplied by the Pinellas County Water System. Process equipment cooling water is supplied by 15 operating equipment cooling water recirculators that range in size from 6 to 100 gpm. A deionized water distribution system has a capacity of 345,600 GPD (PI GE, 1986).

Pinellas uses four types of gas systems in production activities. The cryogenic gases used are hydrogen, nitrogen, argon, and liquid oxygen.

Fuel types at Pinellas include natural gas, #2 fuel oil, and gasoline. The regular use of natural gas was eliminated in 1983 after the installation of three heat pumps; however, a backup boiler using natural gasis still maintained. The #2 fuel oil is used for the boiler and emergency diesel generators (PI GE, 1986).

The amount of stored chemicals is being reduced because of decreased production schedules, pollution prevention and awareness programs, and waste minimization programs. The present chemical storage area is adequate for the Pinellas mission (PI DOE, 1992b).

3.2.4 Rocky Flats Plant

RFP is located in northern Jefferson County, CO, approximately 16 miles northwest of downtown Denver (figure 3.2.4-1). Other nearby communities include Boulder, Arvada, and Golden. The main plant shown in figure 3.2.4-2 is a 384-acre complex consisting of manufacturing, chemical processing, laboratory, and support facilities. It is situated within a 6,550-acre natural preserve which functions as the plant's buffer zone. Currently, RFP has 3,000,000 ft^2 of floor space in 436 buildings and facilities.

3.2.4.1 Rocky Flats Plant Missions

Since it began operation, the primary mission of RFP has been to fabricate the plutonium components (or "pits") for nuclear weapons and to carry out associated plutonium processing and waste management activities. RFP also has been engaged in the manufacture of non-plutonium components for weapons from materials such as stainless steel and beryllium. The principal nonnuclear manufacturing operations performed at RFP are metal forging, fabrication, assembly, and chemical processing. There also is heavy emphasis on production-related research.

Due to the evolving role of Rocky Flats, the primary mission has become a combination of the following actions:

- Stabilize materials for storage and shipment.
- Store and transport special nuclear materials.
- Provide special nuclear materials safeguards, security, and surveillance.
- Maintain an analytical laboratory within the Complex.
- Transition to prepare for D&D of four major plutonium handling buildings.
- Process and ship existing wastes and residues.
- Monitor site for environmental compliance.
- Continue environmental restoration and waste management activities.
- Support the transfer to LANL of functions associated with the Stockpile Surveillance Program.
- Maintain the Complex plutonium component production capability in a contingency status.

DOE has prepared a Transition Plan apprising the Congress about proposed mission plan changes from weapons production to remediation and environmental cleanup for RFP.

3.2.4.2 Facility/Process Description

Nonnuclear manufacturing and support activities are located in Buildings 125, 130, 439, 440, 444, 460, 865, and 881 (figure 3.2.4-2). The nonnuclear activities occupy approximately 445,000 ft^2 of space, including 60,000 ft^2 of outside storage space. With reduced workloads, this amount of space is expected to be reduced by approximately one-half (RF DOE, 1992a). The Rocky Flats Transition Plan proposed to declare nonnuclear manufacturing and support Buildings 439, 440, 444, 460, 865, and 883 as surplus as a result of relocating RFP's nonnuclear manufacturing activities (RF DOE, 1992b).

Nonnuclear manufacturing activities at RFP are listed in table 3.2.4-1. A more detailed discussion of these activities is contained in appendix A, section A.4.

As of September 1992, RFP employed 7,299 workers (DOE, 1993c).

Effluents and Emissions. Activities that are the subject of this EA do not, under normal operating conditions, release radioactive water pollutants. Wastewater effluents from RFP processing activities are treated separately and are used for process make-up water. A small fraction (approximately 3 percent) of the effluent discharged from the sewage treatment plant is comprised of make-up water. Sanitary wastewater is treated at the sewage treatment plant and discharged to Pond B-3 located on South Walnut Creek. Stormwater runoff from the plant is conveyed by several ditches and culverts to the terminal ponds (A-4, B-5, and C-2) located on the east side of the buffer zone. The ponds restrict offsite discharges and allow water testing and, if necessary, treatment to meet water quality standards. Water is transferred from Pond B-5 to Pond A-4. Pond A-4 water is released to Walnut Creek in compliance with NPDES permit discharge limits. Water from Pond C-2 is transferred to the Broomfield Diversion Ditch located east of the plant boundary or, in an emergency, to Ponds A-4 or B-5. Discharges into Walnut Creek from Pond A-4 contain radionuclides, but are in compliance with NPDES permit discharge limits and meet applicable water quality standards. Water effluents from current operations at RFP are discussed in section 4.1.8.3.

Activities which are the subject of this EA do not, under normal operating conditions, release radioactive air pollutants to the environment. The major sources of criteria pollutants at RFP are the steam plant boilers. Other sources include various small boilers, diesel generators, and various manufacturing operations. Hazardous/toxic air pollutant sources include laboratories and manufacturing facilities. RFP hazardous/toxic air pollutants include beryllium, carbon tetrachloride (CCl_4), hydrocarbon vapors, trichlorotrifluoro-ethane, and ammonia. Only trace amounts of beryllium are released at RFP. The beryllium emissions in 1990 were 8.2 grams per year compared to the state daily limit of 10 grams over a 24-hour period. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at RFP are discussed in section 4.1.8.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.4.

Safety and Accidents. The review of historical information at RFP indicated that during the period 1986-1990, five known incidents of offsite contamination occurred as a result of accidental releases. However, these incidents resulted in no significant adverse impact. All involved the release of radiological material and were not associated with the activities that are the subject of this EA. The incidents were as follows: in 1988, an employee was contaminated and contamination was found in his automobile; in 1989, contamination was found in a rail car from RFP at the DOE Pantex Plant, and contaminated boxes were found in a rail car from RFP at the DOE Idaho National Engineering Laboratory (INEL); and, in 1990, a contaminated electric motor was discovered in an offsite warehouse and four contaminated static strip inverters were discovered in another offsite warehouse. These incidents were reported and investigated. Lessons learned were applied, appropriate correction actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. The ES&H projects (DOE, 1992i) at RFP nonnuclear manufacturing facilities that are planned to start prior to the end of 1993 include the following. These projects may be modified as a result of continuing transition planning:

- Replace or modify fire and security alarm systems in nearly all buildings at RFP to bring these facilities up to current DOE orders and National Fire Protection Association standards. This project is planned to be completed in 1998.
- Upgrade, refurbish, or replace facilities and utility systems in manufacturing and support buildings. Included in this project is the restoration of HVAC systems for 26 nonnuclear manufacturing and support buildings, electrical power distribution equipment in approximately 30 primarily nonnuclear manufacturing buildings, replacement of a water treatment plant, and modification to the Plant Data Acquisition and Control System. Completion of this project is planned for 1998.
- Provide complete fire protection packages for seven laboratories and buildings including installation of automatic sprinklers and a fire suppression system to meet DOE orders. Completion of this project is planned for 1993.
- Provide sampling port toxic air monitoring system capable of operating continuously without a full-time operator. Completion of this project is planned for 1996.

3.2.4.3 Waste Management

Waste management operations at RFP involve management of six broad waste types: TRU waste, LLW, mixed waste, residues, hazardous/toxic waste, and nonhazardous wastes. Because there are no TRU wastes or residues associated with any of the proposed activities that would be consolidated, there is no discussion of TRU waste or residue in this EA. However, disposal of existing TRU waste and residues, and waste generated as a result of transition activities, would be addressed in the Rocky Flats Transition Plan. Table 3.2.4-2 presents a summary of the 1991 waste generation at RFP. Appendix A, section A.4 addresses the principal RFP treatment facilities and the categories of waste treated.

Radioactive Waste Streams and Management. Approximately 1,430 gal/yr of liquid LLW and 38,880 ft^3/yr of solid LLW were generated in 1991 from activities at RFP. Liquid LLW streams generated from laundry wastewater, plant waste, pond water, and effluent from precipitation processes are treated by the evaporation process located in Building 374. The sewage sludge solid byproduct of the sanitary wastewater treatment process is currently identified and managed as LLW. The sludge produced is dried, packaged, and currently stored onsite pending approval for offsite disposal at NTS. NTS has approved the shipment of LLW from Building 559. Shipment of LLW from other buildings could follow after inspection by NTS personnel to ensure that the LLW meets the NTS waste acceptance criteria. In 1993, approximately 83,686 ft^3 of LLW are planned to be shipped offsite. All waste forms must be certified before they may be shipped.

Mixed Waste. RFP's RCRA permits specify storage locations and volume limits for low-level mixed waste stored onsite. Currently, RFP-permitted storage capacity for low-level mixed waste is 710,548 ft^3 including interim status units currently storing pondcrete and saltcrete. Pondcrete is a solidified mixture of (waste) sludge from solar ponds and Portland cement. Saltcrete is the low-level mixed waste form originating from the low-level wastewater evaporation system. The brine resulting from concentration of wastewater by the evaporator is dried to low-level mixed salt and then remixed with brine and Portland cement. The result is the solid waste form saltcrete, which is packaged for shipment and disposal in plywood boxes (RF DOE, 1991b).

The construction of new waste storage buildings is being considered to consolidate waste storage and improve efficiency. A new 25,000 ft^2 centralized waste storage facility, which would consolidate low-level, low-level mixed, and hazardous wastes, is scheduled to be completed in April 1994. An additional 19,440 ft^3 of low-level mixed waste storage capacity would be available, allowing RFP to extend permitted storage capacity well beyond 1994 (RF DOE, 1991b).

Low-level mixed shipments to NTS were suspended in May 1990 when the RCRA Land Disposal Restriction went into effect. Permits pertaining to shipments of this waste to NTS have been submitted; however, action is still pending with the State of Nevada. RFP is currently developing a compliance agreement with the State of Colorado to stipulate the provisions for the storage of Land Disposal Restriction mixed wastes at RFP pending the development of treatment and disposal facilities for these wastes.

Hazardous/Toxic Waste Streams and Management. Excluding related maintenance and utility activities, 5,005 gal of liquid hazardous/toxic waste and 1,090 ft^3 of solid hazardous/toxic waste were generated in 1991. The hazardous waste consisted of spent solvents, solvent-contaminated combustibles, waste oils, and paint products. RFP has a hazardous waste permit storage capacity of 9,280 ft^3. RFP does not dispose of hazardous/toxic wastes on the plant site. All hazardous/toxic wastes are manifested and shipped offsite under contract with DOT-registered transporters to commercial RCRA- or TSCA-permitted disposal facilities. RFP has a program to monitor the offsite management of its hazardous waste by commercial facilities on a regular basis.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. The amount of recycled paper from all of RFP in 1990 was 141 tons, a 23 percent increase from 1989. Scrap metal sales in 1990 included steel, aluminum, copper, and lead.

The onsite sanitary landfill accepts all nonhazardous, nonradioactive solid waste generated at RFP. The present landfill, which began operations in 1968, will discontinue operations when the new landfill is opened. Closure of the current landfill is a requirement of an interagency agreement. A site for the new landfill has been recommended by the preliminary conceptual design document. Construction of the first cell is scheduled to begin in March 1994, with completion scheduled for February 1995. A total of four cells will be constructed, each with an expected life of 5 years.

Sanitary liquid sewage wastes from plant cafeterias, lavatory sinks, toilets, showers, and other drains located outside of the process areas are treated in the onsite sewage treatment plant using an activated sludge process. The treatment plant discharges onsite to Pond B-3.

3.2.4.4 Utility and Resource Requirements

Most plant utility needs are filled by combinations of under- and above-ground utilities, which provide for water, electrical, steam, and condensate-return lines and sanitary sewer piping. The majority of the RFP utility systems are 30 years old and their conditions vary. Existing resource requirements are summarized in table 3.2.4-3.

The RFP site is provided with electrical power through four primary 115-kV Public Service of Colorado feeder lines that connect to RFP through a ring bus. The existing RFP substations are designed to support 34.5 megavoltamperes (MVA). A current project will remove the 7.5-MVA substation and replace two existing 5-MVA substations with a single 21-MVA substation. This project will increase the RFP capacity to 38-MVA continuous with 64.4-MVA peaks. Current peak electrical demand is 26-MVA. No new lines from Public Service Company are currently planned for the RFP electrical distribution system.

The RFP site has limited groundwater sources within the plant complex and obtains all water through the Denver Municipal Water District. The district supplies 139 million gal of water annually (318,000 GPD average consumption) with unguaranteed supply to 1.5 million gallons per day (MGD). The water treatment facility can process 1 MGD.

Existing chemical storage facilities for solid, liquid, and gaseous chemicals are adequate for the current RFP mission.

RFP has an extensive domestic wastewater treatment system consisting of primary, secondary, and tertiary treatment using an activated sludge process. The wastewater treatment system has a treatment capacity of 480,000 GPD and processes an average of 250,000 GPD. The domestic wastewater treatment system is separated from the process industrial wastewater treatment system to preclude contaminating local water sources. All plant effluents are monitored to detect unauthorized releases through the sanitary sewage system, with water diversion and retention and holding facilities to recycle through the liquid waste treatment system if necessary.

The existing Western Natural Gas Pipeline is adequately sized for the future. The current supply is on an interruptible basis which would have to be changed if any new facilities are built with gas heating.

3.2.5 Savannah River Site

SRS occupies a 300-square-mile area 12 miles south of Aiken, SC, and approximately 16 miles southeast of Augusta, GA (figures 3.2.5-1 and 3.2.5-2). SRS contains 15 major production, service, and research and development (R&D) areas capable of supporting nuclear materials production and processing operations.

3.2.5.1 Savannah River Site Missions

The primary SRS mission is to produce tritium and special nuclear materials for national defense. The site is operated by Westinghouse Savannah River Company (WSRC), Inc., under contract to DOE.

SRS' primary missions are:

- Production of nuclear materials for weapons.
- Production of other isotopes for both weapons R&D and nonweapons applications.
- Supporting the viability of the stockpile through recycle of limited-life components.
- Processing and storage of nuclear materials.
- Pollution prevention.
- Waste management.

- Heavy water recovery and purification.
- Nonweapons work.
- Californium sources.
- Maintaining process capability program.

3.2.5.2 Facilities/Process Description

SRS contains more than 3,000 facilities, including 740 buildings with 5.5 million ft 2 of floor area. Current operating facilities include the production reactors, a fuel and target fabrication plant, chemical separation plants, and the Savannah River Technology Center (an applied research and development center that provides technical support for all major activities and operating facilities). Operating areas are generally classified as Reactor Materials, Heavy Water, Reactor, Waste Management, Defense Waste Processing, and, of particular interest for nonnuclear operations, Separations (the 200 Area). The Separations Area, further subdivided into the 200-F and 200-H areas, contains approximately 17 major facilities. The key facilities from the tritium-handling standpoint are discussed below.

The Extraction and Tritium Purification Facility (Building 232-H) contains the tritium target processing equipment. After irradiation in the reactor, followed by appropriate cooling and disassembly, targets are processed to provide virgin tritium. Building 234-H receives tritium from Building 232-H for reservoir filling, packaging, and shipment to support the weapons stockpile. This facility also empties reservoirs returned from the field to recover and purify tritium for reuse.

Starting in late 1993, the new Replacement Tritium Facility (RTF), Building 233-H, would assume the tritium processing functions of Building 234-H. The RTF incorporates state-of-the-art technology for tritium storage, enrichment, and pumping to enhance safeguards and security and to prevent significant tritium losses to the environment. All process operations are located within the reinforced concrete, underground, seismic-resistant structure. Process equipment and operations are contained within nitrogen-blanketed glove boxes for secondary confinement. Stripper systems remove tritium from the recirculating nitrogen in the glove boxes if a process leak occurs.

The Materials Test Facility, also located in Building 232-H, conducts life storage of filled reservoirs, metallography, and reservoir failure analysis. The reclamation facility, located in Building 238-H, rebuilds used reservoirs for the stockpile. If the reservoirs were not reclaimed they would be disposed of as radioactive waste.

The workforce at SRS in September 1992 was 21,478 employees (DOE, 1993c).

Effluents and Emissions. SRS discharges wastewater into Savannah River via onsite tributaries under a site NPDES permit. These discharges include cooling water effluent from the reactor and pretreated domestic and industrial wastewater, some of which contains small amounts of radioactive and nonradioactive contaminants. Water effluents from current operations at SRS are discussed in section 4.1.2.3.

Normal SRS production operations routinely release trace quantities of tritium to the atmosphere. The tritium releases are discussed in section 4.1.2.2 and the associated health impacts are discussed in section 4.1.2.9. The major sources of criteria air pollutants at SRS are the nine coal burning and four fuel-oil burning boilers that produce steam and electricity; and fuel and target fabrication and power facilities. Other emissions include fugitive particulate emissions from coal piles and coal processing facilities and vehicles. Hazardous/toxic air pollutant sources include the various SRS operations. Hazardous/toxic air pollutant emissions include trichlorotrifluoroethane, nitric acid, and TCA. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at SRS are discussed in section 4.1.2.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.5.

Safety and Accidents. The review of historical information at SRS indicated that during the period 1986-1990, three accidental chemical releases occurred and were reported under the requirements of CERCLA and SARA because of the quantities released. These included the release of 2 to 3 gal of wastewater treatment sludge in 1986 and two incidents in 1989 involving the release of acidic wastewater with trace amounts of radioactivity and high-level waste (HLW) to the soil. However, these incidents resulted in no significant adverse impacts. Of the numerous releases of radioactive materials, 18 were associated with tritium production and handling activities. However, none of these releases resulted in a significant offsite impact. These incidents resulted in approximately 210,000 curies of tritium being released to the environment. The largest release, 172,000 curies, occurred in 1987 and was from the separations area stack. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1991h and 1992i) planned to start prior to the end of 1993 have been identified for the H-Area tritium-handling facilities. A brief description of the projects follows:

- SRS plans to provide a permanent prefabricated building in the H-Area for 10 to 15 portal monitors to scan personnel for low levels of radioactive contamination. This action will help ensure SRS compliance with DOE Order 5480.11, which requires determinations and documentation of personnel radiation exposure. The building will have additional space for heath physics support contamination response, a fast scan unit, dosimeter issuance, and maintenance needs. This project is planned for completion in 1994.

The remaining projects are planned for completion in 1993.

- Sanitary wastewater treatment capacity will be increased by 80,000 GPD in the H-Area by the installation of a new equalization basin and wastewater treatment plant.
- Another H-Area improvement in the processing of sanitary wastewater calls for the installation of a new lift station with a large wet well and four pumps to handle the increased flow.
- A temperature-controlled, covered access corridor between Buildings 233-H and 234-H will connect the new facility (233-H) to the existing facility.

3.2.5.3 Waste Management

Waste management operations at SRS consist of six broad waste types: HLW, TRU, LLW, mixed waste, hazardous/toxic waste, and nonhazardous waste. Because there is no HLW or TRU waste associated with any of the proposed activities that would be consolidated, there is no discussion in this EA of HLW or TRU waste generation and management. Table 3.2.5-1 presents the 1991 waste generation at SRS.

Radioactive Waste Streams and Management. The following materials are examples of solid LLW that are routinely handled:

- Operating and laboratory waste: small equipment, protective clothing, analytical waste, decontamination residue, plastic sheeting, and gloves.
- Contaminated equipment: obsolete or failed tanks, pipe, and jumpers.
- Reactor-related wastes.

Rigid metal containers are now used in most cases with building debris, soil, and other bulky material still beingshipped to the burial ground in a noncontainerized form. LLW volumes are being reduced by factors of 8 to 10 through compaction processes in H-Area and M-Area.

The current LLW disposal site, known as the Solid Waste Disposal Facility, E-Area, which occupies 195 acres between the F- and H-Separation Areas, is approaching its capacity. Beginning in 1993, LLW will be disposed of in a 100-acre site expansion in the north portion of E-Area. It is projected to meet solid LLW storage/disposal requirements for the next 20 years. The site includes the radioactive waste disposal facility, the Mixed Waste Management Facility, and the TRU waste storage facility. This facility is designed to meet the performance objectives of DOE Order 5820.2A, including the EPA effective dose equivalent of 4 mrem per year for groundwater at the facility's perimeter.

Mixed Waste. SRS generates low-level mixed wastes such as lead, oil, spent scintillation fluid, incinerable mixed waste, benzene, contaminated mercury, nonincinerable mixed waste, and PCBs. The SRS facilities designed to store, treat, and dispose of mixed wastes include the Z-Area Saltstone Solidification Facility, the Effluent Treatment Facility, the Liquid Effluent Treatment Facility, the Consolidated Incineration Facility (planned operation 1995), the M-Area Treatment Stabilization Facility (planned operation 1996), the Y-Area Stabilization Facility (planned operation 1998), and the Hazardous/Mixed Waste Treatment Facility (planned operation 1998). Mixed waste is stored in RCRA-approved SRS storage facilities on an interim basis until treatment or disposal facilities are built and permitted. SRS is currently developing a compliance agreement with the State of South Carolina to stipulate the provisions for the storage of Land Disposal Restriction mixed wastes at SRS pending the development of treatment and disposal facilities for these wastes.

Hazardous/Toxic Waste Streams and Management. Typical hazardous wastes are lead, mercury, cadmium, TCA, leaded oil, chlorofluorocarbons, benzene, and paint solvent. All hazardous waste treatment, storage, and disposal facilities at the SRS are either fully permitted, have interim status, or are operating pursuant to enforceable agreements with regulations while other waste management facilities are being developed. Waste is stored in DOT-approved containers.

Hazardous wastes are manifested and shipped offsite under contract with DOT-registered transporters to RCRA- or TSCA-permitted commercial disposal facilities. Chlorinated hydrocarbons and lead batteries are sold to commercial recyclers.

Nonhazardous Waste Streams and Management. Scrap metal and other selected materials are recycled where possible. All other nonhazardous waste is sent to the onsite sanitary landfill. Nonhazardous waste oil is burned for energy recovery at the SRS powerhouse. Asbestos and rubble are sent to the onsite sanitary landfill. Powerhouse ash is sent to the ash basin and to land reclamation while domestic sewage is sent to the onsite sanitary treatment plant. After treatment of domestic sewage, the sludge is sent to land reclamation and the treated effluent is discharged to an NPDES-permitted outfall.

Sanitary solid waste is disposed of onsite in the sanitary landfill. The northern expansion section would be utilized from 1992 until 1997 if current generation rates continue. The northern expansion would cease operation when the new onsite sanitary landfill, with a 20-year capacity, is available in 1996.

3.2.5.4 Utility and Resource Requirements

Support facilities within the 200-H Area consist of utility systems for water, steam, electricity, sewage, and chemical separations. Existing resource requirements are summarized in table 3.2.5-2. Electricity is supplied from the 115-kV plant system through two 7,500-kVA, 115/13.8-kV transformers in Building 251-H. Either transformer is capable of carrying the area electrical load. Emergency power to critical equipment is primarily supplied from diesel generators; however, some equipment is supplied with emergency power from batteries.

The water supply comes from five wells and is combined to create two different systems. One system, consisting of two wells and a separate treatment building, supplies process cooling water to Building 242-H (waste tanks and make-up water for Building 283-H cooling tower). The other system, consisting of three wells and a separate treatment building, supplies water to domestic-water and service-water ground storage tanks. Steam is provided from two sources: 200-F and steam generation within the area. The F-H steam line is a 10-inch line approximately 2.2 miles long with a capacity of 80,000 lb/hr. Within the 200-H Area, there are three stoker-fired boilers with a capacity of 30,000 lb/hr each. Total capacity in the area is almost 150,000 lb/hr.

The sewage treatment plant within the 200-H Area uses an equalization basin to store excess sewage for treatment during periods of low demand. A new Centralized Sanitary Wastewater Treatment Facility to be built in G-Area is planned and due to be operational in December 1994. The new facility will serve the H-Area among others. Process sewers and storm sewers are adequate.

A plant that chemically processes materials that have been reactor-irradiated is located in the 200-H separations area. The 200-H Area plant recovers enriched uranium and other isotopes from irradiated fuel and puts them in a desired form for shipment or storage. The HB-Line processes Pu-238. The present storage capacity for chemical resources is adequate to support existing missions.

3.2.6 Los Alamos National Laboratory

LANL is located in north-central New Mexico adjacent to the Los Alamos townsite. It is about 60 miles northeast of Albuquerque and 25 miles northwest of Santa Fe. The laboratory is situated on approximately 43 square miles located mostly in Los Alamos County but with 5.6 square miles located in Santa Fe County (figure 3.2.6-1).

3.2.6.1 Los Alamos National

Laboratory Missions

LANL's basic mission as one of the DOE Defense Laboratories is to perform the RD&T necessary to maintain and advance the critical technologies and core competencies required to produce nuclear weapons. The laboratory is operated by the University of California under contract to DOE.

LANL's primary missions are:

- Weapons RD&T, including:
- Advanced weapons concepts, designs, and technologies.
- Preparation for testing limitations.
- Technological surprise.
- Research in support of the stockpile memorandum including dismantlement.
- Weapons surety.
- Complex 21 technology development.
- Plutonium R&D.
- Tritium R&D.
- Arms control and treaty verification technology.
- Nonweapons R&D.
- Nuclear fusion.
- Geothermal energy.
- Nuclear science.
- Environmental science.
- Energy science.
- Intelligence.
- Laser isotope separation.
- Advanced conventional munitions.
- Environmental R&D including storage and management of radioactive waste.
- Nuclear materials processing, R&D, and storage.
- Technology commercialization.
- Stockpile surveillance.
- Pollution prevention.
- Waste management.
- Strategic Defense Initiative.

- Threat assessment.
- Advanced concepts research.
- Space technology.
- Nonproliferation.
- Emergency response.
- Underground nuclear testing.
- War Reserve surveillance of selected compounds.
- R&D to support development and production engineering.
- Nuclear effects, vulnerability, and lethality assessment.

3.2.6.2 Facility/Process Description

LANL has developed facilities at many separate technical areas (TA) throughout the site. Currently, 38 of these TAs are active; figure 3.2.6-2 depicts the specific areas that would be affected by this action.

LANL consists of 1,835 buildings totaling about 7.3 million ft^2. As of September 1992, LANL had 7,450 full-time employees (DOE, 1993c).

The following discussion provides additional information on the technical areas (TA-3, -16, -21, -22, -35, and -40) that are under consideration to receive additional nonnuclear functions.

- TA-3 (South Mesa Site) is the main technical area of the laboratory. It has three million gross ft^2 of building floor space (about half of the laboratory total) and occupies 359 acres of land. The main functions that occur in this area are administrative and technical support, theoretical and computational science, materials science, earth science, space science, and applied physics. Significant facilities include the Administration Building; the Otowi Building (largely for administrative support); the Technical Shops Building; the Chemistry and Metallurgy Research Building (which contains special nuclear materials); and the Sigma Building. The latter two include materials science and nuclear materials chemistry. Approximately 70 percent of all building space in TA-3 is greater than 30 years old, but the age and condition of specific facilities vary considerably.
- TA-16 (S Site) is the weapons engineering area. It occupies 2,006 acres and has 575,000 gross ft^2 of building space. Activities include research, design development, prototype manufacturing, and environmental testing. Approximately 87 percent of the building space exceeds 30 years of age; many of the oldest structures are planned for decontamination, decommissioning, or disposal.
- TA-21 (DP Site) is a former radioactive materials processing facility. It has 311 acres and 274,000 gross ft^2 of space. Remaining functions include nuclear chemistry RD&T, the Tritium Systems Test Assembly Building, and the Salt Facility. Most of the western portion of TA-21 is undergoing decontamination, decommissioning, or disposal.
- TA-22 (TD Site) develops detonators for nuclear weapons. It occupies 86 acres and has 73,000 gross ft^2 of building space.
- TA-35 (Ten Site) incorporates a mixture of experimental science activities. It occupies 149 acres and has 551,000 gross ft^2 of building space. Significant facilities include the Target Fabrication Building (for laser fusion), the former Antares Laser Complex, and the Nuclear Safeguards Laboratory.
- TA-40 abuts the east side of TA-22 and is also in the High Explosives (HE) RD&T area. The mission of TA-40 is explosives testing and characterization. The site is remote and surrounded by undeveloped open space with blast buffer zones contained within LANL boundaries (LANL, 1990a).

LANL is currently considering consolidation of all tritium activities at the site in the Weapons Evaluation Test Facility and adjacent Building 450 at TA-16. The proposed tritium activities consolidation project will require a variety of environmental reports and permit applications. At the appropriate time, separate NEPA documentation will be prepared to identify potential environmental impacts of the project.

Effluents and Emissions. Normal operations at LANL result in releases of small quantities of radionuclides and hazardous chemicals to surface water. These releases are discussed in section 4.1.3.3. Pretreated industrial wastewater and sanitary wastewater are discharged to various canyons at the site. Wastewater effluents from current operations at LANL are discussed in section 4.1.3.3.

Normal LANL operations release small quantities of radionuclides to the atmosphere. These radionuclide releases are discussed in section 4.1.3.2 and the associated health impacts are discussed in section 4.1.3.9. The major sources of criteria air pollutants at LANL are the steam plant and power plant, beryllium operations, the asphalt plant, the burning of HE waste, and the lead-pouring facility. Other emissions include fugitive particulate emissions from waste-burial activities and coal piles, and other process emissions. Hazardous/toxic air pollutant sources at LANL include various laboratories and process operations. Hazardous/toxic air pollutants include, but are not limited to, acetone, ammonia, methyl alcohol, methyl ethyl acetone, and hydrogen chloride. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at LANL are discussed in section 4.1.3.2. The emissions rates for these pollutants are shown in appendix D, section D.2.1.6.

Safety and Accidents. The review of historical information at LANL indicated that during the period 1986-1990, 12 known incidents of offsite contamination occurred as a result of accidental releases. However, these incidents resulted in no significant adverse environmental or health impacts. All but one incident involved the release of radiological materials. One involved the release of 0.4 curies of mixed fission products to the atmosphere in 1989. Ten incidents involved the release of tritium. A total of 11,485 curies of tritium were released to the atmosphere as a result of these incidents. The largest release involved 5,800 curies of tritium and occurred in 1988. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1991h and 1992i) affecting the TAs in question, which are planned to start prior to the end of 1993, have been identified. They are:

- A project consisting of interim upgrades to the Chemical and Metallurgy Building is planned for completion in 1998. Upgrades include compliance studies, continuous air monitoring, and instrumentation upgrades; High Efficiency Particulate Air (HEPA) filter motor upgrades; HEPA filter additions; electrical system modifications and upgrades; eyewash system additions; stack monitor system additions; duct modifications and upgrades; sanitary sewer modifications; perimeter safe-guard additions; acid drain modifications; Wing 1 HVAC upgrades; and as-built drawings.

- LANL plans to replace portions of the Infrastructure Support Facility Gas Line. The project, expected to be completed in 1993, would replace portions of the 130 miles of underground natural gas transmission pipeline that serve LANL from Bloomfield, NM. The work would also include replacement of valve stations along portions of the line.

3.2.6.3 Waste Management

Waste management operations at LANL consist of five broad waste types: TRU, LLW, mixed waste, hazardous/toxic waste, and nonhazardous waste. Because there are no TRU wastes associated with any of the proposed activities that would be consolidated, there is no discussion in this EA of TRU waste generation and management. Table 3.2.6-1 presents the 1991 waste generation at LANL.

Radioactive Waste Streams and Management. Liquid LLW is generated from many areas throughout LANL. LANL has two onsite liquid LLW treatment facilities; a 250-gpm chemical treatment and ion-exchange plant and a 125-gpm chemical treatment plant. A project providing for the construction of a facility for the solidification and subsequent volume reduction of radioactive liquid waste treatment plant sludge containing plutonium, americium, and other radionuclides is planned at LANL. The existing radioactive liquid waste treatment plant generates LLW sludge that is high in water content. This facility would allow for an approximately 80-percent reduction in sludge volume and result in a more stable form for burial or shipment offsite. Construction completion is anticipated in May 2000.

Solid LLW such as paper, plastic, glassware, rags, etc., is separated into compactible and noncompactible materials. They are then packaged and transported to an onsite location for compaction and burial. The Area-G landfill, located at TA-54, is the LLW burial area. LLW items such as large equipment and much of the D&D wastes generally are not packaged but are delivered to the burial site in covered or enclosed vehicles.

Mixed Waste. Low-level mixed waste includes solvents, pyrophoric substances, spray cans, scintillation vials, miscellaneous reagent chemicals, vacuum pump oil contaminated with mercury, and other contaminated material. Currently, LANL does not dispose of mixed LLW. The waste is stored at TA-54 and Areas -L and -G. All LLW mixed packages are planned to be transported by commercial carriers in closed vans to the NTS for burial after NTS is permitted.

Primary construction for the Controlled Air Incinerator has been completed. Minor upgrades are being made. The Controlled Air Incinerator is permitted for hazardous waste and has been granted interim status for mixed wastes. A RCRA mixed waste trial burn is currently scheduled for February 1995.

Construction of a hazardous waste treatment facility to consolidate all existing onsite hazardous waste treatment processes is planned to start construction in April 1995. This facility also will accommodate new treatment processes for hazardous and mixed wastes currently being accumulated and stored. Provisions for the storage of this waste until suitable treatment and disposal facilities are available will be developed later in a compliance agreement with the State of New Mexico.

Hazardous/Toxic Waste Streams and Management. LANL produces a wide variety of hazardous/toxic wastes. Small volumes of RCRA-characteristic and RCRA-listed wastes occur as a result of ongoing research. Primary laboratory sites for basic and applied chemistry RD&T generate typical chemical wastes consisting primarily of laboratory reagent chemicals, pump oil, solvents, test samples, and miscellaneous laboratory wastes. Once-significant volumes of beryllium, lithium hydride, and magnesium turnings generated from the main shops department; plating solutions containing chromates and cyanides; acid or base wastes heavily contaminated with copper; and nitric and sulfuric acid wastes have been greatly reduced.

HE waste is generated during processing and testing of various materials. Processing includes pressing, machining, and casting HE. Waste is produced as discrete pieces of HE, chips, machine cuttings, and powder. The chips, cuttings, and powder usually are in the form of waterborne suspensions, collected in specially designed accumulating and settling sump tanks. Wastes also consist of materials contaminated with HE: paper, oils, solvents, wood, machine tools, fixtures, etc. Chemically, the wastes consist of cyclotetramethylenetetranitramine (HMX), cyclotrimethylenetrinitramine (RDX), trinitrotoluene (TNT), pentaerythritoltetranitrate (PETN), ammonium nitrate, barium nitrate, boric acid, triaminotrinitrobenzene (TATB), nitrocellulose, tetryl, nitroguanidine, and various plastic binders. All HE hazardous waste and potentially contaminated HE waste is picked up and delivered to the TA-16 (S Site) incinerator flashpad where it is burned. Ash residue is treated, and when its hazardous characteristic can be removed and is otherwise nonhazardous, the residue is disposed of in the industrial non-RCRA landfill. Any hazardous constituent is shipped offsite using commercial RCRA-permitted vendors.

All hazardous waste treatment, storage, and disposal facilities at LANL are either fully permitted, have interim status, or are operating pursuant to enforceable agreements with the regulators while other waste management facilities are being developed. Many hazardous wastes are sent off-site for disposal. LANL has an EPA Letter of Authorization allowing disposal of radioactive PCB-contaminated articles at the TA-54 Area-G landfill. Much of the hazardous waste is shipped offsite to commercial incinerators and the residual ash is landfilled. LANL does not landfill RCRA-hazardous waste onsite, but contracts with DOT-registered transporters to deliver hazardous waste to commercial RCRA-permitted disposal facilities. Before waste is sent offsite, the potential disposal facility is inspected by LANL personnel. Operating records and permits are also reviewed.

Nonhazardous Waste Streams and Management. Nonhazardous wastes are generated routinely and include general facility refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. Trash is accumulated onsite and taken to the county sanitary landfill on a regular basis.

The Los Alamos County sanitary landfill is located on government property and is operated under a special use permit. Approximately one-third of the domestic solid waste disposed of at the county landfill originates from LANL. The Area-J landfill, operated by and under the administrative control of LANL, receives nonhazardous, nonradioactive solid waste.

A new sanitary wastewater treatment plant and collection system to replace 8 existing treatment facilities and 30 existing septic tanks is completed. The new treatment plant will enable reuse of the treated wastewater for cooling water and irrigation. The plant and collection system is designed to meet the requirements of LANL's existing Federal Facilities Compliance Agreement.

3.2.6.4 Utility and Resource Requirements

The LANL utility system has 400 miles of lines that provide electricity, telecommunications, water, sanitary sewer, radioactive liquid waste, and natural gas distribution within the laboratory. Existing resource requirements are summarized in table 3.2.6-2.

Electricity is supplied to LANL by a Los Alamos County/DOE power pool over two 115-kV lines (one from Santa Fe and one from Albuquerque). Substations in TA-3, -5, and -53 provide 13.2 kV service throughout the laboratory. There is also a 20-megawatt (MW) gas-fired generating plant in TA-3. LANL's total annual consumption of power is considerably below the transmission capacity of the system.

Natural gas used by the laboratory comes from the San Juan Basin in northwest New Mexico. The lines are owned by DOE but operated and maintained by the Gas Company of New Mexico under contract to DOE. Natural gas is distributed to buildings directly, or to three central steam plants (TA-3, 16, and 21), and a standby plant for fueling the heating system. All plants also maintain reserves of fuel oil.

Water for the laboratory and adjacent areas (including Los Alamos townsite, White Rock and Bandelier National Monument) primarily comes from three DOE-operated well fields and surface water from the Jemez Mountains. The system depends on gravity flow for distribution from high elevation terminal storage facilities.

The existing LANL sanitary sewer system includes nine treatment facilities. Consolidation of this sanitary wastewater treatment system is underway and would eliminate eight of the existing treatment facilities. In addition, approximately 70 septic tanks are dispersed throughout laboratory areas not served by the existing sanitary sewer system.

The present chemical storage capacity is adequate for the laboratory's existing mission.

3.2.7 Y-12 Plant

The Oak Ridge Reservation (ORR), within which Y-12 is located, lies southwest of the city of Oak Ridge, TN, but within the incorporated city limits (figure 3.2.7-1). The largest city in the area is Knoxville, located approximately 20 miles to the east.

Within the 35,252-acre ORR, the DOE has three primary complexes (figure 3.2.7-2). These are the Oak Ridge Y-12 Plant, Oak Ridge National Laboratory (ORNL), and the K-25 Site (formerly the Oak Ridge Gaseous Diffusion Plant). The primary facilities at Y-12 are shown in figure 3.2.7-3. Y-12 is operated for DOE by Martin Marietta Energy Systems, Inc.

3.2.7.1 Y-12 Plant Missions

Y-12's primary mission is the production of nuclear weapons components involving the fabrication of various forms of materials into components, certification of the fabricated components, and the production of subassemblies from some components.

Y-12 primary missions are:

- Fabrication and assembly of uranium parts and lithium parts.
- Precision machining.
- Specialty subassembly processing.
- Inspection of precisional components.
- Safe, secure trailer vehicle maintenance.
- Pollution prevention.
- Waste management.
- Processing and storage of highly-enriched uranium materials.
- Performance of stockpile surveillance activities to ensure reliability of nuclear stockpile.
- Maintain process capability program.
- Weapon dismantlement.

- Handling, processing, and storage of returned weapons components and sub-assemblies.
- Special production for design laboratories.
- Storage of strategic quantities of lithium compounds.
- Development and production engineering support.

3.2.7.2 Facility/Process Description

Y-12 is located in Oak Ridge, TN, on the 35,252-acre ORR. The plant site consists of approximately 811 acres, 630 of which are enclosed by security fencing. The site contains 492 buildings or other structures totaling 7.2 million ft^2. The site is used by DP in support of nuclear weapons production and surveillance, and nuclear materials production mission assignments. These activities are housed in approximately 425 of the 492 buildings containing 5.4 million ft^2. ORNL, whose primary facilities are located elsewhere on the ORR, uses approximately 47 buildings containing 1.5 million ft^2. These facilities are not related to the Y-12 DP mission. Also located on the Y-12 site are approximately 20 buildings containing 300,000 ft^2 which house support activities and several organizations of the DOE Oak Ridge Field Office.

As of September 1992, Y-12 had 5,384 employees (DOE, 1993c).

Effluents and Emissions. Normal operations at Y-12 do not discharge radioactive water pollutants as a result of the activities that are the subject of this EA. Pretreated industrial wastewater and sanitary wastewater are discharged to Bear Creek, East Fork Poplar Creek, McCoy Branch, and Kerr Hollow quarry. Wastewater effluents from current operations at Y-12 are discussed in section 4.1.4.3.

Normal Y-12 operations do not release radioactive air pollutants to the environment as a result of activities that are the subject of this EA. The major sources of criteria air pollutants at Y-12 are the steam plant and two commercial oil-fired boilers. Other sources include fugitive particulate emissions from coal piles, other process emissions, and vehicles. Hazardous/toxic air pollutant sources at Y-12 include various laboratories and process operations. Hazardous/toxic air pollutants include, but are not limited to, methanol, nitric acid, trichlorotrifluoroethane, hydrochloric acid, and TCA. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at Y-12 are discussed in section 4.1.4.2. The emissions rates for these pollutants are shown in appendix D, section D.2.1.7.

Safety and Accidents. The review of historical information at Y-12 indicated that during the period 1986-1990, 95 accidental releases were reportable under the requirements of CERCLA and SARA or the Clean Water Act (CWA). These mostly involved the release of petroleum products, mercury, asbestos, and sewage. However, none of these releases resulted in a significant adverse impact offsite. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1992i) planned to start before the end of 1993 and that affect Y-12 include:

- ORR plans to provide upgrades in several life safety areas. This includes egress systems, fire protection systems, electrical equipment, and emergency power equipment required to meet the Occupational Safety and Health Administration (OSHA), the National Fire Protection Association Codes, and DOE orders and policies. This project is scheduled for completion in 1997.
- The Emergency Notification System would be replaced for portions of the protected, limited, and eastern areas of Y-12. The proposed Emergency Notification System is intended to provide a reliable, available emergency warning system as well as comprehensive monitoring and testing capabilities from the plant shift superintendent's office. Emergency Notification System replacement will be completed in 1995.
- A new hazardous materials handling vehicle would be procured and equipped to meet response requirements. Procurement is expected to be completed in 1993.
- Powered platforms to be used by maintenance personnel throughout the plant would be procured beginning in 1993 and would be complete by 1995. This project would replace existing platforms designated as potential safety hazards.
- All Y-12 nonhazardous laboratory drains, except roof drains, would be rerouted to discharge to the sanitary sewer line. Internal piping alterations and lines would be provided to existing manholes modified to accept the new drain lines. This action is being accomplished to comply with pending NPDES regulations.
- The cooling tower water chemical treatment program would be replaced with an ozonation system to be installed at two cooling towers. Ozonation would reduce the amount of wastewater discharged from cooling towers. Project completion is scheduled for 1995.
- A 10,000-gal storage tank would be installed in the West End Tank Farm. Piping, pumps, level indicators and controls, and alarms are included as part of the project. The tank would replace the current practice of pumping directly into a diked tanker trailer and would reduce the potential for accidental spills. Installation is expected to be completed in 1995.

3.2.7.3 Waste Management

Waste management operations at Y-12 consist of four broad waste types: LLW, low-level mixed waste, hazardous/toxic waste, and nonhazardous waste. Table 3.2.7-1 presents the 1991 waste generation at Y-12.

Radioactive Waste Streams and Management. Machining operations use stock materials including steel, stainless steel, aluminum, depleted uranium, and other metals, which result in significant quantities of machine turnings and fines as a waste product. Uranium-contaminated industrial trash is generated by daily operations throughout the plant. These operations include janitorial services, floor sweepings in production areas, and production activities. Long-term Y-12 storage options include storage in warehouses, tanks, and vaults at Y-12, as well as storage of Y-12 mixed or hazardous wastes in buildings at the K-25 Site.

The Y-12 Central Pollution Control Facility also generates low-level uranium-contaminated RCRA hazardous sludge, which is collected and sent to the West End Tank Farm.

The Waste Feed Preparation Facility processes and prepares solid LLW for volume reduction by an outside contractor for storage at Y-12. The facility utilizes a 200-ton capacity baler to reduce the waste volume to one-eighth of its original size. Waste comes to the facility from areas known to generate contaminated materials, or from dumpsters that were analyzed at the Trash Monitoring Station and deemed to be above the radioactive acceptability limits for the sanitary landfill. The compacted bales are placed in DOT-approved metal boxes and staged in an adjacent warehouse prior to offsite incineration or storage at Y-12.

The Certification & Staging Facility is a proposed 1996 line item project to provide a facility that would determine the isotopic content of heterogeneous solid low-level and mixed waste contained in either 96 ft^3 boxes or 55-gal drums. In addition to radiological characterization, the facility would also provide remote inspection of waste containers via real-time radiography. If the project remains on schedule, the facility is expected to be operational in the year 2000.

Y-12 does not have onsite disposal facilities for LLW. The Old Salvage Yard is used as a staging area for solid LLW scrap metal. The contaminated scrap is placed in boxes and would eventually be transferred to above-grade storage pads. Planned LLW disposal facilities scheduled to be operational in 1996 willserve waste generators from all three DOE complexes on the ORR. The planned facilities would have up to 40 years' capacity available to dispose of LLW.

Mixed Waste. Y-12 generates low-level mixed wastes from the following operations: metal plating, maintenance of sodium/potassium-cooled equipment, machine cooling and machine cleaning associated with the forming and machining of nuclear weapon parts, and general cleaning activities that involve regulated solvents or acidic and caustic cleaners. Non-defense process activities generating mixed wastes are wastewater treatment activities at the West End Treatment Facility and the Central Pollution Control Facility, environmental restoration activities, D&D, and storm sewer sludge cleanout activities.

Y-12 has a number of container and tank storage facilities with capacity available for management of mixed wastewater treatment sludges, RCRA/TSCA mixed waste, organic liquid mixed waste, solid mixed waste, flammable liquid mixed waste, lab-pack mixed waste, and classified mixed waste. The lack of available outlets for uranium-contaminated solid waste forces many combustible flammable wastes generated at Y-12 into long-term storage. An increased capacity for the storage of ignitable solid wastes is required due to the impending closure of the Interim Drum Yard in 1993. The oil drum storage facility, OD10, provides additional flammable storage in four 6,500-gal tanks and two 3,000-gal tanks. The Containerized Waste Storage Area would provide storage for most wastes stored at the Interim Drum Yard after closure. The Production Waste Storage Facility, scheduled for start-up in 1995, would provide several years of storage capability for mixed classified wastes.

Y-12 has no operating onsite disposal facilities for mixed wastes. The West End Treatment Facility/West End Tank Farm treats mixed acid wastes generated by Y-12 Plant Production operations. The Certification and Staging Facility planned for design in 1996 would ensure that mixed solid waste generated by defense and restoration activities at Y-12 meets the waste acceptance criteria of the receiving treatment, storage, or disposal facility. The Mixed Waste Treatment Facility, a proposed 1995 line item planned for construction to begin in 1997, would provide treatment capability for mixed soils and sludges. With a sufficient capacity to treat 1,400,000 ft^3 per year, the Mixed Waste Treatment Facility is intended to remove and segregate hazardous and radioactive components of the mixed wastes and to prepare mixed wastes for ultimate disposal when suitable disposal facilities are available. Present plans call for the Mixed Waste Treatment Facility to treat mixed wastes from Y-12, K-25, and ORNL.

Hazardous/Toxic Waste Streams and Management. Y-12 generates a large variety of hazardous/toxic wastes. Major waste-generating activities at Y-12 include construction/demolition activities that produce large volumes of contaminated wastes, including lumber, concrete, metal objects, soil, and roofing materials.

Plating waste solutions are generated by metal-plating operations, and reactive wastes and waste laboratory chemicals are generated from various laboratory activities. Sludges are generated as a result of treating process wastes at multiple sites, and waste oils and solvents are generated from machining and cleaning operations. Contaminated soil, soil solutions, and soil materials are generated from RCRA closure activities.

RCRA wastes generated at Y-12 were either treated and discharged (in the case of wastewaters) or shipped offsite to permitted, approved disposal facilities (in the case of solids). Due to the moratorium on offsite shipments from Y-12, RCRA wastes that are not discharged are being stored in permitted facilities.

Nonhazardous Waste Streams and Management. The average annual discharge rates from the Central Pollution Control Facility and the West End Treatment Facility are approximately 4.7 MGY and 7.7 MGY, respectively. The NPDES annual discharge volume permit limit for East Fork Poplar Creek is 6 MGY. Major waste-generating activities at Y-12 include construction and demolition activities that produce large volumes of non-contaminated wastes, including lumber, concrete, metal objects, soil, and roofing materials.

Noncontaminated industrial trash is generated by daily operations throughout the plant. These operations include janitorial services, floor sweeping in production areas, and production activities.

The Y-12 Centralized Sanitary Landfill II is a state-permitted facility that accepts combustibles, decomposed materials, and other industrial wastes, as well as certain special wastes such as asbestos, beryllium oxide, aerosol cans, and fly ash. The Y-12 Spoil Area I is a state-permitted shallow land burial facility for the disposal of noncontaminated rubble and construction spoil, including asphalt, brick, block, brush, concrete, dirt, tile, and other similar materials.

The new salvage yard is used for the staging and public sale of nonradioactive, nonhazardous scrap metal. Y-12 is restricted from sending any scrap metals offsite. Scrap metal sorting continues, however, in anticipation of future provisions for clean scrap metal consolidation/recycle/resale.

3.2.7.4 Utility and Resource Requirements

Major underground utility systems that serve the Y-12 site include water, the sanitary sewer system, and natural gas pipelines. Major above-ground systems include steam and condensate, demineralized water, plant and instrument air, and electrical distribution. Two major utility facilities are located at Y-12: the water treatment plant and the steam plant.

Electrical power is procured from the Tennessee Valley Authority and transmitted throughout the plant by three 161-kV overhead radial feeders and one 161-kV interconnecting overhead feeder. Table 3.2.7-2 lists Y-12's utility and chemical resource requirements.

The source of water for Y-12 is Clinch River water impounded by the Melton Hill Dam. The filtration plant, with its 7-million-gallon storage reservoir, is the source of treated water for Y-12. The treated water supplies the fire protection system, process operations, sanitary requirements, and boiler feed at the steam plant. Heating and process steam is supplied by the main steam plant, which houses four boilers.

Chemical needs include industrial gases (argon, helium, hydrogen, nitrogen, and oxygen) delivered in an above-ground distribution system. The present handling and storage area is adequate for the Y-12 mission.

Y-12 has two primary energy needs: natural gas and electricity. Natural gas is used for process furnaces and laboratory needs. The Y-12 natural gas system is supplied by a pipeline from the East Tennessee Natural Gas Company. Beginning in 1993, coal would be used in place of natural gas for steam generation. As a result, an estimated 100,000 tons of coal per year would be required for the Y-12 missions. This is up from the 15 to 30 tons per year used from 1990 to 1992.

3.2.8 Sandia National Laboratories, New Mexico

Sandia National Laboratories, headquartered in Albuquerque, NM, maintains facilities in three locations: Albuquerque, NM; Livermore, CA; and Tonopah, NV. The facilities discussed in this document refer only to the Albuquerque location (SNL), which is located adjacent to the city of Albuquerque (figures 3.2.8-1 and 3.2.8-2). The site is approximately 6.5 miles east of downtown Albuquerque. SNL consists of 8,300 acres on Kirtland Air Force Base (KAFB) allocated to DOE.

3.2.8.1 Sandia National Laboratories Missions

SNL's basic mission as one of the DOE Defense Laboratories is to perform the RD&T necessary to maintain and advance the critical technologies and core competencies required to produce nuclear weapons. The laboratory is operated by AT&T under contract to DOE.

SNL's primary missions are:

- Weapons RD&T, including:
- Advanced weapon concepts, designs, and technologies.
- Preparation for testing limitations.
- Technological surprise.
- Research in support of the stockpile memorandum, including weapons dismantlement.
- Weapons surety.
- Complex 21 technology development.
- Nuclear weapons systems ordnance engineering.
- Nonnuclear component design and development.
- Field and lab testing.
- Manufacturing engineering.
- Verification and control technologies.
- Safeguards and security.
- Nonweapons work.
- Particle beam technology.
- Intelligence.
- Advanced military technology.
- Radiation-hardened microelectronics.
- Nuclear Regulatory Commission (NRC) R&D.
- Activities for non-Federal entities.

- Technology commercialization.
- Performance of surveillance activities to insure reliability of stockpile.
- Pollution prevention.
- Waste management.
- Strategic Defense Initiative.
- Threat assessment.
- Advanced concepts research.
- Space technology.
- Nonproliferation.
- Emergency response.
- Underground nuclear testing.
- Energy Sciences.
- Environmentally conscious manufacturing.
- Energy systems development.
- R&D to support development and production engineering.
- Nuclear effects, vulnerability, and lethality assessment.

3.2.8.2 Facility/Process Description

SNL uses facilities at five Technical (Tech) Areas and a Test Field (figure 3.2.8-2).

- Tech Area IÄAdministration, site support, technical support, component development, research, energy programs, microelectronics, defense programs, and exploratory systems.
- Tech Area IIÄTesting explosive components.
- Tech Area III Ä Testing and simulating a variety of natural and induced environments, including two rocket sled tracks, two centrifuges, and a radiant heat facility.
- Tech Area IVÄA remote site for pulsed power sciences such as X-ray, gamma-ray, and particle beam fusion accelerators.
- Tech Area VÄA remote area for experimental and engineering reactors and particle accelerators.
- Coyote Test Field-Land parcels scattered throughout the Coyote Test Field used for testing.

There are currently 560 major buildings totaling 4 million ft 2 spread over Tech Areas I, II, III, IV, V, and the Coyote Test Field. This action would involve existing facilities only in Tech Areas I and III.

As of September 1992, SNL had 8,473 employees (DOE, 1993c).

Effluents and Emissions. Normal operations at SNL release small quantities of tritium to surface waters. These releases are discussed in section 4.1.5.3. Pretreated industrial wastewater and sanitary wastewater are discharged to the city of Albuquerque's wastewater treatment plant. None of the industrial or sanitary wastewater discharges go directly to surface water channels. Wastewater effluents from current operations at SNL are discussed in section 4.1.5.3.

Normal SNL operations release tritium to the environment. The tritium releases are discussed in section 4.1.5.2 and the associated health impacts are discussed in section 4.1.5.9 The major sources of criteria air pollutants at SNL are the steam plant at Tech Area I; paint shops, toxic machine shops, process development laboratory, emergency diesel generator plant, and solvent spray booth, all located in Tech Area I; and explosive testing at Tech Area II. Other emissions include fugitive particulate emissions from waste-burial activities, other process emissions, and vehicles. Hazardous/toxic air pollutant sources include various laboratories and miscellaneous operations. Hazardous/toxic air pollutants include, but are not limited to, TCA, toluene, and xylene. The concentrations of criteria pollutants and hazardous/toxic air pollutants from current operations at SNL are discussed in section 4.1.5.2. The emission rates for these pollutants are shown in appendix D, section D.2.1.8.

Safety and Accidents. The review of historical information at SNL indicated that during the period 1986-1990, one accidental release was reported under the requirements of CERCLA and SARA because of the quantity released. This involved the release in 1987 of 30 lb of capacitor oil containing PCBs. Additionally, there have been numerous releases of lead associated with rocket tests which were reported to the National Response Center and the appropriate approval received before the tests were conducted. However, none of these releases resulted in a significant adverse impact offsite. These incidents were reported and investigated. Lessons learned were applied, appropriate corrective actions were instituted, and follow-up was performed in accordance with DOE order requirements.

Improvements Required to Continue/Comply with ES&H Requirements. ES&H projects (DOE, 1991h and 1992i) planned to start prior to the end of 1993 include:

- The Robotic Manufacturing Science & Engineering Laboratory and Program Support Center projects would eliminate the serious problems of ventilation, chemical handling and storage, access to hazardous materials, structural deterioration, unsafe co-mingling of activities, and extreme overcrowding caused by the use of temporary and substandard buildings. Completion of this project is planned for 1996.
- The Fire Protection Main to Building 9925 project would enhance the fire response capability to remote facilities. Completion of this project is planned for 1995.
- The Acid Waste Neutralization System Upgrade would lower the probability of pH and fluoride excursions in the Microelectronics Development Laboratory's wastewater. Completion of this project is planned for 1995.
- The Closed Loop Rinse Water Pre-treatment System is required to ensure meeting all Albuquerque wastewater requirements while minimizing water usage. This project is scheduled for completion in 1993.
- The Vacuum Plasma Spray Chamber and Plating Process Control project would replace outdated equipment. This project is scheduled for completion in 1993.

3.2.8.3 Waste Management

Waste management operations at the SNL consist of five broad waste types: TRU, LLW, mixed waste, hazardous/toxic waste, and nonhazardous waste. Because there are no TRU wastes associated with any of the proposed activities that would be consolidated, there is no discussion in this EA of TRU waste generation and management. Table 3.2.8-1 represents the 1991 waste generation at SNL.

Radioactive Waste Streams and Management. Radioactive waste at SNL is generated in both technical and remote test areas as the result of RD&T activities. Most of the waste consists of contaminated equipment, combustible decontamination materials, and cleanup debris.

All LLW and mixed waste are being temporarily stored at generator sites or in DOT-approved containers above ground at the permitted Technical Area III interim storage site. Approximately 1,600 ft^3 of waste were accepted at the Technical Area III storage site during 1990. The waste consists primarily of fission product and uranium-contaminated waste on a volumetric basis, and tritium-contaminated waste on an activity basis. All LLW packages are currently stored onsite pending approval to be transported by commercial carriers in closed vans to NTS for disposal.

Mixed Wastes. Low-level mixed wastes include radioactively-contaminated oils and solvents, radioactively-contaminated or activated lead, or other heavy metals. Other mixed wastes may be generated as a result of weapons tests. Completion of construction and operation of the Radioactive and Mixed Waste Management Facility is expected in 1996. This 6,000-ft^2 facility will have a centralized packaging and storage facility function for LLW and mixed waste. Mixed waste will be stored at the facility until accepted for disposal at the NTS or Waste Isolation Pilot Plant site. Processing at the Radioactive and Mixed Waste Management Facility will include activities required to comply with the waste acceptance criteria and Federal regulations. Waste will be stored at this facility until suitable treatment and disposal facilities are available for the disposal of these wastes in accordance with the provisions of RCRA. SNL is currently aiding DOE in a compliance agreement to be negotiated with the EPA, Region VI Field Office. DOE and SNL are assessing their responsibilities as outlined in the Federal Facilities Compliance Act and may enter into similar agreements with the State of New Mexico.

Hazardous/Toxic Waste Streams and Management. Hazardous/toxic chemical wastes are generated at SNL by the numerous research and development activities conducted throughout the facilities. Major waste generators include the development shops (i.e., plating, plastics, glass) and chemical laboratories. Wastes consist of a large number of different reagents, chemicals, solvents, caustics, acids, and other general laboratory wastes. Chemical wastes generated by RD&T activities are collected from generator locations, segregated according to DOT Hazard Class, and transported to the Hazardous Waste Management Facility for storage.

There are no active onsite disposal facilities for hazardous/toxic wastes at SNL. All RCRA-regulated wastes are manifested and shipped under contract with DOT-registered transporters offsite to RCRA-permitted treatment, storage, and disposal facilities.

Nonhazardous Waste Streams and Management. SNL contains more than 15 miles of sewer lines interconnected with those of KAFB. SNL has five categorical pretreatment operations and three general wastewater streams discharging to the city of Albuquerque's sewer system. These discharges are regulated by the Albuquerque Public Works Department.

Nonhazardous solid sanitary wastes are generated routinely and include general plant refuse such as paper, cardboard, glass, wood, plastics, scrap, metal containers, etc. Nonhazardous wastes are segregated and recycled whenever possible. SNL operates a number of salvage/scrap yards throughout the technical and remote areas where surplus equipment is sold to offsite vendors. Trash is collected and taken to the KAFB sanitary landfill on a regular basis.

3.2.8.4 Utility and Resource Requirements

Electricity is supplied to SNL and much of southeast Albuquerque through the Public Service Company of New Mexico's switching station on Eubank Boulevard. Voltage is stepped down through transformers to two subtransmission voltages, 46 kV and 115 kV, for distribution through five subtransmission feeders.

KAFB is responsible for the overall natural gas system. The distribution system in Tech Areas I, II, & IV is owned by DOE and operated by SNL. Natural gas is purchased from KAFB, which buys it commercially. Fuel oil is stored in Tech

Area I for refueling remote-site tanks and for emergency supply to the steam plant. The steam plant in Tech Area I supplies steam to both that area and KAFB for space heating, hot water converters, absorption chillers, and processes.

Responsibility for water storage and transmission rests with KAFB, with SNL handling distribution only to its own facilities. Remote test areas in Coyote Canyon have water trucked to them.

SNL is responsible for the collection system in its Tech Areas and in Coyote Test Field, while KAFB is responsible for the system base-wide. Tech Areas I and IV are tied into the KAFB system, while Areas II, III, V, and Coyote Test Field have septic tanks independent of the main system. The present chemical storage capability is adequate for SNL's existing missions. The existing resource requirements are summarized in table 3.2.8-2.

3.3 Proposed Action-Kansas City Plant Consolidation

The Proposed Action is summarized in section 3.1.1 of this chapter; detailed descriptions of all activities involved with this action are presented here. Function transfers for the Proposed Action are illustrated in figure 3.3-1. The proposed facility modifications required to support each relocated function are discussed for each of the potentially affected sites. Table 3.3-1 shows the anticipated workforce requirements for this action.

Ongoing implementation planning by DOE and refinement of the conceptual design reports (CDR) prepared for the Proposed Action indicate that changes to these workforce numbers may occur. The Socioeconomics and Community Services Sections of Chapter 4 discuss the impact of these potential changes on the analysis of the workforce numbers presented in table 3.3-1 as appropriate.

3.3.1 Consolidate Electrical/Mechanical Functions at the Kansas City Plant

The electrical/mechanical functions to be consolidated at KCP would be situated within existing buildings at the KCP site as shown in figure 3.3.1-1.

Nonnuclear electrical/mechanical manufacturing functions from Mound, Pinellas, and RFP described in sections 3.2.2, 3.2.3, and 3.2.4, respectively would be consolidated at KCP. These functions consist of the 16 specific activities listed in table 3.3.1-1.

Under the Proposed Action, no new buildings or additional parking would be required at KCP. Interior modification, demolition, and remedial measure requirements are summarized in table 3.3.1-2. Anticipated construction material resource requirements for the consolidation of nonnuclear manufacturing activities at KCP are listed in table 3.3.1-3.

Buildings that would receive relocated activities include the Main Manufacturing Building, the Manufacturing Support Building, and the Electrical Products Manufacturing Building. The proposed activities would be incorporated into the existing product lines or moved into space that either is currently vacant or can be made available by rearranging other items. There would be a substantial amount of interior renovation such as relocation of walls, utilities, and equipment, and the construction or renovation of special facilities such as clean rooms.

A process waste assessment was conducted for each of the component manufacturing operations to be transferred to KCP. Table 3.3.1-4 presents a summary of the additional waste types and volumes of the liquid and solid wastes to be generated by the transfer. Appendix B, section B.1 provides more detailed discussion and summary tables of the process waste assessment data for each component production operation. The management and disposal of generated waste and effluents is also discussed in appendix B, section B.1. Appendix D details air emissions.

As a result of this consolidation, certain hazardous chemicals (discussed in detail in appendix F and included in table F-3) would continue to be used in activities at the KCP. Because of exposure during normal use and possible release, the suspect carcinogenic chemicals toluene diisocyanate and methylene dianiline were analyzed. In 1991, KCP used 5,960 lb of toluene diisocyanate as a curing agent in a polyurethane molding process and 145 lb of methylene dianiline in a number of epoxy resin lamination processes. Processes that would be transferred as a result of this consolidation would cause negligible or no increases in the annual use of these chemicals. The consolidation would add 1 lb of toluene diisocyanate, used as a curing agent in a polyurethane compound, and 3 lb of methylene dianiline, used in "Z" Hardener as part of an epoxy encapsulating material. The impacts of chemicals associated with normal operations are discussed in section 4.1.1.9.

No new support facilities (e.g., storage facilities, electrical substations or power plants, and water treatment facilities) would be required.

Estimates of the anticipated additional total operations resource requirements resulting from the consolidation of electrical and mechanical nonnuclear manufacturing activities at KCP are shown in table 3.3.1-5.

3.3.2 Savannah River Site

Tritium-handling functions at Mound, discussed in section 3.2.2, would be relocated to SRS. Potential facility modification and resource requirements at SRS are discussed below.

Tritium-handling activities (discussed in section 3.2.2) would be relocated to SRS within existing buildings as shown in figures 3.3.2-1 and 3.3.2-2. Table 3.3.2-1 lists the planned location of the relocated products and provides estimates of space requirements. No new support facility construction would be required to accommodate new products.

All proposed activities could be accommodated in five buildings in the H-Area and one building in the 700-Area. The RTF, Building 233-H, currently preparing for operational startup, would provide much of the needed space for the tritium-handling activities and would receive the most extensive modifications with the addition of a mezzanine and an upgraded or additional exhaust plenum. Interior construction/modification requirements at SRS are addressed in table 3.3.2-2. Anticipated construction material/resource requirements for the consolidation of tritium-handling activities at SRS are listed in table 3.3.2-3.

As a result of tritium-handling processes being transferred to SRS, tritium is of particular concern because of its possible release during potential accidents. The maximum increase of tritium is estimated to be 5 to 10 percent above the quantity estimated to be handled and stored at SRS in 1995. The impacts of tritium and chemicals associated with normal operations are discussed in section 4.1.2.9.

Table 3.3.2-4 presents the anticipated additional annual waste generation volume at SRS. A partial list of waste items resulting from the tritium handling activities is discussed below and in greater detail along with treatment and management in appendix B, section B.2. Effluents are also discussed in the same section, while air emissions are covered in appendix D.

- Reservoir Surveillance Operations "Waste generated would be low level compactible and non-compactible waste from nitrogen and argon blanketed glove boxes (approximately 200 ft 3 year). Waste would also be generated by decontamination of tritium-contaminated components, gloves, etc. In addition, waste would be generated from non-repairable contaminated equipment.
- Gas Transfer Systems "Materials containing tritium and materials contaminated with tritium would be processed in a vacuum furnace. Residual material would be transferred to the SRS burial ground for waste disposal.
- Commercial Sales/Inertial Confinement Fusion Target Loading "LLW would consist of alcohol, cleaning cloths, and gloves contaminated with tritium.

Besides modifying utilities in existing buildings, the relocation of tritium-handling activities would not require new utility services.

Anticipated resource requirements resulting from the consolidation of tritium-handling activities at SRS are provided in table 3.3.2-5.

3.3.3 Los Alamos National Laboratory

High-power detonators and calorimeters from Mound, neutron tube target loading from Pinellas, and beryllium technology and pit support functions from RFP are proposed for relocation to LANL. The option to the Proposed Action to relocate beryllium technology and pit support functions to Y-12 is discussed in section 3.3.4. Relocated functions and activities would be situated within existing buildings as indicated in table 3.3.3-1 and figures 3.3.3-1 through 3.3.3-1f. Descriptions of the functions to be relocated are presented in section 3.2 and appendix A.

Interior construction/modification requirements to existing buildings and facilities at LANL are addressed in table 3.3.3-2 and the anticipated construction material/resource requirements are addressed in table 3.3.3-3.

As a result of this consolidation, certain hazardous chemicals used in activities transferred to LANL are of particular concern because of their possible release during potential accidents (discussed in detail in appendix F and included in table F-3). These chemicals are beryllium compounds (beryllium oxide and beryllium sulfate) and tritium. LANL currently has on hand approximately 2,000 lb of beryllium and beryllium compounds. Under consolidation, the beryllium compounds would be used for coating graphite crucibles and molds to prevent exothermic reaction of molten beryllium with graphite in the vacuum induction and gas atomization melting processes. Processes that would be transferred as a result of this consolidation would increase the amount of beryllium and beryllium compounds on hand by 8,000 lb to 10,000 lb. The maximum increase of tritium would be less than 5 percent above the quantity currently handled and stored at LANL. The impacts of tritium and chemicals associated with normal operations are discussed in section 4.1.3.9.

Additional annual waste generation volumes at LANL due to relocation of the nonnuclear manufacturing activities are shown in table 3.3.3-4. Appendix B, section B.3 provides details on the effluents and additional wastes associated with each of the relocated functions. Appendix D provides details on the air emissions associated with the relocated functions. LLW would be generated from neutron tube target loading functions and calorimeters. Non-compactible materials may include metal shavings and non-repairable contaminated equipment such as disabled pumps, motors, etc.

The high-power detonators, beryllium technology, and pit support functions would generate liquid and solid wastes. The high-power detonators would generate 7,000 gallons per year of HE-contaminated solvents and 205 ft 3 /yr of residues from solid scrap HE and HE-contaminated solid wastes after incineration. Beryllium technology and pit support

3.3.4 Y-12 Plant

The beryllium technology and pit support functions to be collocated at Y-12 as an option to the Proposed Action would be situated within existing buildings on the ORR as shown in figure 3.3.4-1. Table 3.3.4-1 provides estimated space requirements and specifies location for the relocated beryllium technology and pit support activities. Interior construction/modification requirements at Y-12 are addressed in table 3.3.4-2. Anticipated construction material/resource requirements are presented in table 3.3.4-3.

Beryllium and pit support waste streams are discussed in section 3.3.3. Table 3.3.4-4 presents a summary of waste streams at Y-12 from relocated products. A detailed description of the waste streams and waste management and disposal of the wastes is provided in appendix B, section B.4. A discussion of effluents can also be found in the same section, while air emissions are covered in appendix D.

As a result of this consolidation, certain hazardous chemicals are of particular concern because of their possible release during potential accidents (discussed in detail in appendix F and included in table F-3) would be used in activities transferred to Y-12. These chemicals are beryllium compounds (beryllium oxide and beryllium sulfate) used in coating graphite crucibles and molds to prevent exothermic reaction of molten beryllium with graphite in the vacuum induction melting and gas atomization melting processes. The maximum increase in beryllium compounds as a result of consolidation would be less than 1 percent of the quantity presently handled and stored at Y-12. The impacts of chemicals associated with normal operations are discussed in section 4.1.4.9.

No onsite utility (water, electricity, etc.) upgrade requirements are anticipated. Existing support facilities would be utilized to provide specialized services (such as testing, coating, industrial hygiene, maintenance, etc.) for the relocated activities.

Anticipated resource requirements resulting from the relocation of beryllium technology and pit support activities to ORR's Y-12 facility are presented in table 3.3.4-5.

3.3.5 Sandia National Laboratories,

New Mexico

Neutron generators, thermal batteries, and cap assemblies at Pinellas (discussed in section 3.2.3) and the milliwatt heat source surveillance function at Mound (discussed in section 3.2.2) would be relocated to SNL. These functions would be situated within existing buildings at SNL as shown in figure 3.3.5-1. The estimated space requirements and planned location of the relocated products are provided in table 3.3.5-1.

Relocated neutron generator manufacturing activities except tritium loading of the neutron tube targets would be performed at SNL. Tritium-loading operations would be performed at LANL, as already discussed in section 3.3.3. Building 870 at SNL would be modified to support the neutron generator by extensive modifications to include the addition of 10,000 ft 3 of floor space. The CDR conservatively estimated materials, resources, and costs for this project by adding a second story on the northern (oldest) part of the building.

Further design refinement could result in a building addition on to the paved area adjacent to Building 870. This area has no known areas of contamination, and because it is already disturbed, there would be no cultural or biological impacts. The one-story addition would require the same or smaller amount of materials, resources, and funds to complete and would not require the demolition and removal of the contaminated concrete foundation and floor slabs that are included in the current CDR estimates.

Shelf life-storage neutron generator units and other tritium inventory items would be stored in Building 6730 in Tech Area III where more adequate stand-off is available for the storage of larger tritium quantities than is allowable in Building 870.

Approximately 3,050 ft 2 of Building 841 would be modified to accommodate various processes used in cap assemblies. Machining operations would be performed in Building 840, while flame spraying and related operations would be done in Building 842. There would be some other minor accommodations made in the existing work spaces and building for cap assemblies.

The capability for backup manufacture of thermal batteries at SNL would be established by renovating portions of Building 894 and relocating necessary equipment. Approximately 400 ft 2 in Building 894 would be used for milliwatt heat source surveillance operations.

Construction/modification requirements at SNL are summarized in table 3.3.5-2. Anticipated construction material and resource requirements are in table 3.3.5-3.

As a result of this consolidation, certain hazardous chemicals would continue to be used in activities at SNL. These chemicals are methylene chloride, methylene dianiline, TCE, and toluene diisocyanate. In 1991, SNL used 119 lb of methylene chloride and 531 lb of TCE as cleaning solvents. Processes that would be transferred as a result of this consolidation would add 11 lb of methylene chloride and 61 lb of TCE per year. Both chemicals would be used as cleaning solvents. The impacts of chemicals associated with normal operations are discussed in section 4.1.5.9.

Table 3.3.5-4 presents the anticipated additional waste generation volume at SNL. A partial list of waste items from the relocated functions is discussed below. Waste management and effluents are discussed in greater detail in appendix B, section B.5. Air emissions are covered in appendix D.

- Neutron Generators "Manufacture of neutron generators would generate additional waste streams, consisting principally of laboratory wastes and flammable liquids. Tritiated wastewater and solid LLW would be generated, as shown in table 3.3.5-4; the bulk of these additional waste streams would contain hazardous and nonhazardous materials. Wherever possible, the use of hazardous solvents would be kept to a minimum.
- Thermal Batteries "The manufacture of thermal batteries would result in a minor addition to SNL waste streams. Solid hazardous waste would be generated in small quantities and stored in local accumulation areas before transfer to the hazardous waste storage area.
- Cap Assemblies "Cap assemblies would also result in a minor addition to the SNL mixed, nonhazardous, and hazardous waste.
- Milliwatt Heat Source Surveillance "These operations would generate only very small amounts (less than 55 ft 3 per year) of hazardous and nonhazardous waste.

Other than modifying utilities in existing buildings, no new utility services or support facilities are required. Anticipated resource requirements for the relocation of the new functions to SNL are provided in table 3.3.5-5.

3.4 Other Alternatives

This section describes consolidation at the alternative sites Mound, Pinellas, and RFP. Although these alternatives are essentially the same as those described in the NCP, some minor changes have been made as a result of the more detailed planning that was done for the Proposed Action, consolidation at KCP as described in section 3.3. The data being used to evaluate these sites is based on the CDRs prepared for the Proposed Action by the receiver sites and the work done by the Activity Transfer Groups in support of the Nonnuclear Consolidation Implementation Plan being prepared by the Albuquerque Field Office. This data incorporates all the latest workload guidance as described in section 1.6.2.

As a result of the work done for the Proposed Action, it was determined that the total floor space required at KCP to accommodate the existing and transferred activities would be 2,777,000 ft 2 . In addition to this space at KCP, 159,000 ft 2 would be required at other sites (LANL, SNL, and SRS) to accommodate additional transferred activities. Thus the total space required for the consolidation of all nonnuclear activities would be 2,936,000 ft 2 , the sum of these two figures. With this as the basis for the space required and the current available nonnuclear manufacturing space at the alternative sites, the additional space requirements at these sites can be determined. Table 3.4-1 shows these space requirements and table 3.4-2 shows the anticipated workforce requirements for these actions.

Ongoing implementation planning by DOE and refinement of the CDRs prepared for the Proposed Action indicate that changes to these workforce numbers may occur. The Socioeconomics and Community Services sections of chapter 4 discuss the impact of these potential changes on the analysis of the workforce numbers presented in table 3.4-2 as appropriate.

3.4.1 Mound Plant Alternative

The Mound alternative is similar to the Proposed Action in that neutron tube target loading from Pinellas and beryllium technology and pit support functions from RFP would be relocated to LANL (section 3.3.3); and neutron generators, cap assemblies, and thermal batteries from Pinellas would be relocated to SNL (section 3.3.5).

This alternative differs from the Proposed Action in that milliwatt heat source surveillance, high-power detonators, and tritium-handling functions from Mound would not be transferred to SNL, LANL, and SRS, respectively, and the remaining electrical/mechanical and special product functions would be consolidated at Mound rather than at KCP.

With Mound as the consolidation site for nonnuclear manufacturing, the KCP, Pinellas, and RFP nonnuclear manufacturing functions would be terminated. Figure 3.4.1-1 illustrates the consolidation alternative of transferring the electrical and mechanical nonnuclear manufacturing activities to Mound.

Electrical/mechanical functions that would be consolidated at Mound under this alternative would be situated within existing, as well as newly constructed, buildings. The construction would consist of five new buildings, one office expansion, new parking areas, and one new storage pad. The proposed locations of new facilities at Mound are shown in figure 3.4.1-2.

Under this alternative, all current operations at Mound, including electrical/mechanical functions, tritium-handling functions, and detonator functions, would continue at Mound. In addition, electrical/mechanical functions would be transferred from KCP, Pinellas, and RFP to Mound. The activities that would be transferred to Mound are shown in figure 3.4.1-1. Descriptions of the activities to be consolidated under the Mound alternative are provided earlier in this chapter in sections 3.2.1, 3.2.3, and 3.2.4; these represent current operations at KCP, Pinellas, and RFP, respectively.

As shown in table 3.4-1, this alternative would require approximately 2,810,000 ft^2 at Mound to house operations related to the consolidation of electrical/mechanical functions. Mound currently has 1,400,000 ft^2 of space available for these activities. Therefore, approximately 1,410,000 ft^2 of additional facility space would have to be constructed at Mound under this alternative. Additional land area requirements for the consolidation of nonnuclear manufacturing activities at Mound, including construction laydown area and additional parking, are listed in table 3.4.1-1. Anticipated construction materials/resource requirements are listed in table 3.4.1-2.

Primary products to be transferred from KCP to Mound would include: electrical and electronics items such as radars, firing systems, timers, telemetry, unique signal generators, cables, printed wiring boards, field test equipment, microelectronics, large-scale integrated circuits, arming and fuzing systems, and depth sensors; mechanical devices such as coded switches, squib valves, case parts, fins, strong link switches, inertial sensing devices, battery actuators, structural supports, handling equipment, locking tapes, command disable devices, and assembly hardware; and plastics items such as compression pads, membranes, cushions, foam supports, composite structures, metal-filled polymers, insulators, radomes, shock mitigators, molded rigid plastics, desiccants, and hydrogen getters.

Products to be transferred from Pinellas to Mound would include optoelectronics assemblies, neutron detectors, support pads, lightning arrestor connectors, transducers, and lithium ambient batteries.

Products to be transferred from RFP to Mound would include reservoirs, nuclear grade steels/Oxnard, safe secure trailers, weapons trainer shop, and metrology services.

The consolidation of activities at Mound would involve the generation of additional hazardous wastes and nonhazardous wastes. The additional hazardous waste volume of Mound due to consolidation could require revision of existing hazardous waste permits, because new facilities must be added to handle the additional volume. Table 3.4.1-3 provides a summary of anticipated additional annual waste generation. A discussion of the wastes, effluents, and emissions and discussions related to their treatment/management can be found in appendix C, section C.1.

Additional support facilities would provide for the balance of plant functions, which include at a minimum administration, cafeteria service, medical services, fire protection, security, all maintenance functions, environmental monitoring, utility services, Emergency Operations Center, and parts warehousing and storage.

Additional utility upgrade requirements for consolidation at Mound include water, power consumption, natural gas, and steam. Water and steam are produced on the plant site; natural gas and electricity are provided by local utility companies.

The anticipated additional resource requirements for nonnuclear manufacturing electrical/mechanical consolidation at Mound are shown in table 3.4.1-4.

3.4.2 Pinellas Plant Alternative

The Pinellas alternative is similar to the Proposed Action in that tritium-handling functions from Mound would be relocated to SRS (section 3.3.2); calorimeters and high power detonators from Mound and beryllium technology and pit support functions from RFP would be relocated to LANL (section 3.3.3); and milliwatt heat source surveillance functions from Mound would be transferred to SNL (section 3.3.5).

This alternative differs from the Proposed Action in that neutron tube target loading from Pinellas would not be transferred to LANL; neutron generators, cap assemblies, and thermal batteries from Pinellas would not be transferred to SNL; and the remaining electrical/mechanical and special product functions would be consolidated at Pinellas rather than at KCP.

With Pinellas as the consolidation site for nonnuclear manufacturing, the KCP, Mound, and RFP nonnuclear manufacturing functions would be terminated. Figure 3.4.2-1 illustrates the consolidation alternative of transferring the electrical and mechanical nonnuclear manufacturing activities to Pinellas.

Electrical/mechanical functions that would be consolidated at Pinellas under this alternative would be situated within existing as well as newly constructed buildings. The construction consists of three new buildings, a large four-story office/production facility, and two multilevel parking structures. The proposed locations of new facilities at Pinellas are shown in figure 3.4.2-2.

Under this alternative, all current operations at Pinellas including electrical/mechanical functions, tritium-handling functions, and neutron generators, cap assemblies and batteries would continue at Pinellas. In addition, electrical/mechanical functions at KCP, Mound, and RFP would be transferred to Pinellas. The activities to be transferred to Pinellas are shown in figure 3.4.2-1. Descriptions of the activities to be consolidated under the Pinellas alternative are provided earlier in this chapter in sections 3.2.1, 3.2.2, and 3.2.4; these represent current operations at KCP, Mound, and RFP, respectively.

As shown in table 3.4-1, this alternative would require approximately 2,887,000 ft^2 at Pinellas to house operations related to the consolidation of electrical/mechanical functions. Pinellas currently has 700,000 ft^2 space available for these activities. Therefore, approximately 2,187,000 ft^2 of additional facility space would have to be constructed at Pinellas under this alternative. Additional land area requirements for the consolidation of nonnuclear manufacturing activities at Pinellas, including construction laydown area and additional parking, are listed in table 3.4.2-1. Anticipated construction materials/resource requirements are listed in table 3.4.2-2. Primary products to be transferred from KCP to Pinellas would include: electrical and electronics items such as radars, firing systems, timers, telemetry, unique signal generators, cables, printed wiring boards, field test equipment, microelectronics, large scale integrated circuits, arming and fuzing systems, and depth sensors; mechanical devices such as coded switches, squib valves, case parts, fins, strong link switches, inertial sensing devices, battery actuators, structural supports, handling equipment, locking tapes, command disable devices, and assembly hardware; and plastic items such as compression pads, membranes, cushions, foam supports, composite structures, metal-filled polymers, insulators, radomes, shock mitigators, molded rigid plastics, desiccants, and hydrogen getters.

Products to be transferred from Mound to Pinellas would include electrical/mechanical products such as flat cable products, mechanical assemblies and detonator safing strong links, round wire detonator cables, nonnuclear Acorn, and plastic headers.

Products to be transferred from RFP to Pinellas would include reservoirs, nuclear grade steels/Oxnard, safe secure trailers, weapons trainer shop, and metrology services.

The consolidation of functions at Pinellas would require the transfer of the following processes from KCP, Mound, and RFP: soldering, welding, bonding, lasers, robotics, cleaning, wire/sleeving, preparation, encapsulation, wafer fabrication, semiconductor packing, machining, plating and surface finishing, painting and special coatings, molding, manufacture of special chemicals, and assembly.

The consolidation of activities at Pinellas would involve the generation of additional hazardous and nonhazardous wastes. The additional hazardous waste volume of Pinellas due to consolidation could require revision of existing hazardous waste permits, because new facilities would be added to handle the additional volume. Table 3.4.2-3 presents a summary of anticipated additional annual waste generation. A discussion of the wastes, effluents, emissions, and information related to their treatment and management can be found in appendix C, section C.2.

Onsite utility upgrades required for consolidation at Pinellas would include water, power consumption, natural gas, and steam. Water and steam are produced on the plant site. Natural gas and electricity are provided by the local utility companies. Table 3.4.2-4 describes the anticipated additional resource requirements for consolidation at Pinellas.

Under the Pinellas alternative, additional bulk chemical inventory would be required. However, no centralized storage and distribution systems are planned for these materials due to the limited number of facilities supplied. All of these materials are assumed to be brought to the site by tank truck. Facilities for receiving, unloading, and distributing these liquids are included at the plant buildings where the materials are consumed. See table 3.4.2-4 for a list of bulk chemical resource requirements identified for this consolidation activity.

3.4.3 Rocky Flats Plant Alternative

The RFP alternative is similar to the Proposed Action in that tritium-handling functions from Mound would be relocated to SRS (section 3.3.2); calorimeters and high power detonators from Mound and neutron tube target loading from Pinellas would be relocated to LANL (section 3.3.3); and neutron generators, cap assemblies, and thermal batteries from Pinellas, and milliwatt heat source surveillance from Mound, would be transferred to SNL (section 3.3.5).

This alternative differs from the Proposed Action in that beryllium technology and pit support functions from RFP would not be relocated to LANL and the remaining electrical/mechanical and special product functions would be consolidated at RFP rather than at KCP.

With RFP as the consolidation site for nonnuclear manufacturing, the KCP, Mound, and Pinellas nonnuclear manufacturing functions would be terminated. Figure 3.4.3-1 illustrates the consolidation alternative of transferring the electrical/mechanical nonnuclear manufacturing activities to RFP.

Electrical/mechanical functions that would be consolidated at RFP under this alternative would be situated within existing as well as newly constructed buildings. The new construction would consist of two new 3-story office/manufacturing buildings, two new 2-level parking garages, and new surface parking. The proposed locations of the new facilities at RFP are shown in figure 3.4.3-2. Descriptions of the activities to be consolidated under the RFP alternative are provided earlier in this chapter in sections 3.2.1, 3.2.2, and 3.2.3; these represent current operations at KCP, Mound, and Pinellas, respectively.

Under the RFP alternative, all current operations and missions, including the special products functions and beryllium technology and pit support functions, would continue at RFP. In addition, electrical/mechanical functions would be transferred from KCP, Mound, and Pinellas to RFP. The activities to be transferred to RFP are shown in figure 3.4.3-1.

As shown in table 3.4-1, the RFP alternative would require approximately 2,793,000 ft^2 at RFP to house operations related to consolidation of electrical/mechanical functions. RFP currently has 445,000 ft^2 available for these activities. Therefore, approximately 2,348,000 ft^2 of additional facility space would have to be constructed at RFP under this alternative. Additional land area requirements for the consolidation of nonnuclear manufacturing activities at RFP, including construction laydown area and additional parking, are listed in table 3.4.3-1. Material and resources requirements during construction of the consolidated RFP can be found in table 3.4.3-2.

Additional space for nonnuclear manufacturing activities may be made available in existing buildings declared as surplus in the Rocky Flats Transition Plan (RF DOE, 1992b). If this is confirmed as a result of more detailed planning, then the amount of new construction would be decreased accordingly.

Primary products to be transferred from KCP to RFP would include: electrical and electronics items such as radars, firing systems, timers, telemetry, unique signal generators, cables, printed wiring boards, field test equipment, microelectronics, large-scale integrated circuits, arming and fuzing systems, and depth sensors; mechanical devices such as coded switches, squib valves, case parts, fins, strong link switches, inertial sensing devices, battery actuators, structural supports, handling equipment, locking tapes, command disable devices, and assembly hardware; and plastic items such as compression pads, membranes, cushions, foam supports, composite structures, metal-filled polymers, insulators, radomes, shock mitigators, molded rigid plastics, desiccants, and hydrogen getters. Descriptions of the nonnuclear electrical/mechanical functions to be transferred from KCP to RFP can be found in section 3.2.1.

Products to be transferred from Mound to RFP would include flat cable products and mechanical assemblies, detonator safing strong links, round wire detonator cables, nonnuclear Acorn, and plastic headers. Descriptions of the nonnuclear electrical/mechanical functions to be transferred from Mound to RFP can be found in section 3.2.2.

Products to be transferred from Pinellas to RFP would include optoelectronics assembly, neutron detectors, support pads, lightning arrestor connectors, and transducers. Descriptions of the nonnuclear electrical/mechanical functions to be transferred from Pinellas to RFP can be found in section 3.2.3.

The transfer of all of the activities from KCP to RFP would involve the generation of additional hazardous wastes and nonhazardous wastes. The additional hazardous waste volume at RFP due to consolidation could require revision of existing hazardous waste storage permits, because new facilities would have to be added to handle the additional volume. Table 3.4.3-3 presents a summary of the anticipated additional annual waste generation at RFP.

RFP is restricted by Federal regulations and operating permits regarding both the amounts of different types of waste that may be stored and the capacity constraints. In addition, RFP must maintain compliance with storage regulations in all of its storage facilities. Activities necessary to address the generation of additional hazardous wastes would include improvements and/or expansion of storage facilities and certification of wastes to meet disposal criteria at offsite disposal facilities.

RFP must operate all waste packaging, treatment, and storage facilities in compliance with applicable regulations. The requirements of the Colorado Department of Health/DOE Agreement in Principle and the Federal Facility Compliance Agreement for land-disposal restricted waste must be considered for the additional wastes associated with this alternative.

A summary of the wastes, effluents, and emissions and discussions related to their treatment/management can be found in appendix C, section C.3.

Existing RFP support facilities would provide for the balance of plant functions to support consolidation, which includes at a minimum administration, cafeteria service, medical services, fire protection, security, all maintenance functions, environmental monitoring, utility services, Emergency Operations Center, and parts warehousing and storage.

Utility upgrade requirements for consolidation at RFP include water, power consumption, natural gas, and steam. Water is obtained and treated on RFP; steam is produced on the plant site; natural gas and electricity are provided by local utility companies.

The anticipated additional resource requirements for nonnuclear manufacturing electrical/mechanical consolidation at RFP can be found in table 3.4.3-4.

4 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The affected environment consists of the existing conditions at each of the eight sites that are affected by the Proposed Action and any reasonably foreseeable changes independent of the Proposed Action that may occur throughout the expected operating lifetime of the facilities. Environmental consequences are the potential adverse impacts of the project as well as its beneficial effects. Environmental consequences have been assessed for the No Action alternative, the Proposed Action, and alternatives. Where applicable, and depending on the resource or issue involved, cumulative impacts at sites receiving relocated functions are discussed as the additional or incremental effects of the Proposed Action over the baseline or No Action. Each alternative involves seven or eight sites: a principal consolidation site, three or four other receiver sites, and three sites where the Nuclear Weapons Complex (Complex) missions will be closed out. For each site, a description of each environmental resource that may be affected by the project is presented: land resources, air quality and acoustics, water resources, geology and soils, biotic resources, cultural resources, and socioeconomics. In addition, waste management and human health effects are discussed.

The environmental consequences of the No Action alternative are equivalent to existing environmental conditions, plus reasonably foreseeable changes to the existing situation that would occur with or without consolidation, such as reduced plant workloads. Reasonably foreseeable future baseline changes, including population forecasts, have been projected for socioeconomic conditions. For resource issues such as air quality, water resources, and waste management that are subject to regulatory standards, the future baseline assumes the facilities would be in compliance with those standards. Facilities currently out of compliance, or that may be out of compliance in the future due to regulatory changes, would submit and implement plans and corrective measures to meet applicable compliance standards. For land resources, geology and soils, biotic resources, cultural resources, and human health, it was assumed that current conditions adequately represent the future baseline. The best available data have been used to represent existing conditions. In some cases, information that is several years old represents the best available data regarding design or upper-bound operating conditions of facilities that are now functioning at reduced capacities due to lower workloads.

At each site, the study area evaluated for each resource is consistent with the requirements of the resource. In all cases, the area is large enough to include possible direct and indirect impacts of consolidation activities. For each environmental resource, the study area depends on the nature of the resource and the manner in which it may be affected by the project.

The period for building modification and relocation of functions for the nonnuclear consolidation would be from 1993 to 1995. Depending on the relocated function, operations would be phased in beginning in late 1994 with full operations achieved around 1997 and continuing until the middle of the 21st century.

Overview of Environmental Assessment Methodologies. Brief descriptions of the approaches used in the analyses of land resources, air quality and acoustics, water resources, geology and soils, biotic resources, cultural resources, socioeconomics, waste management, and human health are provided below. More detailed discussions of methodologies and analyses of air quality and acoustics, socioeconomics, and human health are presented in appendixes D, E, and F, respectively.

Land Resources . Land resource analyses included assessments of land use, recreation, and visual resources. The land use analysis was based on assessment of potential impacts to land ownership patterns, potential disturbance of prime farmlands, and future compatibility with local land use plans and policies. The land use analysis included assessments of direct impacts which could result from future project-related activities during the implementation and operation phases, and indirect impacts which could result from land use changes caused by project-induced population growth or decline.

Local-level impacts on urban land use were evaluated for those communities where project in-migrants would reside as determined by the socioeconomic analysis. The construction of new housing on vacant land in the urban areas would be the predominant land use impact. Any increased business, commerce, industrial, or other related activities generated as a result of the proposed program would be absorbed through the utilization of existing office, store, and building space, together with land already platted to accommodate new construction. The analytical methods utilized to evaluate program-induced impacts are similar to those used to determine projected conditions. The amount of land needed to accommodate the project-induced in-migrant population was projected to determine whether project-related impacts can be absorbed under the existing zoning ordinances and be consistent with the adopted city-county comprehensive plans. The land use analysis was predicated on the premise that local decision-makers would enforce existing plans, policies, and ordinances; therefore, future development would be compatible with existing plans, policies, and ordinances.

Land required for future residential offsite use was estimated using the following methods: the acreage requirements (gross) of residential housing needed for project-related in-migration was determined by combining and averaging density factors of residential types found in the Residential Development Handbook by the Urban Land Institute (1990). This resulted in a single factor (6.9 dwelling units per acre) used with the projected in-migration estimates.

For example, 100 in-migrating employees divided by 6.9 dwelling units per acre equals 14.49 acres of space estimated to accommodate these in-migrating employees in offsite housing. The number of in-migrating employees was based on housing projections for each phase of the project developed by the socioeconomic analysis. Offsite impacts of out-migration were not predicted since, although housing and rental units may become vacant, this would not change the land use classification.

Evaluations of impacts on recreational facilities were based on qualitative assessments of potential changes in the use of available Federal, state, and local recreation sites.

Visual resource assessments were based on the Bureau of Land Management Visual Resource Management (VRM) methodology (BLM, 1980). The existing landscape at each site was given a VRM classification ranging from 1 (applied to wilderness areas, wild and scenic rivers, and other similar situations) to 5 (applied to areas where the aesthetic character of the landscape has been destroyed). Landform, vegetation, water features, color, adjacent scenery, scarcity, and cultural modifications were key factors used to determine VRM classification. Visual impacts were assessed based on the potential of the project to alter or conflict with this classification.

Visual impact was determined by assessing the degree of visual contrast that the proposed activities and/or facilities would create with the existing landscape character as seen from viewpoints accessible to the public, such as public roadways, parks, and residential areas. If the contrast would demand attention, and if the degree of contrast would conflict with the VRM classification by exceeding accepted standards, the contrast would be considered an impact. Sensitivity levels of representative key viewpoints, based on the number and concerns of observers and the distance from viewpoints to the affected area, were also taken into consideration.

Air Quality and Acoustics . The assumptions used in the modeling analysis were selected to ensure that the overall assessment was conservative. Assessments of environmental consequences for air quality were based on comparison of project effects with applicable standards and guidelines. The assessment consisted of determining the potential of additions to ambient levels of criteria air pollutants, hazardous air pollutants (HAP), and other toxic compounds, and comparing the total quantities to Federal and state ambient air quality standards and guidelines. The criteria pollutants are the pollutants for which National Ambient Air Quality Standards (NAAQS) exist, as defined in 40 CFR 50. These pollutants are sulfur dioxide (SO_2), nitrogen dioxide (NO_2), nitrogen oxides (NO_x), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter less than 10 micrometers in diameter (PM_{10}). The 189 HAPs include: those listed under Title III of the 1990 Clean Air Act (CAA), as amended through May 1992; those regulated by the National Emissions Standards for Hazardous Air Pollutants (NESHAP); and, those that may have been proposed or adopted in regulations or are listed as guidelines by the respective states.

Available ambient air monitoring data were used to determine maximum background concentrations of pollutants for each site. Results from modeling site emission rates for criteria pollutants, HAPs, and toxic air pollutants were used to estimate the No Action alternative air quality. The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state criteria pollutant, HAP, and toxic pollutant guidelines and regulations to provide an estimate of the effects of the No Action alternative on air quality. Because the maximum background concentration may already include a portion of the pollutant emissions from the site, summation of the maximum background concentration and the No Action concentration may overpredict pollutant concentrations.

The methodology used in modeling the site-specific emissions meets the guidelines of the Environmental Protection Agency's (EPA) Guideline on Air Quality Models (EPA, 1986b). The EPA-recommended Industrial Source Complex Short Term (ISCST) Model (EPA, 1987) was chosen as the most appropriate model to perform the air dispersion modeling analysis because it allows for the estimation of dispersion from a combination of point, area, and volume sources. Required input data for the model were provided by each of the sites. The input parameters include emissions inventories (release rates) and source characteristics (stack height, stack diameter, and effluent velocity), meteorological data, source locations, and distances to the site boundary and critical receptors. Modeling was performed for all compounds that had projected emission rates greater then 100 lb/yr. However, modeling was performed for compounds at emission rates less than 100 lb/yr if emissions at these rates could cause an exceedance of Federal or state air quality standards or guidelines. This was accomplished by obtaining the maximum concentration at or beyond the site boundary for a representative compound emitted at 100 lb/yr. Since the resulting concentration would be the same for any compound emitted at 100 lb/yr, this concentration was compared to applicable air quality standards for all other regulated compounds. If the air quality standard of a regulated compound could be exceeded by emissions below 100 lb/yr, then information on emission rates for the compound were requested from the appropriate DOE field office or from the architecture and engineering contractor. The concentration of the compound was then calculated and compared to applicable air quality standards. All exceedances of quality standards are discussed. EPA guidelines were conservatively applied while performing the air quality assessment. The "highest-high" concentration was selected for comparison to applicable standards and guidelines, instead of the "highest secondhigh" concentration as recommended by EPA. This concentration was the maximum occurring at or beyond the site boundary. It was also assumed that the HAP emissions for each site originated from a single point source located in the approximate center of the site. This assumption generally results in higher concentrations than would actually occur, because emission sources are commonly geographically separated from one another.

Terrain data for the modeling assessment were input for the sites considered to be other than "flat." These include the Kansas City Plant (KCP), the Mound Plant (Mound), the Oak Ridge Reservation Y-12 Plant (Y-12), the Los Alamos National Laboratory (LANL), and the Rocky Flats Plant (RFP). The use of site terrain data in the ISCST model provides more representative results for those sites located in areas not considered "flat."

The emission rates for each pollutant were provided by each site or by the Architect/Engineer which furnished the design information. For most sources, data were provided on an annual emission rate basis in units of tons per year or pounds per year. The model requires units in pounds per hour, assuming that the source was operated for the entire year, or 8,760 hours (the number of hours in a year). Data were generally not available to determine actual operating hours.

The assessment of impacts of the Proposed Action and alternatives involved the addition of baseline concentrations of pollutants to concentrations determined through modeling, which represent emissions during the implementation and operation phases of the project. The sum of baseline concentrations and concentrations attributed to the Proposed Action or alternatives was then compared with state and/or Federal standards and guidelines to determine compliance and the potential significance of impacts.

Acoustic assessments involved evaluating noise emissions from traffic on major routes leading to the sites using the Federal Highway Administration Traffic Noise Prediction model as discussed in appendix D. The assessment of noise impacts of the Proposed Action and alternatives during the implementation and operation phases is based on changes in traffic volumes as a function of changes in employees required during these phases. The EPA guidelines recommend a day-night sound level (DNL) of 55 decibels, A-weighted (dBA), which is sufficient to protect the public from the effect of broadband environmental noise in typically quiet outdoor and residential areas (EPA, 1974). For protection against hearing loss in the general population from nonimpulsive noise, the EPA guideline recommends an equivalent sound level (L_{eq}) of 70 dBA or less over a 40-year period. The Noise Control Act of 1972 (P. L. 92-574), with its subsequent amendments (P. L. 95-609), allows states to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. The No Action baseline includes results from site sound-level measurements, if available, and/or ranges of typical DNL for each location. These sound levels were then compared to local community noise statutes, regulations, and guidelines to determine the acoustic impacts. Workers at each site are exposed to varying levels of equipment noise. Department of Energy (DOE) Order 5480.4 requires compliance with Department of Labor Occupational Noise Exposure Standard (29 CFR 1910.95) for DOE and contractor employees. This standard requires that an effective hearing protection program be administered whenever employee noise exposures equal or exceed an 8-hr time weighted average (TWA) sound level of 85 dBA, where noise levels exceed an exposure to an 8-hr level of 90 dBA or other levels and duration as specified by the regulations. Protection against noise would be provided in the form of administrative or engineering conrol, where feasible, or as personal hearing protection equipment. At a minimum, these requirements are met at each site.

Water Resources . The environmental impacts on surface water and groundwater resources from the Proposed Action and alternatives were assessed by determining the potential degree of change in baseline conditions as a result of the implementation and operation of the Proposed Action or alternatives.

The baseline characterization reflects conditions at the sites as they currently exist. Conditions at the sites used in the analysis of the No Action alternative were considered to be the same as the baseline conditions. The affected environment sections include a brief overview of the following key hydrological features: water availability, usage, rights, and allocations; floodplains and drainage basins; and, water quality with regard to compliance with regulatory authority requirements.

Surface Water . For the baseline environment, surface water flow, water rights, and water quality were studied. An assessment of water availability was made in light of the potential change in demand caused by consolidation activities. The change in the average annual flow of surface water resulting from proposed withdrawals and discharges was determined. The change in stream flow was compared with the average annual flow to determine the impact. Impacts from consolidation activities were predicted if the change in water demand or use exceeded the available water supply, exceeded water allocations, or would be in violation of current water rights agreements. Furthermore, a decrease in stream flow was determined to have an impact if the diminished flow resulted in the alteration of the physical and chemical characteristics of the stream such that the assimilative capacity of the stream was substantially reduced. A reduced assimilative stream capacity could potentially result in the need to revise the Clean Water Act " s (CWA) National Pollutant Discharge Elimination System (NPDES) permit, in addition to changing the characteristics of the stream. An increase in stream flow could have an impact if the stream were to overflow stream banks or erode stream channels.

In accordance with Executive Order 11988, "Floodplain Management," and 10 CFR 1022, "Compliance with Floodplain/Wetland Environmental Review Requirements," the effects of proposed actions on floodplains were considered. Federal agencies are required to avoid, to the extent possible, adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development whenever there is a practical alternative. The locations for the Proposed Action or alternatives were compared to known floodplain areas. Floodplains exist in low-lying areas adjoining inland or coastal waters and are measured as having either a 0.2 percent chance (500-year floodplain) or a 1.0 percent chance (100-year floodplain) of being inundated by a flood in any given year. Activities for which even a slight chance of flooding would be intolerable are "critical actions" and cannot be located within a 500-year floodplain. Reconfigured activities constituting "critical actions" that would be relocated to an area within a 500-year floodplain or any actions modifying areas within the 100-year floodplain would require a floodplains assessment.

The potential impact of reconfigured activities on water quality was evaluated. Baseline water quality was assessed by reviewing the monitoring data for surface water supplies and identifying any individual parameters that exceeded water quality criteria. The water quality criteria are presented to provide an understanding of an undesirable concentration and are not enforceable limits. Although water quality criteria do not directly affect plant activities or discharges, they can be translated into end-of-pipe effluent limitations through the permitting process. As such, any concentrations exceeding water quality criteria were noted and the NPDES permit reviewed to determine whether monitoring for those parameters was required. Relationships between surface water and groundwater quality were also described, as appropriate.

NPDES-permitted discharge outfalls are identified and described. Typical NPDES discharges include: stormwater, one-pass cooling water, and pretreated industrial, sanitary, or a combined pretreated industrial/sanitary effluent flow. Discharges of wastewater to municipal wastewater treatment facilities are also identified and described. Discharges to municipal wastewater treatment facilities are generally regulated by the municipal authority having jurisdiction over the treatment plant. Discharges to municipal wastewater treatment facilities may be required to meet pretreatment standards limiting the volume and character of the waste stream similar to NPDES discharge limits.

Monitoring results for discharges permitted under the NPDES or municipal wastewater treatment facility program were examined to ascertain whether any permit limits were exceeded and if permit requirements were satisfied. Discharge permits set discharge limits and monitoring requirements for discharges. The site compliance history with the permit requirements is presented in the discussion. Any actions taken by the site to identify and/or rectify the cause of the noncompliance were noted. At some sites, the NPDES permit requires the plant to notify the regulatory authority if discharge monitoring identified unpermitted parameters at concentrations above a predetermined level. Although notifications were required, the discharges were not considered violations of the permit. The notification process serves to guide the regulatory authority in the renewal and reissuing of permits. NPDES permits are issued for a maximum period of five years. At sites where a notification requirement is in effect, the compliance activities were noted. Municipal wastewater treatment facility discharge permits are issued for varying lengths of time depending upon the municipality.

Consequences of the site operating in non-compliance with NPDES permit requirements or discharging to a receiving water with poor water quality could include more stringent discharge limitations when the NPDES permit is reissued. Parameters for which a change in future permit requirements may be a possibility are presented. Particular significance was attached to those parameters identified at concentrations exceeding water quality criteria and not complying with NPDES permit limitations. Future NPDES permits will take into consideration the existing water quality, the sites' NPDES monitoring record, and current site activities including the transferred technologies.

Consequences of the site operating in non-compliance with municipal wastewater treatment facility pretreatment requirements could result in fines, the revocation of the permit, or the requirement for additional pretreatment operations.

Groundwater . The analysis considers effects of groundwater usage on aquifers and groundwater quality within the regions-of-influence (ROI) for groundwater resources. Groundwater resources are defined as the aquifers underlying the site and their extensions down the hydraulic gradients to, and including, discharge points and/or the first major users. In the affected environment discussion, local aquifers are described in terms of the extent, thicknesses, and quality of the groundwater.

Current facility groundwater usage is described in each discussion. Cases in which projected groundwater use would exceed locally developed sources of groundwater supply were identified. Existing water rights for the major water users, as well as contractual agreements for water supply to the sites from support communities, were summarized. Impacts associated with construction and operations withdrawal were estimated if available data indicated that serious drawdown problems would occur.

Current groundwater quality conditions were analyzed. The results were compared to Federal and state groundwater quality criteria and drinking water standards to assess current conditions. Impacts of groundwater withdrawals on existing contamination plumes were assessed to determine the potential for changes in their rates of migration. Impacts were assessed by the degree to which drawdown of groundwater levels, groundwater availability, and groundwater quality would be affected by the Proposed Action or alternatives.

Geology and Soils . Analyses of environmental consequences on geology and soils were based on the location and extent (new construction and/or building renovation) of proposed project activities and the local geologic and soils setting. In general, impacts to the geological environment may include destruction of or damage to unique geological features, landslides or shifting caused by loading or removal of supporting rock or soil, and removal or covering of mineral resources.

The descriptions of the individual settings emphasize, as appropriate, the aspects of the local geology that could affect or be affected by project alternatives including geomorphology, faults and seismicity, and general foundation conditions. The degree to which any of the above factors would be affected by the project was an indication of geologic impacts.

Assessments of soil impacts, including soil erosion and contamination, were based on evaluations of implementation and operation activities associated with the Proposed Action and alternatives. Soil impacts during the implementation phase were assessed according to the type of renovation and/or construction activities and the amount of disturbed area. Erosion prevention and control measures are described, as necessary, and their effectiveness is considered. Soil contamination potential was assessed by determining current and future waste management and material-handling practices due to expected operations activities. Spill prevention and control measures are described as appropriate and their effectiveness is considered.

Biotic Resources . Potential impacts to terrestrial resources, aquatic resources, wetlands, and threatened and endangered species were evaluated. In general, potential impacts were based on the degree to which various habitats of species would be affected by the project. Where appropriate, impacts were evaluated with respect to Federal and state protection regulations and standards.

Potential impacts to terrestrial resources, wetlands, aquatic resources, and threatened and endangered species include loss and disturbance of wildlife and wildlife habitats, as well as exposure of flora and fauna to air and water emissions. Impacts on terrestrial plant communities were evaluated by comparing data on site vegetation to proposed land requirements. Impacts to wildlife were based to a large extent on plant community loss, which is closely related to animal habitat. Effects on wetlands were addressed similarly to terrestrial plant communities. Project impacts on aquatic resources considered whether water withdrawal or discharge would affect site streams onsite. Impacts to threatened and endangered species were addressed in a manner similar to that for terrestrial and aquatic resources because the sources of potential impacts are similar.

Cultural Resources . Impact analyses for cultural resources focused on three major elements: prehistoric, historic, and Native American resources. The affected environment sections include a brief overview by element type; the number and type of resources in the project areas, if known; their status on both the National Register of Historic Places (NRHP) and appropriate state registers; and the importance of traditional resources to Native American groups with historical ties to the project areas.

Assessments for prehistoric and historic resources focus mainly on those properties likely to be eligible for the NRHP. In addition to identifying the numbers and kinds of prehistoric and historic resources to be affected, the following issues were also considered: evaluation of the relative importance of a resource type in the regional context, the depositional integrity of a given resource, and the relative degree of protection afforded similar resources in nonproject areas in the region. The individual resource type, the proximity of impact areas to the resources, and the likely duration of impacts were considered in the analysis of Native American resources. Impacts to prehistoric and historic resources were predicted if the proposed project could substantially add to existing disturbance of resources in the project areas or if the project could adversely affect NRHP-eligible resources, or cause loss or destruction of important scientific, cultural, or historic resources. Impacts to Native American resources were predicted if the project had the potential to affect sites important for their position in the Native American physical universe or belief system, or to reduce access to traditional use areas or sacred sites.

Socioeconomics . A detailed description of the assumptions, data, methodologies, and models used for the assessment of environmental consequences is provided in appendix E. Environmental consequences for socioeconomics and community services were assessed for an ROI surrounding each site. The ROIs were determined to be those areas in which approximately 90 percent of the current DOE and contractor employees reside. Population growth projections were developed for each site to establish a No Action population baseline from which other baseline estimates for employment, housing, and community services were projected for each county, city, and special purpose jurisdiction in the ROI. This No Action baseline was used as a comparison against the effects that the Proposed Action and alternatives might have on the conditions of each county, city, and special purpose jurisdiction in the ROI. The results of the socioeconomics analysis for cities, counties, and special purpose jurisdictions with impacts greater than 1 percent are identified in the text.

The assessment of impacts associated with the Proposed Action and alternatives was based on the additional employees the project would require during the construction and operations periods. These directly created jobs would also lead to indirectly created jobs. A labor analysis was performed to ascertain the amount of appropriate labor available in the region to fulfill the employment requirements created by the project and the number of workers that would be expected to in-migrate with their families. This project-related population increase was compared to the No Action population growth baseline to determine additional housing and community services that would be needed to accommodate the new growth. In addition to assessing the effects of population increases, the effects of decreasing population caused by out-migrations from job losses at the sites where there would be workforce reductions were also analyzed. Projections for population losses are conservative because they are estimated on the assumption that all the jobs lost will occur in the single year 2000.

Projected housing needs were based on current housing unit and population data and were developed by estimating the household size from current population and housing unit ratios. These ratios were applied to the estimated future population trends to obtain the number of housing units needed to accommodate the projected No Action baseline population and the population created by the project. Estimates of additional housing unit vacancies created directly and indirectly by a project alternative as a result of out-migrations were also developed from current population and household size ratios.

The major water supply and wastewater treatment systems providing service in each ROI were identified and information was collected on their current capacities and average daily demands. The effects of any future population on the average daily demands and capacities of these systems were then evaluated.

Statistics on public school enrollments, school capacities, and the number of teachers were collected for all school districts in each ROI. The percentage of school-age children in the population was applied to future population trends to project the number of enrollments with the No Action future baseline and the number of future students as a result of the project. Estimates of the number of teachers needed in the future were based on current pupil-to-teacher ratios and were developed by applying future enrollment trends to these ratios.

Projected population data were applied to current hospital occupancy rates and capacities to determine the number of additional hospital beds in excess of capacity, if any, that would be needed to accommodate future population with the No Action baseline or as a result of the project. Current level-of-service ratios for physicians were applied to projected population trends to estimate the number of physicians needed in the future.

Statistics on current levels of service (LOS) for police and fire protection were applied to future population trends to estimate the number of additional personnel, if any, that would be needed with the No Action baseline or as a result of the project.

Local transportation impacts were assessed in terms of the changes to roadway traffic volumes and service levels associated with consolidation activity employment changes and commercial trucking requirements. Projected vehicle accident and fatality levels were also assessed relative to baseline conditions.

Waste Management . Waste management assessments were based on projected waste types and waste volumes due to the implementation and operation of the Proposed Action and alternatives; the waste storage, treatment, and disposal facilities required to manage these wastes; the current waste types and waste volumes generated; and the existing and planned storage, treatment, and disposal facilities. Data for projected wastes were derived from conceptual design reports, other environmental reports, or site contacts. Existing annual waste generation data and existing onsite storage, treatment, and disposal capacities were obtained directly from each of the facilities.

The impact assessment for the Proposed Action and alternatives considered the additional waste types and waste volumes generated by the Proposed Action and alternatives, compared to the No Action baseline at each of the affected sites. Impacts to the existing storage, treatment, and disposal facilities due to changes in waste type volumes could consist of incremental or substantial increases (or decreases) to onsite waste volumes that could cause current design capacities to be exceeded (or underutilized). The result could produce minor or no impacts on the operational waste management functions or identify the need to either upgrade or construct new waste management facilities to handle the additional waste types or waste volumes.

Human Health. Human health effects were assessed for normal operations and potential accidents. Information contained in the site environmental reports and received directly from the sites was used to evaluate No Action conditions as well as the Proposed Action and alternative conditions. The air and water concentrations of hazardous chemicals and radioactive material were compared to applicable permit, regulatory, and DOE operational limits. These concentrations were also compared to cancer potency factors for carcinogenic compounds and the Hazard Index for noncarcinogenic compounds. Additionally, each operation was examined for the use of hazardous and radioactive materials in the manufacturing process. When available, monitoring data were compared to DOE, Occupational Safety and Health Administration (OSHA), and National Institute for Occupational Safety and Health limits for worker exposure. The results of these comparisons were used to assess the human health effects.

The hazardous chemicals and radioactive materials associated with each of the activities proposed for transfer were also assessed for their potential to affect human health in the event of an accident. An inventory of hazardous/toxic chemicals was conducted to generate a list of toxicants and the processes with which they are associated. In addition, quantitative hazard assessments that had been previously performed and documented were reviewed to determine the accidents that had been assessed or analyzed. Accidents at donor and receiver sites that involved hazardous or radioactive materials and processes similar to the functions that may be relocated to the receiver sites were assessed to make qualitative comparisons. Because of decreased workloads, the time period of the review (1986-1990) was chosen as being more representative of maximum future activity levels at the various sites because the activity levels for the last two years have been uncharacteristically low.

Baseline Conditions Common to All Sites. Current operations at each Complex site result in the emission of pollutants to the atmosphere, discharge of pollutants in wastewater, and the generation of wastes. DOE orders require that site operations be conducted in accordance with all regulatory standards and provide for protection of the public and the environment. Monitoring is conducted at each site to determine compliance with these standards. Where monitoring indicates noncompliance, DOE orders require that appropriate corrective action(s) and follow-up be performed. Monitoring activities conducted at DOE sites are reported in accordance with permit, regulatory, and DOE operational requirements. Additionally, monitoring results and analyses are included in the sites' annual environmental reports, which are available to the public as required by DOE Order 5400.1, General Environmental Protection Program .

At all sites, applicable waste management regulatory requirements and guidelines for hazardous/toxic wastes include the Resource Conservation and Recovery Act (RCRA) Permit, RCRA Subtitle C Standards and Toxic Substance Control Act (TSCA) regulations. Nonhazardous (sanitary) solid wastes are governed by RCRA Subtitle D Standards. All radioactive and mixed waste management activities at the sites are conducted primarily under DOE Order 5400.3, Hazardous and Radioactive Mixed Waste Program , and DOE Order 5820.2A, Chapter III, which defines the requirements for handling, storage, and shipment of low-level and mixed waste. All mixed waste storage areas must meet RCRA containment system requirements of 40 CFR 175. The recent Federal Facilities Compliance Act (October 6, 1992) requires DOE to submit site-specific plans to EPA and the states containing schedules for providing treatment capacity for mixed waste streams at DOE sites. DOE is proposing to develop the site-specific plans based on decisions made in the National Compliance Plan for DOE Mixed Wastes and the Office of Environmental Restoration and Waste Management (EM) Programmatic Environmental Impact Statement (PEIS). Due to the small quantities of mixed wastes associated with the relocated nonnuclear activities, the Proposed Action will not affect DOE's ability to comply with the Federal Facilities Compliance Act.

In accordance with RCRA, as amended, the Pollution Prevention Act of 1990 , and DOE Order 5400.1, all sites have an active pollution prevention and waste minimization program to reduce the volume and toxicity of waste generated to the extent that is economically practical. The site programs are an organized and continual effort to systematically reduce waste generation. The overall focus of these programs is aimed at pollution prevention, which involves the elimination/minimization of pollutant releases to all environmental media from all aspects of site operations. This includes air emissions and water discharges to sewer systems, as well as the offsite disposal of solid waste.

Many of the solvents used in the Complex and proposed to be used in the reconfigured nonnuclear facilities have been identified as ozone depleting pollutants. Attempts are being made, both internationally and nationally, to reduce ozone-depleting gases. In September 1987, 27 nations, including the United States, signed an agreement called the Montreal Protocol, to limit the production of chlorofluorocarbons (CFC) and halogens. A second meeting regarding the Montreal Protocol was held in June 1990. The participants agreed to a total phaseout of CFCs, halogens, and carbon tetrachloride (CCl_4) by the year 2000. A third meeting of the Montreal Protocol extended the phasing-out of ozone-depleting gases into the early 21st century due to the slow development of CFC alternatives. Schedules contained in Title VI of the CAA Amendments (November 1990) call for the phaseout of all CFCs and halogens between 2015 and 2030. All DOE sites have, or aredeveloping, site-specific plans to meet the CAA-mandated phaseout schedule. Potential ozone depleting chemicals identified in 40 CFR 82 and discussed in this Environmental Assessment (EA) include 1,1,1-trichloroethane (TCA), CCl_4, chlorodifluoromethane (HCFC-22), dichlorodifluoromethane (CFC-12), and trichlorotrifluoroethane (CFC-113).

Workplace Safety and Accidents. Operations at all DOE sites expose workers to occupational hazards during the normal conduct of their work activities. Accidents and injuries that occur on the job can be minimized but not entirely avoided. Public Law 91-596, Occupational Safety and Health Act of 1970 , establishes Federal requirements for assuring occupational safety and health protection for employees. The general industry safety and health standards pursuant to Public Law 91-596 are established at 29 CFR 1910, Occupational Safety and Health Standards . The Department has adopted this regulation and standards and provided implementation guidance in DOE Order 3790.1B Federal Employee Occupational Safety and Health Program . The policy set forth in the Occupational Safety and Health Program for the Department of Energy is to:

- Provide places and conditions of employment that are as free as possible from recognized hazards that cause or are likely to cause illness or physical harm.
- Assure that employees and employee representatives shall have the opportunity to participate in the Federal Employee Occupational Safety and Health Program.
- Establish programs in safety and health training for all levels of Federal employees.
- Consider all Occupational Safety and Health Administration (OSHA) and 29 CFR 1960 requirements to be the minimum standards for Federal employees.

As part of a comprehensive nuclear and occupational safety and health initiative announced by the Secretary on May 5, 1993, the Department intends to initiate consultation with OSHA with the aim of establishing regulation of all DOE facilities by OSHA.

Occupational safety and health training is provided for all employees at DOE facilities and includes specialized job safety and health training appropriate to the work performed. Such training also includes informing employees of their rights and responsibilities under section 19 of the Occupational Safety and Health Act of 1970 , Executive Order 12196, 29 CFR 1960, and the DOE's Federal Employee Occupational Safety and Health Program. DOE Order 3790.1B also includes the requirements and guidelines for the Federal Employee Industrial Hygiene Program for the Department of Energy.

Operations at each site also present the potential for exposures of workers to hazardous constituents. DOE orders require that site operations provide for protection of workers, including having programs in place to protect workers. DOE Orders 5480.11, Radiation Protection for Occupational Workers, and 5483.1A, Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities, establish protection of workers against radiological and hazardous materials, respectively. Should an exposure occur, the incident would be reported in accordance with DOE Order 5000.3A, Occurrence Reporting and Processing of Operations Information , which would include appropriate corrective action(s) and follow-up.

As with any facility, operations at each site have the potential for accidents. DOE orders require the review of all planned and existing construction and operations for the potential for accidents and the assessment of the associated human health and environmental consequences, should an accident occur. The results of these reviews are used as the basis for determining the need for controls or other mitigative actions to eliminate or greatly reduce the potential for, and consequences of, an accident. These reviews are required before authorization of construction or start of operations. The orders that require review include, but are not limited to, the following: DOE Order 5440.1E, National Environmental Policy Act (NEPA); DOE Order 6430.1A, General Design Criteria ; DOE Order 5481.1B, Safety Analysis and Review System ; DOE Order 5480.23, Nuclear Safety Analysis Reports (which canceled 5481.1B on 4/30/92); and DOE Order 5480.1B, Environment, Safety, and Health (ES&H) Program for Department of Energy Operations . The reviews involve the identification of hazards and an analysis of normal, abnormal, and accident conditions. This includes consideration of natural and man-made external events including fires, floods, tornadoes, earthquakes, other severe weather events, human errors, and explosions. The sites associated with the Proposed Action have complied with applicable DOE orders. KCP has contracted for a site Safety Assessment which is currently under review by DOE. The Savannah River Site (SRS) is currently reviewing the need for, and update of, Safety Analysis Reports (SAR).

In accordance with DOE Order 5500.1B, Emergency Management System , emergency response planning and training are provided to mitigate the consequences of potential accidents. Additionally, should an accident occur, the incident would be reported in accordance with DOE Orders 5000.3A, Occurrence Reporting and Processing of Operations Information, and 5400.4, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which would also include appropriate corrective action(s) and follow-up.

Consequences of the Proposed Action Common to All Sites. Consolidating or relocating nonnuclear functions to a site could result in increases in the emissions of pollutants to the atmosphere, discharges of pollutants in wastewater, and the generation of wastes. Members of the public could be exposed to pollutants that are released to the environment. Additionally, these functions, as with all industrial processes, would have the potential for exposing workers to hazardous constituents and accidents.

The monitoring currently conducted at each Proposed Action site will be reviewed to ensure that monitoring activities are adequate to assess whether new operations and site conditions are adversely affecting members of the public, workers, or the environment. At each site, modifications to monitoring activities would be made, as appropriate. Any modifications, as well as the bases for the modifications, would be documented in the sites' Environmental Monitoring Reports, as required by DOE Order 5400.1, General Environmental Protection Program . The results of these monitoring activities and the potential for exposures to the public and workers would be reviewed, processed, and reported, as discussed earlier.

In many cases, the nonnuclear functions proposed for relocation are similar to or the same as activities currently being performed at the receiver site. In addition, the processes and materials associated with relocated functions are similar to or the same as those currently performed and used at the receiver sites. These processes and materials have been previously reviewed and analyzed in accordance with applicable regulatory and DOE order requirements and documented in various forms, including memoranda, safety assessments, and various NEPA documents. In all cases, current activities at these sites have received the appropriate authorization to operate. The human health impacts of relocating a nonnuclear function to a receiver site were assessed in the following manner for each site: from an operational perspective, the additional impacts associated with that activity and the cumulative impacts after relocation were determined and presented; from an accident perspective, the processes to be transferred and the potential hazards they present were assessed. This assessment included the review of NEPA documents, SARs, and other applicable documents.

Additionally, all proposed nonnuclear functions to be consolidated or relocated are currently being performed at existing DOE sites and do not constitute new activities within the Complex.

Workplace Safety and Accidents. Construction and operation of relocated functions at each Proposed Action site would result in increased exposure of site workers to industrial-type work hazards and accidents. Before implementation of the Proposed Action at any site, however, notification would be made to the site's environmental, safety, and health staff that a new process or facility is being planned, or that an existing process is being considered for change or modification to allow the impact of the anticipated change on the work environment to be evaluated. Appropriate measures would be implemented to minimize work hazards and accidents based on this early evaluation. Once operational, as part of the Occupational Safety and Health Program at each site, ongoing surveillance of the new or modified processes or activities would be performed to identify potential health hazards. If potential health hazards are identified, a hazard evaluation would be conducted to determine the extent of the hazard and if required, the recommended control measures. Where feasible, engineering controls would be used to protect worker health and safety. Administrative controls and personal protective equipment would supplement engineering controls as appropriate.

4.1 Affected Environment and Environmental Consequences of the Proposed Action

This section discusses the affected environment and environmental consequences of the Proposed Action. Sites discussed include existing nonnuclear facilities of the DOE Complex and potential Complex sites not currently performing nonnuclear functions, but which are candidates for such functions with the Proposed Action and alternatives.

The affected environment discussion includes an analysis of the consequences of continued operation at each of the sites that may be affected by the Proposed Action: the principal consolidation site-KCP; other consolidation sites-SRS, LANL, Y-12, Sandia National Laboratories, New Mexico (SNL); and sites where the Complex mission would be closed out-Mound, the Pinellas Plant (Pinellas), and RFP (nonnuclear functions only). Because the affected environment discussions include the consequences of continued operations at each site, they represent the impacts of the No Action alternative. The discussions of the affected environment reflect each site's expected reduced workload projections. For Mound, Pinellas, and RFP, this means that they would continue to have the same manufacturing missions; however, the anticipated lower workloads would require some facilities to be placed in a standby mode.

The analysis of environmental consequences of the Proposed Action at each site includes the effects of all nonnuclear functions proposed for relocation (see figure 3.3-1). The discussion of environmental consequences addresses consolidation of electrical/mechanical functions at KCP; most tritium-handling functions at SRS; detonators, calorimeters, neutron tube target loading, and beryllium technology and pit support functions at LANL; beryllium technology and pit support functions as an option at Y-12; and neutron generators, cap assemblies, thermal batteries, and milliwatt heat source surveillance functions at SNL.

Impacts associated with implementation and operations activities are described for each resource at each site that would receive new missions. Following these discussions, the impacts associated with transition activities and decontamination and decommissioning (D&D) due to closing out the Complex missions at Mound, Pinellas, and RFP (nonnuclear functions only) are described for each resource.

A limited capability currently exists at Lawrence Livermore National Laboratory (LLNL) to perform beryllium technology and other metal machining work now performed at RFP. This would not require analysis of impacts of this type of work at LLNL, nor inclusion of LLNL as a site analyzed in this EA, because existing capabilities are already in place.

4.1.1 Kansas City Plant

Detailed discussion of KCP's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.1. The functions and processes associated with the Proposed Action to be consolidated at KCP and the proposed facility modifications required to support each relocated function are discussed in section 3.3.1. Discussions of the assumptions used in this EA for determining the affected environment and environmental consequences at KCP and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action that supports the following discussion on KCP is also provided in the chapter 4 introduction and section 4.1.

4.1.1.1 Land Resources

Affected Environment. KCP consists of 141 acres and is located within the boundaries of the 300-acre Bannister Federal Complex. The Bannister Federal Complex is located approximately 12 miles south of the downtown area of Kansas City, MO (figure 3.2.1-1). Generalized land uses at the Bannister Federal Complex and vicinity (including KCP) are shown in figure 4.1.1.1-1. KCP currently contains approximately 3.2 million ft^2 of floorspace, with approximately 82 percent located within the large Federal office/industrial building that dominates the site. KCP, as well as the remainder of the Bannister Federal Complex, is compactly developed with limited open space. Residential distribution of KCP employees is discussed in section 4.1.1.7.

No residential structures are within the Bannister Federal Complex. The General Services Administration operates a child care center onsite with a capacity of 160 children, 400 feet north of the main DOE building and west of the DOE-controlled parking area. The center currently has approximately 150 children enrolled and a staff of 25 (KC ASAC, 1991c). Kansas City has zoned the Bannister Federal Complex, including KCP, heavy industrial. It is city policy to plan for space for existing and new industries by expansion rather than relocation (Kansas City, 1990).

Land use within a 2-mile radius of the Bannister Federal Complex is urban, consisting of 41 percent residential (containing 15,164 dwelling units), 42 percent open space (25 percent consists of city-owned recreational lands; the remainder is vacant property), 6 percent commercial, 6 percent publicly owned (Federal, state, and local government), and 5 percent industrial (Kansas City, 1992). The closest residence to the Bannister Federal Complex is 20 feet away at its northernmost boundary; however, this residence is 540 feet northwest of the closest DOE-controlled property. A multi-family development west of the Bannister Federal Complex is 409 feet away from the nearest DOE-controlled property.

The city proposes to expand the Indian Creek Greenway through future acquisition of vacant private property, which would increase the amount of permanent open space around the Bannister Federal Complex (Kansas City Board, 1983). There are no prime farmlands on the Bannister Federal Complex.

The Bannister Federal Complex does not contain any public recreation facilities. A U.S. Marine Corps baseball diamond and the General Services Administration child care center playground are located at the northwest corner.

Human modifications to the natural landscape of the Bannister Federal Complex and vicinity are consistent with that of the Kansas City urban area. The Bannister Federal Complex presents a view of a typical industrial facility with most of the structures lower than 35 feet. The landscape of the Federal property, consisting of office/industrial uses, is applicable to VRM Class 5.

Environmental Consequences. The relocated functions would be incorporated into existing buildings at KCP through the rearrangement of existing activities and the use of vacant space. No building additions or major disturbances of land are proposed. The relocated functions would be compatible with existing KCP missions. The Proposed Action would maintain employment at KCP close to current levels (see section 4.1.1.7). Offsite land requirements for residential development as a result of project related in-migration would be approximately 4 acres during implementation and 47 acres during operations. The extensive public and private recreational facilities in the region could easily absorb the anticipated demand. Because relocated facilities would be placed in existing structures, the impacts on visual resources would be negligible and would not affect VRM classifications.

4.1.1.2 Air Quality and Acoustics

Affected Environment. The climate at the Bannister Federal Complex and in the surrounding region is characterized as humid, continental, with warm summers, moderately cold winters, and moderate annual precipitation evenly distributed throughout the year (Trewartha, 1954). The annual average temperature in the area, as measured at the Kansas City National Weather Service (NWS) station, is 54.1 "F; temperatures vary from an average daily minimum of 17.2 "F in January to an average daily maximum of 88.5 "F in July. Annual average precipitation is 35 inches with most occurring between April and October. About 20 inches of snowfall are typically recorded per year. Maximum monthly precipitation measured at the Kansas City NWS station ranged from 2.66 inches in January to 11.34 inches in September (NOAA, 1991c).

Ambient Air Quality . The Bannister Federal Complex is located in the Metropolitan Kansas City Intrastate Air Quality Control Region (AQCR). This AQCR is designated as attainment by the EPA for all criteria pollutants (40 CFR 81.326). The Missouri state ambient air quality standards for criteria pollutants, which are the same as the NAAQS, are listed in table D2.1.1-1.

Missouri has standards for the HAPs regulated by NESHAP. The Missouri Department of Natural Resources has guidelines for acceptable ambient air levels of the 189 HAPs specified in the CAA, as amended. The HAPs/toxics described in this section are those currently used at KCP or those anticipated to be used with the Proposed Action.

Ambient air quality within and near the Bannister Federal Complex is monitored at three perimeter locations for each of the criteria pollutants. The data from each of these monitoring stations for 1990 are presented in table D2.1.1-2. To achieve a conservative estimate, the maximum background concentrations, as measured from the monitoring stations, were used in this analysis. With the exception of the ozone (1-hour) standard, the ambient air quality in the Bannister Federal Complex area does not exceed applicable guidelines or regulations. The ozone standard is exceeded primarily due to chemical reactions that involve vehicle emissions.

The principal sources of criteria air pollutants are the four boilers serving the Bannister Federal Complex. Table D2.1.1-3 presents an emissions inventory of these sources. Volatile organic compounds (VOC) emission sources include fugitive emissions and fuel storage tanks (KC ABA, 1987). Hazardous/toxic air pollutants are emitted from various process sources at the Bannister Federal Complex. Analytical data from a stack monitoring project (KC ASAC, 1992b) detail quantities of hazardous/toxic air pollutants released (table D2.1.1-5). Because radioactive materials are not processed at KCP, no radioactive materials are released to the atmosphere at KCP.

Air quality under ambient and No Action conditions at KCP is shown in table 4.1.1.2-1. Ambient air quality monitoring data are listed as "maximum background concentration," and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and the averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of the ozone (1-hour) standard, and the proposed Missouri state guidelines for hydrogen chloride, phosphoric acid, and sulfuric acid, baseline air quality concentrations in the Bannister Federal Complex area do not exceed, and are not expected to exceed, applicable guidelines or regulations. The maximum measured ozone background concentration is approximately 110 percent of the 1-hour standard. The hydrogen chloride and phosphoric acid concentrations are approximately 130 and 220 percent, respectively, of their proposed 24-hour standards. The sulfuric acid concentration is approximately 170 percent of the proposed 24-hour standard. The majority of the ozone concentrations is attributed to chemical reactions involving vehicular traffic and not emissions from KCP.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions . The major noise sources within the Bannister Federal Complex include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). Sound-level measurements were made around the west boilerhouse and at the western site boundary of the Bannister Federal Complex. The maximum measured sound level at the western site boundary along Troost Avenue was 69 dBA (KC ASAC, 1991e). The contribution from the plant to noise levels at the other site boundaries is minimal. Traffic is the primary source of noise (other than the steam plant) at the site boundaries. The acoustic environment in residential areas near the Bannister Federal Complex away from major roads was assumed to be that of a typical suburban or urban location, with DNL in the range of 53 to 62 dBA (EPA, 1974). The Kansas City community regulations limit noise levels in residential areas to an L_{eq} of 60 dBA during the daytime and to 55 dBA at night. In commercial and light industrial areas voice levels are limited to 80 dBA (Kansas City, 1982).

Sound levels at the Bannister Federal Complex boundaries are within applicable city and Federal guidelines and limits, except at the western boundary, due to the Bannister Federal Complex west boilerhouse and local traffic. A noise-dampening enclosure has been proposed and would be installed to reduce noise levels from the west boilerhouse cooling tower condenser pumps. This enclosure should reduce noise levels in the affected residential areas.

Environmental Consequences.

Air Quality . The consolidation of the electrical/mechanical operations at KCP would be accomplished by renovating and upgrading space in existing buildings (section 3.3.1). Renovation of these facilities would temporarily increase particulate matter emissions such as dust and dirt, and vehicle emissions. This increase is minor when compared to overall site emissions and is not expected to significantly contribute to existing air quality concentrations.

The potential emission rates for the consolidation of nonnuclear manufacturing activities at KCP are listed in table D3.1.1-1. The Proposed Action's contribution to ambient air quality is shown in table 4.1.1.2-2. The contributions from the Proposed Action are a very small percentage of the applicable regulations or guidelines. Consolidation of the nonnuclear activities at KCP would not result in the emission of radioactive materials from normal operations.

Total pollutant concentrations are within applicable standards or guidelines except for O_3, hydrogen chloride, phosphoric acid, and sulfuric acid. As stated previously, the exceedance for O_3 is due to vehicular traffic in the Kansas City metropolitan area and not from site activities. The exceedances of the state proposed guidelines for hydrogen chloride, phosphoric acid, and sulfuric acid are due to current operations.

Acoustic Conditions. Effects of the Proposed Action on noise levels during construction and operations have been evaluated for the major traffic routes around the Bannister Federal Complex. The changes in traffic volumes are expected to result in an increase of 2 decibels (dB) in peak-hour sound levels along Bannister Road and Troost Avenue. Changes in sound levels along other routes are expected to be less than 1 dB. The predicted rise in noise levels along the major access routes is expected to cause little or no increase in annoyance to the surrounding communities or individuals.

Noise generated by construction activities and onsite operation activities is not expected to increase offsite noise levels. Construction activities are limited primarily to interior renovation of existing buildings, resulting in few outdoor noise sources. Noise generated by renovation work and by operational facilities, equipment, and machines is not expected to cause ambient noise levels at the site boundary to exceed EPA guidelines.

Although no significant increase in noise is expected offsite from construction and operations, measures would be implemented onsite to protect workers' hearing including the use of standard silencing packages on construction equipment and providing workers in noisy environments with hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas, and a hearing protection program would be conducted.

4.1.1.3 Water Resources

Affected Environment. This section describes the surface water and groundwater resources at KCP.

Surface Water . KCP is located near the confluence of the Big Blue River and Indian Creek. Individual drainage basins exist for each, but both the Big Blue River and Indian Creek are included in the Big Blue River basin. KCP lies on the divide between the two drainage basins, both of which receive surface runoff and cooling water discharge from the plant. The Big Blue River drains 188 square miles upstream of KCP, with a mean annual flow of 159 cubic feet per second (ft^3/s) past the plant's eastern perimeter. Flow in Indian Creek during the summer is primarily effluent from the sewage treatment plant located on Indian Creek upstream of KCP (KC DOE, 1988, 1989). Indian Creek has a mean annual flow of 23 ft^3/s (KC ABA, 1986). Surface water channels near KCP are shown in figures 3.2.1-1 and 3.2.1-2.

No surface water is withdrawn at KCP (KC DOE, 1989). The Kansas City, MO, municipal water supply system provides all drinking and process water for KCP. The water usage at KCP averages approximately 1.4 million gallons per day

(MGD) (table 3.2.1-3).

Four NPDES outfalls at KCP, numbered 001 through 004, discharge a combination of stormwater and one-pass cooling water. Outfall 001 discharges to the Big Blue River and outfalls 002, 003, and 004 discharge into Indian Creek. There are six unpermitted stormwater outfalls at the Federal complex under the responsibility of the General Services Administration. Two discharge to the Big Blue River and four discharge to Indian Creek.

Industrial wastewater is pretreated onsite at the 1.3 MGD-capacity industrial wastewater pretreatment facility. The site currently discharges approximately 0.2 MGD to the industrial wastewater pretreatment facility. Following pretreatment, effluent is monitored and discharged in combination with KCP sanitary wastewater to the Kansas City Municipal Wastewater Treatment Plant. Wastewater generation from KCP is estimated at 200 million gallons per year (MGY) (table 3.2.1-2).

The quality of the effluent discharged from KCP to the Kansas City Municipal Wastewater Treatment Plant is regulated by Kansas City, MO, Discharge Permit and city ordinances administered by the Kansas City, MO, Water and Pollution Control Department and by the U.S. EPA Pretreatment Standards for the metal-finishing category (40 CFR 433.17) (KC ASAC, 1992c). KCP discharges to the municipal wastewater treatment plant include untreated sanitary sewage and treated industrial wastewater effluent from the KCP Industrial Wastewater Pretreatment Facility. Regulatory compliance is monitored where these two flows are combined (KC ASAC, 1992c). Table 4.1.1.3Ä1 presents a summary of the parameters monitored, a comparison of the average concentrations discharged in 1991 with regulatory standards, and the estimated total quantity of each parameter discharged from KCP to the municipal wastewater treatment plant during both 1990 and 1991. As indicated in the table, the estimated quantity of constituents released in the plant effluent has decreased significantly between 1990 and 1991. In 1990, two exceedances of chlorinated solvents, one exceedance of boron, and one exceedance of total toxic organics occurred (KC ASAC, 1991a). No discharge limits were exceeded during the required monitoring periods in 1991. However, the metal finishing pretreatment standard was exceeded once for total toxic organics and lead and twice for cadmium (KC ASAC, 1992c). As required, the Kansas City Water and Pollution Control Department was notified in each case, source investigations were initiated, and follow-up sampling was conducted. In 1992, KCP maintained full compliance with city and Federal wastewater discharge standards without a single violation.

As part of KCP's Waste Minimization and Pollution Program, design work progressed on a Central Organics Removal System (KC ASAC, 1992c). This system will consist of new piping to route all chlorinated solvent and total toxic organics-contaminated wastewater at KCP to a new organics treatment facility which would treat it prior to discharge to the Kansas City Municipal Wastewater Treatment Plant (KC ASAC, 1991c). The Central Organics Removal System does not have NEPA approval and construction is not yet underway.

KCP lies within the floodplain of the Big Blue River and Indian Creek. A flood exceeding the protective capacity of the existing levee system, designed for a once-every-70-years flood, poses a threat to the facilities (KC COE, 1990). Additional flood control works, providing protection against a 500-year flood, are under construction and scheduled for completion in December 1993. An environmental review of the levee construction project found no significant environmental impacts, and a Finding of No Significant Impact (FONSI) was prepared by DOE (KC COE, 1990). Upon completion of the levee, KCP will no longer be within floodplain areas.

Surface Water Quality . Water quality in Indian Creek and Big Blue River is affected by effluent introduced upstream of KCP from the Leawood, KS, Sewage Treatment Plant on Indian Creek, and runoff from the urbanized Big Blue River watershed. Water quality in the Big Blue River is monitored monthly at three locations and quarterly at three additional locations for the same parameters monitored at the NPDES-permitted outfalls (KC ASAC, 1991a). Water quality monitoring results for the Big Blue River near KCP in 1990 are presented in table 4.1.1.3-2. The monitoring results reflect the water quality of the river . Water quality would be taken into consideration in future NPDES permitting of all upstream and downstream dischargers, including KCP.

As indicated in table 4.1.1.3-2, the average concentration of silver downstream of all KCP outfalls exceeds Missouri chronic water quality standards. Identical results were found upstream of KCP on the Big Blue River, indicating that the source of contamination is upstream. Similarly, the average concentration of aluminum, nitrate, thallium, and total dissolved solids exceeded Federal drinking water regulations. However, these parameters were measured at similar levels upstream of KCP, again indicating the source of contamination is upstream. Although the average concentration of iron was within Missouri water quality standards, the maximum concentrations exceeded these standards. The maximum upstream and downstream concentrations exceed standards, and the difference between the upstream and downstream concentrations also exceeds standards.

Monthly monitoring of Indian Creek, conducted at two locations downstream of KCP, indicates that average silver and lead (Pb) concentrations exceeded applicable Missouri water quality standards in 1990. Similar concentrations observed upstream of KCP and low concentrations in KCP outfalls indicate that the source of these constituents is upstream of the plant.

NPDES permitted outfall 001, one of the three outfalls discharging to the Big Blue River, has a flow of approximately 0.7 MGD (KC ASAC, 1991c). 1,2-dichloroethylene (DCE) from contaminated groundwater infiltrating into the storm sewer system has been found in Outfall 001 effluent. Sewer rehabilitation projects have reduced DCE levels at Outfall 001 to an average of 5 to 7 micrograms per liter (æg/L) (KC ASAC, 1991a). For 1992, the annual average concentration of solvent in outfall 001 was 4 "g/L, and efforts to further reduce the discharge are continuing. DCE concentrations for all monitoring stations in the Big Blue River and Indian Creek were below the detection limits of the analysis (KC ASAC, 1993b). The two other outfalls emptying to the Big Blue River discharge only stormwater from non-industrial areas of the Bannister Federal Complex.

Seven outfalls empty into Indian Creek from the Bannister Federal Complex. Three of these (002, 003, and 004), which discharge a total of approximately 0.8 MGD of stormwater and one-pass cooling water, are covered by an NPDES permit (KC ASAC, 1991c). The remaining four outfalls discharge only stormwater from non-industrial areas of the Bannister Federal Complex.

All average effluent concentrations were within NPDES limits in 1990. Past violations for polychlorinated biphenyls (PCB) led to the reconstruction of Outfall 002, resulting in compliance in 1989 and 1990 (KC ASAC, 1991a). Zinc concentrations exceeded notification levels nine times in 1990, although concentrations in the receiving water bodies remained within applicable standards (table 4.1.1.3-1). It is important to note that the exceedance of a notification level is not considered a permit violation (KC ASAC, 1991a). A zinc source report was prepared and issued in March 1991. This report associated elevated levels of zinc with rainwater runoff from vehicle parking areas, and from galvanized equipment and fencing on roofs and grounds of the facility (KC ASAC, 1993b).

Groundwater . KCP lies on alluvium consisting of a complex of continuous and discontinuous units of clayey silt, sand, and gravel. Two separate water-bearing units are present within the alluvium. The basal gravel unit is less than 1 foot to 6 feet thick (KC ASAC, 1993b), continuous throughout the site, and lies at a depth of 37 to 45 feet below the ground surface. The upper sand-clay-silt unit has a thickness of approximately 10 feet and lies at a depth of 10 to 15 feet below the ground surface. The two are separated in some areas by a layer of silty clay. The alluvial aquifer is considered a Class II aquifer having current and potential sources of drinking water and water having other beneficial uses.

Groundwater Quality . Groundwater quality in the alluvial aquifer is generally good. However, four separate contaminated groundwater sites have been identified within the KCP boundaries. These are related to past activities and include the

Trichloroethylene (TCE) Still Area, the Underground Tank Farm, and the Northeast Area (figure 4.1.1.3-1). In addition, an abandoned landfill south of the Internal Revenue Service parking lot is a contributing source of contamination to the groundwater. This landfill is not under the authority or control of DOE.

The primary contaminant at these sites is TCE and its degradation products: DCE and vinyl chloride. Other organic solvents and VOCs are also present. The contamination exists solely in the upper portion of the alluvial aquifer. The groundwater quality for the Tank Farm Area, Northeast Area, TCE Still RFI (RCRA Facility Investigation), and TCE Still Area plume is summarized in table 4.1.1.3-3. Remediation activities include treating an average of approximately 40,000 gallons of solvent-contaminated groundwater per day (KC ASAC, 1993b). The main contamination plume from the former underground Tank Farm Area lies beneath Building 73, an outlying storage building. This plume is moving to the south-southeast.

The Northeast Area plume and the Internal Revenue Service plume are not located near buildings that house DOE Defense Program (DP) activities. The source of the contamination is unknown.

The TCE Still was used for the recovery of used solvent. A portion of the contamination plume from the TCE Still RFI Area lies beneath the Main Manufacturing Building and the Manufacturing Support Building and is moving in an overall southerly direction.

Groundwater Use . No groundwater is withdrawn for water supply use at KCP. Water is supplied to KCP from the city of Kansas City, MO, potable water distribution system. This water is obtained from the Missouri River and wells in the Missouri River alluvium 15 miles north of the plant (KC DOE, 1991a). Water use at KCP averages about 1.4 MGD (table 3.2.1-3). The Kansas City, MO, potable water distribution system currently supplies its users with approximately 115 MGD. The capacity of the KCP system is approximately 32 MGD (table 3.2.1-3).

Groundwater Rights . KCP is able to purchase unlimited amounts of water from Kansas City, MO. Missouri operates under the Riparian Doctrine where landowners have unrestricted rights to use the water contained on the land.

Environmental Consequences. No new buildings would be constructed at KCP as part of consolidation activities. Some modification would take place within existing facilities. A description of the functions to be transferred to KCP and the facility locations selected to house these activities is presented in section 3.3.1.

Surface Water . Process and sanitary wastewater from transferred operations would be discharged to the Kansas City Wastewater Treatment Plant. The additional sanitary wastewater generated by the transferred processes would be approximately 1.7 MGY (table 3.3.1-4). This represents a less-than-1-percent increase over the current sanitary wastewater generation rate of 200 MGY (table 3.2.1Ä2). All industrial wastewater would be pretreated to meet all applicable regulatory standards before discharge to the Kansas City Wastewater Treatment Plant. There would be no increase in cooling water discharge to the Big Blue River and Indian Creek from the transferred operations.

With improved flood control works scheduled for completion before the initiation of nonnuclear consolidation, the transferred operations would be protected from flooding events up to and including a flood with a 500-year recurrence interval. Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Surface Water Quality . KCP was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. As described in section B.1, the relocated functions would affect the volume of plant waste streams. There would be no new waste streams added or special waste-handling capability required. Existing capabilities would be used to handle the incremental increase in wastewater generated. Most of the additional process wastewater is acidic and alkaline wastewater requiring pH adjustment, and is readily amenable for treatment at the Industrial Wastewater Pretreatment facility prior to discharge to the Kansas City municipal sewer system. Further, the addition of less than 5,000 GPD of relatively "clean" wastewater, as compared to metal finishing operations wastewater, would be beneficial to pretreatment facility operations. The KCP Industrial Wastewater Pretreatment Facility, having a design capacity of approximately 1.3 MGD, has sufficient available capacity to treat the incremental increase in wastewater from the Proposed Action. There would be no impact to surface water quality due to increased sanitary or process wastewater. There would be no increase in cooling water discharge from the transferred operations. In addition, significant changes in stormwater runoff from KCP are not anticipated due to the Proposed Action. As such, the reconfiguration activities would not require a new NPDES permit (KC ASAC, 1991c).

Groundwater . Water for construction activities is supplied by the Kansas City municipal system. Water required for construction at KCP would be supplied from the existing plant distribution system (table 3.3.1-3) and is not a significant increase over the current water use of 1.4 MGD.

The water requirements for operations of the relocated activities would be approximately 1,200 gallons per day (GPD) (table 3.3.1-5). This would be less than 1 percent of the current use of 1.4 MGD. This is even a smaller percentage of the 11.6 billion gallons per year (BGY) capacity of the system, and would not affect groundwater levels or water supply in the area.

Groundwater Quality . Plumes of organic solvents and VOCs are present beneath the buildings proposed to contain nonnuclear consolidation functions. Groundwater corrective actions conducted in 1991 consisted of continued operation of the tank farm and interceptor well, and preparation for complete operation and testing of the TCE Still Area and Northeast Area plumes. These corrective actions should not affect nonnuclear consolidation activities. However, because no groundwater beneath KCP would be used and no discharge of waste materials to groundwater is planned, no additional impacts to groundwater quality are expected to result from the Proposed Action. The Proposed Action is not expected to affect groundwater remediation efforts.

4.1.1.4 Geology and Soils

Affected Environment. KCP is located on the Central Stable Interior Platform of the Great Plains Province and rests on the southeastern flank of the Forest City Basin as it rises toward the Ozark Uplift. The plant lies on approximately 45 feet of alluvium of the Big Blue River floodplain, which is bordered by outcrops of Pennsylvanian limestones and shales (KC USDA, 1984).

No capable faults are present within or near KCP. A capable fault is one that has had movement at, or near, the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years (10 CFR 100, appendix A).

The Kansas City area is seismically stable. It is located on the boundary between Seismic Zone 2-A and Zone 1 (ICBO, 1991). Since 1867, Kansas has experienced 27 earthquakes of magnitude 3 or greater (KC DuBois, 1978).

Several large earthquakes greater than magnitude 8 occurred in 1811 and 1812 along the New Madrid Fault Zone, 350 miles southeast of Kansas City. The Kansas City area was affected by Modified Mercalli Intensity (MMI) values estimated at VII or less during these events (Nuttli, 1990). An earthquake with a MMI of VII is felt by everyone and causes negligible damage to structures of good design and construction.

No geological hazards are known in the immediate area of KCP. The plant does not lie within 80 miles of any known capable faults, nor does it lie in areas of subsidence, landsliding, active volcanism, rapid erosion, or sedimentation.

KCP is underlain by Urban bottomland and Udifluvents. Urban bottomland consists of areas where more than 85 percent of the surface is covered by concrete, asphalt, buildings, or other impervious material. Udifluvents consist of nearly level fill areas and are located adjacent to the Big Blue River. These soils present no erosion hazard or shrink-swell problems (KC USDA, 1984). No agricultural or prime farmland soils are present.

Environmental Consequences. The Proposed Action would cause no significant alteration of geologic features, such as slopes, rock outcrops, or drainages.

Renovation and facility modifications to accommodate the relocated functions would be performed according to seismic design building code requirements appropriate to the facility and to regional seismicity; therefore, earthquake activity hazards would not increase.

The Proposed Action would have no adverse impact on KCP soils because the entire area has been disturbed to accommodate existing facilities and operations.

4.1.1.5 Biotic Resources

Affected Environment. Tracts within and surrounding DOE-controlled areas in the Bannister Federal Complex are of limited value to terrestrial wildlife due to intensive human activity and the lack of large areas of natural habitat. A 1.2-acre remnant of riparian woodland occurs near the southern boundary of the Bannister Federal Complex, where a bend of Indian Creek was cut off from the rerouted channel by construction of Bannister Road. The Bannister Federal Complex is bordered on the north by a bluff supporting a relatively undisturbed oak-hickory woodland designated as Legacy Park. Riparian forests, dominated by cottonwoods (Populus deltoides) and willow (Salix nigra), and disturbed by human activities, border the Big Blue River and Indian Creek east and south of the Bannister Federal Complex (KC DOE, 1989). Flora and fauna of various natural habitats in and around the Bannister Federal Complex are described in a recent EA prepared by the U.S. Army Corps of Engineers (KC COE, 1990).

No wetlands occur within DOE-controlled areas in the Bannister Federal Complex. The Corps of Engineers has determined that the 1.2-acre remnant of riparian forest near the southern boundary does not contain wetlands under jurisdiction of the CWA (KC DOE, 1989). Current plans call for this area to be excavated, capped, and grassed in 1993 as part of a hazardous waste remediation effort. An area of potential wetlands supporting a cover of narrow-leafed cattail (Typha angustifolia) and a mixture of bulrushes (Scirpus sp.) and sedges (Carex sp.) is located in a low area north of the Internal Revenue Service building near the northeastern corner of the Bannister Federal Complex (KC COE, 1990).

No aquatic habitats occur within the Bannister Federal Complex. Beyond the KCP boundary, aquatic habitats associated with the Big Blue River and Indian Creek receive discharges of stormwater and one-pass cooling water generated on the Bannister Federal Complex. Four fish kills have occurred in the Big Blue River in the five years preceding 1992; however, the Missouri Department of Conservation has not attributed any of those kills to activities conducted at KCP (KC ASAC, 1991g).

The U.S. Fish and Wildlife Service (FWS) has indicated that the bald eagle (Haliaeetus leucocephalus) (a Federally-listed endangered species) is the only Federally-protected, threatened, or endangered species present in the vicinity of the Bannister Federal Complex (KC COE, 1990). Because of the nearly complete development of the Bannister Federal Complex, suitable habitat for the bald eagle does not likely occur. The Missouri Department of Conservation's records do not indicate that any sensitive species or communities exist within the Bannister Federal Complex or the surrounding area (KC DOE, 1989).

Environmental Consequences. Temporary land disturbance from renovating KCP facilities would be limited to construction laydown areas on lawns and paved areas within the already intensively developed KCP. Because these areas have been previously developed, they have minimal habitat value for terrestrial wildlife. No undeveloped land would be disturbed by the Proposed Action.

No wetlands occur on the DOE-controlled areas of the Bannister Federal Complex, and any renovation activities would be limited to previously developed areas in KCP. Therefore, no impacts to wetlands would result from the Proposed Action.

The Proposed Action would not affect aquatic biota or aquatic habitats in the vicinity of KCP. Renovation for, and operation of, the consolidation facilities would not involve water withdrawal from aquatic habitats. As described in the water resources section, effects of discharges into surface waters would not be significant; therefore, aquatic habitats would not be affected.

No terrestrial or aquatic areas potentially providing habitat to Federally- or Missouri-listed threatened or endangered species would be affected by the Proposed Action. DOE has initiated discussions with the United States Fish and Wildlife Service (FWS) and the Missouri Department of Conservation to ensure that renovation or operation of the facilities would not result in impacts to any listed or special status species in the vicinity.

4.1.1.6 Cultural Resources

Affected Environment. The prehistoric chronology of the KCP area consists of five broad time periods: Paleoindian (12,000-8000 B.C.), Dalton (8000-7000 B.C.), Archaic (7000-1000 B.C.), Woodland (1000 B.C.-A.D. 900), and Mississippian (A.D. 900-1700) (KC Chapman, 1975, 1980; KC Weston, 1987). Site types that may occur in the area include villages, campsites, limited-activity sites, and burial mounds. Two prehistoric sites and a multi-component site have been previously recorded along the terraces of the Big Blue River (KC Ziegler, 1990b). All of the KCP area has been either developed or disturbed, mainly as a result of flood protection construction. No surveys have been conducted at KCP. However, one cultural resource survey was conducted on areas adjacent to KCP; no prehistoric resources were identified (KC Ziegler, 1990a and b).

The history of the KCP region has been previously documented (KC Brown, 1963; KC Zeigler, 1990a and b). The main building was built in 1942 for the manufacture of Pratt & Whitney aircraft engines for the U.S. Navy. After World War II, production ceased, and the plant was declared excess. The Atomic Energy Commission (AEC) began production at the plant in 1949. The facilities at KCP lack architectural integrity, are not representative of a particular style, and are not considered contributing features to the broad themes of World War II defense production, the Manhattan Project, or initial nuclear production. Consequently, the facilities are not likely to be considered eligible for the NRHP.

Three Native American groups occupied or traversed the KCP area: the Osage, the Missouri, and the Kansas (KC Henning, 1970; KC Unrau, 1971; KC Chapman, 1983). The Great and Little Osage Indians occupied the region when French explorers and trappers arrived in the early 1700's. The Missouri Indians occupied the area along the Missouri River between the Grand and Chariton rivers in central Missouri. The Kansas moved along the Missouri River from St. Louis toward St. Joseph, MO, from the late 1600's to around 1800. By 1827, they were living along the Kansas River in northern Kansas. Native American resources in the KCP area may include villages, trails, and sacred areas such as springs, vision quest sites, and burial sites. However, most of the historic Indian villages were not located in the KCP area, but south on the Osage River or north and east along the Missouri River.

Environmental Consequences. All electrical/mechanical functions at KCP would be accommodated within existing structures with no new construction. The existing facilities are not likely to be considered NRHP-eligible. Therefore, no NRHP-eligible prehistoric or historic resources or important Native American resources would be affected by either renovation or operations activities.

4.1.1.7 Socioeconomics and Community Services

Affected Environment. The discussion of socioeconomics and community services at KCP is based on an ROI where 93 percent of the KCP employees lived in 1991. The ROI includes Cass (14 percent) and Jackson (60 percent) counties in Missouri, and Johnson (17 percent) and Wyandotte (3 percent) counties in Kansas. Within these counties, the following key cities have been included in the analysis: Belton, MO (4 percent); Harrisonville, MO (3 percent); Kansas City, MO (28 percent); Lee's Summit, MO (11 percent); and Overland Park, KS (7 percent) (see figure 3.2.1-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.1-1 through E3.1-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 42 percent, increasing from 471,743 in 1970 to 670,954 in 1990. Total employment increased from 455,781 to 637,550 between 1970 and 1990, an annual growth rate of 2 percent. The unemployment rates for 1970 and 1990 were 3.4 percent and 5.0 percent, respectively. For the same years, personal income increased from approximately $4.8 billion to $23.2 billion (an annual average of 8 percent), and per capita income increased from $4,319 to $19,076.

Between 1970 and 1990, employment at KCP decreased from 7,546 to 6,320, representing less than 1 percent of the ROI employment in 1990 (KC ASAC, 1991h). Changes in mission requirements have historically led to fluctuations in employment levels over this period. For example, employment decreased to 4,623 in 1975 and increased to 7,827 by 1985. As of September 30, 1992, employment at KCP had decreased to 4,473. The proposed Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in work force associated with the budget reductions is only estimated at this time. With the proposed Fiscal Year 1994 budget, the No Action alternative future site employment is expected to decrease to approximately 3,900 by the year 2000 (DOE, 1993c). In 1992, the total KCP payroll was estimated to be more than $158 million (KC ASAC, 1991h). With the No Action baseline, the total payroll is projected to be approximately $137 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 752,000 by 2000 and 768,000 by 2020. The unemployment rates for 2000 and 2020 are both projected to be 6 percent. For the same years, personal income is projected to increase from approximately $32.1 billion to $40.4 billion, an annual average increase of 1 percent. Per capita income is projected to increase from an estimated $24,000 in 2000 to $27,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 11 percent to 1,214,087. During the same period, the Missouri population increased 9 percent, and the Kansas population increased 10 percent. The population in the 4-county ROI is projected to increase from an estimated 1,335,000 in 2000 to 1,473,000 by 2020, at an annual rate of less than 1 percent.

The largest county population increase (63 percent) occurred in Johnson County between 1970 and 1990, while over the same years, populations in Wyandotte and Jackson counties declined 13 percent and 3 percent, respectively. Population in Johnson County is estimated to increase 6 percent between 1990 and 2000 and 10 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Wyandotte County population is projected to increase approximately 16 percent between 1990 and 2000 and 10 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The population in Jackson County is expected to increase approximately 11 percent by 2000 and an additional 10 percent by 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, Kansas City, MO, had the greatest decrease in city population (33 percent) in the ROI. For the same years, the Belton, Harrisonville, Lee's Summit, and Overland Park populations increased 86 percent, 52 percent, 183 percent, and 42 percent, respectively.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 34 percent from 386,007 to 518,323. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 10 percent by the year 2000 and an additional 10 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (114 percent) occurred in Johnson County, while the smallest increase (9 percent) occurred in Wyandotte County. The number of housing units in Johnson County is expected to increase approximately 12 percent by 2000 and an additional 10 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Wyandotte County is expected to increase about 16 percent by 2000 and an additional 10 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 2 percent in the ROI and ranged from approximately 2 percent in Cass County to 3 percent in Wyandotte County. The vacancy rates for rental units averaged 12 percent and ranged from about 9 percent in Johnson County to 16 percent in Wyandotte County.

Community Infrastructure and Services. The water supply systems operated by Johnson County; Kansas City, KS; Kansas City, MO; and Independence maintain about 97 percent of the total capacity of the 6 major public systems in the ROI. Most of these systems utilize surface water as their primary source of raw water, although Kansas City, MO, utilizes some groundwater and Independence utilizes only groundwater supplies.

Kansas City, MO (240 MGD capacity), and Independence, MO (36 MGD capacity), operate systems in Jackson County and had 1991 average daily demands of 48 percent and 64 percent of capacity, respectively. The Johnson County Water Supply District #1 (105 MGD capacity) had 1991 average daily demands of 42 percent of capacity. The Kansas City, KS, system (60 MGD capacity) in Wyandotte County had 1991 average daily demands of 50 percent of capacity.

Independence and Johnson County plan to increase their system capacities to 42 MGD and 130 MGD, respectively, by 1995. In 1995, these systems are projected to have average daily demands of less than 61 percent of capacity. By 2000, these systems are projected to have average daily demands of less than 66 percent of capacity.

Johnson County; Kansas City, KS; Kansas City, MO; Independence; and the Little Blue Valley Sewer District in Missouri operate wastewater treatment systems that maintain about 96 percent of the capacity of the 7 major public systems in the ROI. Kansas City, MO, (about 132 MGD capacity); the Little Blue Valley Sewer District (40 MGD capacity); and Independence (10 MGD capacity) all operate systems in Jackson County and had 1991 average daily demands of 77 percent, 68 percent, and 80 percent of capacity, respectively. The Johnson County Unified Wastewater District (about 33 MGD capacity) had 1991 average daily demands of 96 percent of capacity. The Kansas City, KS, system (42 MGD capacity) in Wyandotte County had 1991 average daily demands of 48 percent of capacity.

Johnson County plans to expand its system capacity to about 37 MGD by 1995 and is projected to have average daily demands of to 87 percent of capacity in 1995 and 90 percent of capacity in 2000. The Independence system is projected to have average daily demands of 83 percent of capacity in 1995 and 86 percent of capacity in 2000. The other 2 systems are projected to have average daily demands of less than 80 percent of capacity in 1995 and less than 82 percent of capacity in 2000.

Thirty-two school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 110 students in the Strasburg School District to 34,640 students in the Kansas City, MO, School District #33. School districts with enrollments over 1,000 were operating between 60 percent and 107 percent of capacity, but the majority of school districts were operating between 85 and 100 percent of capacity. Those school districts operating over 100 percent of capacity were Independence (107 percent) and Piper-Kansas City (101 percent). School districts in Jackson, Cass, and Wyandotte counties were operating, on average, at 87 percent of capacity. However, current capacities are projected to be exceeded by the years 1995 and 2000 with the No Action future baseline. The largest increases are expected to occur in the Jackson County school districts, where enrollments are projected to exceed current capacities by 17 percent in 1995, increasing to 24 percent in 2000. Smaller increases are expected to occur in the Wyandotte County school districts, where enrollments are projected to exceed the current capacities by 3 percent in 1995 and 11 percent in 2000. The average pupil-to-teacher ratio for the ROI was 15:1, and expenditures averaged $4,558 per pupil. The Missouri average pupil-to-teacher ratio was 21:1, and expenditures averaged $4,142 per pupil. The Kansas average pupil-to-teacher ratio was 16:1, and expenditures averaged $4,760 per pupil (MO DEd, 1990; KS DEd, 1990).

Thirty-five hospitals serve the four-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 3,538 physicians served the ROI. The physician-to-population ratio for the ROI was 2.9:1,000, and ranged from 0.4:1,000 in Cass County to 3.5:1,000 in Johnson County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990).

Sixteen city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the 4-county ROI was in Kansas City, MO, with 1,178 sworn officers or 2.7 sworn officers per 1,000 persons. Other large agencies are in Kansas City, KS, with 297 sworn officers or 2.0 sworn officers per 1,000 persons, and Johnson County, with 230 sworn officers or 0.6 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 2.1 per 1,000 persons (FBI, 1991).

Thirty-three fire departments and 2,615 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Kansas City, MO (733 firefighters; 1.7 firefighters per 1,000 persons), and in Kansas City, KS (435 firefighters; 2.9 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.2 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to KCP is provided by Troost Avenue, a city-maintained arterial; Bannister Road, a four-lane divided highway; and 95th Street.

Projected 1995 and 2000 baseline traffic for segments providing access to KCP was estimated using average daily traffic (ADT), peak-hour volume (PHV), and LOS. ADT estimates represent the average vehicular traffic volume experienced on a specific route segment each day, with PHV representing the maximum volume of vehicles during a given hour of that day. These volume estimates were assessed relative to the design capacity of the route to determine the associated LOS, which is a qualitative measure of traffic flow conditions. These levels are further defined in appendix E.

Estimated traffic along segments providing access to KCP is projected to contribute to differing service level conditions in accordance with population growth. Bannister Road would generally support congestion-free traffic flow. Troost Avenue, however, and to a lesser extent 95th Street, would typically experience traffic congestion, with volumes approaching or exceeding the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in considerable congestion. In addition, estimated truck traffic into KCP for delivery of supplies and removal of wastes would typically average 77 trips per day. However, the additional traffic volumes associated with continued operation of KCP are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to KCP (KS DOT, 1991; MO Hwy, 1990).

KCP has a fleet of 29 government-owned and 5 subcontractor-owned vehicles on the property. Other modes of transportation within the ROI include public transportation systems, railways, and waterways. Public transport in the ROI is provided by the Area Transportation Authority, serving metropolitan counties in both Missouri and Kansas. Major railroads in the ROI include the Atchison, Topeka, and Santa Fe Railroad; Burlington Northern Railroad; Chicago and Northwestern Railroad; Norfolk Southern Corporation; the SOO Line; and the Union Pacific Railroad. KCP is provided rail access via single-track rail line operated by the Union Pacific Railroad. Waterborne transportation to the ROI is via the Missouri River and the Port of Kansas City, MO (COE, 1991).

Kansas City International Airport, the largest airport in the ROI, receives passenger and cargo service from both national and local carriers. Numerous smaller private airports are located in the ROI (DOT, 1991).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 425 to 330 new jobs (DOE, 1993d). The analysis presented in table 4.1.1.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 425 new jobs. The estimate of 330 new jobs is 23 percent lower than the 425 new jobs used in the following analysis, and this lower estimate would result in fewer economic benefits than the 425 new jobs. The construction, modification, and installation of facilities and equipment for the Proposed Action at KCP would require 80 additional employees during peak construction (KC ASAC, 1993b). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 425 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions would be filled through donor transfers, new hires, and internal reassignments. In addition to the jobs created directly by the project, another 190 jobs would be created indirectly during peak construction and 670 additional jobs during operations. This direct and indirect employment would lead to the in-migration of 58 persons during peak construction and 558 persons during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside the regional labor force.

With the No Action alternative, the current KCP employment level of 4,473 is projected to decline to 3,900 by the year 2000, a decrease of 573. The addition of 425 full time equivalent jobs at KCP would be realized as a result of the Proposed Action.

The direct and indirect additional jobs at KCP will help offset the closure of the Defense Finance and Accounting Service Center located next to KCP at the Bannister Federal Complex. The Kansas City Center was not chosen as a finalist for a future consolidated center and will be closed in the near future. It is estimated that this closure will result in the loss of 1,000 jobs (KC DOD, 1992).

The projected economic and population changes that would result with the Proposed Action are summarized in table 4.1.1.7-1 . In the year 2000, this project-related population growth from in-migration would represent an increase of less than 1 percent over the projected ROI baseline population of 1,335,000, and no cities or counties in the ROI would experience population growth greater than 1 percent.

The less than 1 percent change in population during peak construction would create the need for only an estimated 22 additional housing units. For operations in the year 2000, the less than 1 percent change in population would not create a need for additional housing units beyond a 1 percent increase. In past years, housing units have been built at an annual rate of 2 percent. Therefore, the additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI. The estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI. Existing water and wastewater capacities more than exceed the projected demand. Many existing public education facilities are currently approaching 100 percent of capacity. Although enrollments will exceed school capacities by the years 1995 and 2000 with the No Action future baseline, these capacities will be affected only slightly beyond what would naturally occur with the No Action baseline growth because the Proposed Action would not add more than 1 percent to enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over the No Action baseline. Additional commercial truck traffic into KCP would be negligible relative to historic levels, and this truck traffic would occur during non-peak hours. Impacts to the local transportation network serving KCP would be negligible.

4.1.1.8 Waste Management/Pollution Prevention

Affected Environment. Discussion of the KCP waste management baseline is provided in section 3.2.1.3 and appendix A.1. Because no transuranic (TRU) wastes are associated with any of the proposed consolidation activities, no further discussion of TRU waste generation or management is presented.

Generation of all waste types at KCP is expected to decrease as production operations are reduced. Additionally, KCP's Pollution Prevention Program would systematically reduce waste generation through specific waste minimization projects and the use of process waste assessments. The following discussion represents no significant changes in waste stream types or handling other than possibly reduced quantities due to the smaller workload.

KCP generates small quantities of low-level waste (LLW); however, through process changes, KCP no longer generates low-level mixed waste (section 3.2.1.3). Smaller amounts of LLW are also expected in the future due to a projected decrease in production operations. All radioactive and mixed waste management activities conducted at KCP, including requirements for handling, storage, and shipping of LLW and mixed waste, are covered by many DOE orders, and Federal and state statutes and regulations such as RCRA (see tables 5-1 and 5-2). KCP mixed wastes are currently subject to all applicable RCRA requirements. LLW and mixed waste are accumulated onsite and stored in DOE-approved containers in one controlled-access facility. LLW is stored onsite on an interim basis until sufficient quantities accumulate to warrant shipment to an approved DOE disposal facility. The mixed waste is stored onsite on an interim basis until the Nevada Test Site (NTS) receives permit approval for receipt of this type of material. At this time, mixed waste would be packaged according to regulatory requirements and transported to NTS or other treatment and disposal facilities that may be developed in the future for ultimate disposal.

All hazardous wastes generated onsite are managed and stored in compliance with all RCRA requirements. PCB and asbestos wastes are managed and stored in compliance with all applicable TSCA requirements. KCP has submitted both a RCRA Part A and Part B Permit Application and currently manages hazardous waste under RCRA interim status pending approval of its RCRA permit application. All waste stream residue generated at KCP that is not reclaimed by solvent reclamation/distillation or recycled onsite is manifested and shipped under contract with RCRA-permitted transporters to RCRA-permitted offsite treatment and disposal facilities.

The onsite industrial waste processing facility uses a precipitation process to treat dilute metal-finishing rinsewaters, concentrated acids and caustics, chromium waste, and cyanide waste to acceptable indirect discharge, pretreatment effluent standards. This is done prior to discharge to the Kansas City, MO, wastewater treatment plant.

KCP operates under discharge permits required by the CWA, the Missouri Department of Natural Resources, and the city of Kansas City, MO. Compliance with respect to the permitted discharge limits was described or referenced in section 4.1.1.3.

Solid refuse waste streams, including paper, cardboard, glass, wood, plastics, metal scrap, and metal containers, are segregated and recycled whenever possible. Normal refuse is disposed of in the local sanitary landfill by a commercial contractor. Normal sanitary wastewaters are discharged to the industrial wastewater processing facility or to the sanitary sewer system.

Because of a projected decrease in KCP production operations, certain existing KCP equipment may be categorized as surplus, making it subject to decontamination protocols. The decontamination of existing equipment could result in the generation of wastes; the volume of waste would depend on the degree of decontamination required.

The volumes of several waste streams at KCP have been reduced since 1989 as a result of KCP's Pollution Prevention Program. Significant progress has been achieved as a result of activities such as significant solvent usage and emission reduction, inorganic waste reductions, ongoing material substitution development work, and development of process waste assessments. The most noteworthy is the overall chlorinated hydrocarbon and chlorinated fluorocarbon reductions of 90 percent each over 1989 baseline usage. Corresponding 1991 reductions over 1990 for chlorinated hydrocarbons and chlorinated fluorocarbons were 70 percent and 61 percent, respectively. In addition, the KCP Waste Management organization recycled 99 gallons of trichloroethylene and 144 gallons of 1,1,1-trichloroethane during 1991. These have been accomplished through material substitution, minimization, recycling, and training. The operation of the KCP industrial wastewater pretreatment facility in 1991 has minimized the amount of acid, alkaline, and cyanide wastes by 80 percent since 1988. Goals established for pollution prevention activities to be achieved during 1992 and 1993 include a reduction of chlorinated hydrocarbon and chlorinated fluorocarbon use by 15 percent over 1991 usage, process waste assessment completion goals, and spill reduction and solid waste initiatives. Table 4.1.1.8Ä1 summarizes the 1991 reductions for solvent usage and plating waste over 1989 and 1990.

Environmental Consequences. No radioactive or mixed waste streams are anticipated as a result of the relocated nonnuclear functions. Consequently, no impacts on KCP's radioactive waste management operations are anticipated. Any equipment to be transferred to KCP from another site as a result of the Proposed Action would be decontaminated prior to shipment. Construction debris and scrap metals from demolition of existing interior utilities and partitions would be disposed of as sanitary waste or sold and recycled as scrap. Although the quantities cannot be accurately assessed at this time, minimal impacts to the KCP waste management program are expected. All demolition will be conducted in such a manner so that construction debris will not contain any hazardous waste subject to TSCA.

Construction/modification activities involving decontamination are part of routine facility operations at KCP. Project decontamination activities may include the removal of asbestos piping insulation, floor and ceiling tiles, and asbestos- or PCB-contaminated concrete flooring. Such decontamination activities, if identified as necessary, would be performed in accordance with TSCA requirements for handling and disposal of asbestos and PCB wastes. The amount of hazardous construction waste materials is expected to be minimal.

Should any soil excavation occur as a result of piping modification or replacement of sanitary and industrial drains, the soils would be analyzed for possible contamination before disposal. Uncontaminated soils would be used as fill or disposed of in a local sanitary landfill if considered unsuitable for backfill. If soils are found to be contaminated, the location would be referred to the KCP Environmental Restoration Program for subsequent management. Management activities would involve an area inspection and characterization, then an evaluation of cleanup alternatives (if necessary). Cleanup action and compliance follow-up would be conducted, as necessary, to remove and dispose of contaminated soils. Remediation of contaminated areas would be conducted according to accepted guidelines and procedures applicable to the type and extent of contamination. Although remediation activities would have additional project cost implications, no adverse impacts to the KCP waste management program are expected.

No new hazardous waste streams would be generated at KCP as a result of consolidation operations. Wastes generated from the consolidation of operations are outlined in appendix B, section B.1, and would be disposed of through KCP's Waste Management Department. Section B.1 also summarizes the waste minimization considerations for processes being transferred. The 8,130 GPY of additional liquid hazardous wastes represent a less than 5 percent annual addition to the current KCP waste stream. The 109 ft^3 of additional solid hazardous waste is a less than 1 percent increase. KCP has 11 RCRA-permitted waste storage areas for containerized waste and 6 RCRA bulk waste storage tanks. The storage container areas and the tanks have storage capacities of 44,000 gallons for liquid hazardous wastes and 83,000 ft^3 for solid hazardous wastes. In 1988, approximately 22,630 ft^3 of hazardous liquid and solid wastes were shipped offsite for disposal in 88 shipments. Consequently, at any given time, existing storage areas would have sufficient capacity to handle the additional liquid and solid hazardous wastes.

The additional 1.7 MGY of nonhazardous sanitary effluents generated by the relocated reservoirs and nonnuclear Acorn product and the support pads operation can easily be handled by the KCP industrial wastewater processing facility, which has a design capacity of 1 MGD.

In summary, the additional quantities of waste generated by increased nonnuclear manufacturing activities at KCP are well within the storage, treatment, and disposal capability of existing waste management facilities.

4.1.1.9 Human Health: Facility Operations and Accidents

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.0. Information specific to KCP is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (4.1.1.2 and 4.1.1.3, respectively), chemical pollutant levels from KCP operations to which the public is exposed meet applicable permit, regulatory, and DOE operational requirements. No radiological releases are associated with KCP activities.

A review of the recent KCP annual environmental and accident reports indicates that there have been no significant adverse impacts on workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The level of operations during the time period of the review (1986-1990) was higher than either the past year's operations or those expected in the future.

Environmental Consequences. The Air and Water Resources sections discuss the releases associated with relocating the electrical/mechanical and special products functions identified in section 3.3.1 to KCP.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated to remove the toxicants before combining with sanitary wastewater and discharge to the Kansas City Wastewater Treatment Plant. Furthermore, all stormwater releases of the pollutants are below NPDES limits and surface water quality would not be adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For normal operations at KCP, all possible HAPs were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, dimethylformamide, 1,4-dioxane, isopropyl alcohol, methylene chloride, toluene, TCA, TCE, methyl ethyl ketone, and nitric acid. The Hazard Index (EPA, 1983), a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk which is calculated only for those chemicals identified as carcinogens. The cumulative Hazard Indexes for KCP (see table F-12a) were 0.210 onsite (worker effects) and 0.080 at the site boundary (effect on the public) on an annual basis, and the incremental change Hazard Indexes were 0.00003 onsite and 0.00001 at the site boundary. Therefore, the Proposed Action would contribute only 0.01 percent to the cumulative Hazard Index onsite and at the site boundary.

Three of the chemicals identified (1,4-dioxane, methylene chloride, and TCE) are considered to be carcinogens and the cancer risk to individuals for each was calculated. The combined risk for the carcinogens was calculated as 1.2×10^{-5} onsite (worker) and 4.7×10^{-6} at the site boundary (public) (see table F-12b), whereas the incremental change due to the Proposed Action contributed a risk of 0 both onsite and at the site boundary. Most of the current risk is attributed to TCE, a solvent, which will be replaced by a different solvent that does not pose a cancer risk. Risks less than 10^{-6} are considered acceptable by EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population.

Consolidation of the nonnuclear activities at KCP would not result in the emission of radioactive materials from normal operations.

In summary, these analyses show that no adverse health effects or excess cancer risks are expected from the normal release of hazardous chemicals/chemical pollutants at KCP as a result of the Proposed Action.

The accident assessment for KCP draws upon the information presented in chapter 3, section 3.3.1. The processes and chemicals of concern associated with the functions to be relocated to KCP from the donor sites are the same as those performed and currently used at KCP. There is an increased annual usage of 3 lb of methylene dianiline and 1 lb of toluene diisocyanate. These amounts represent only 2.1 percent and 0.02 percent, respectively, of the present annual usages at KCP.

KCP site activities have been reviewed in accordance with the requirements of DOE Order 5481.1B; KCP is currently in the process of performing a site safety assessment. The safety assessment reviews site processes to identify potential hazards. The results of the safety assessment would be used as a basis for determining the need for additional reviews, including an SAR, if required by DOE. The site safety assessment, expected to be completed in 1993, is anticipated to confirm that KCP is a low-hazard facility. The existing site accident profile is strictly chemical in nature. As indicated in section 3.3.1, the functions to be relocated to KCP are common industrial processes that are the same as or similar to those currently being performed at KCP and would require no additional bulk chemical storage or chemical resources. Based on the above discussions, the current accident profile would not change as a result of the relocation of functions to KCP.

4.1.2 Savannah River Site

A detailed discussion of SRS's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.5. The functions and processes associated with the Proposed Action to be consolidated at SRS and the proposed facility modifications required to support each relocated function are discussed in section 3.3.2. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at SRS and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on SRS, is also provided in the chapter 4 introduction and section 4.1.

4.1.2.1 Land Resources

Affected Environment. SRS occupies a 300-square-mile area approximately 16 miles southeast of Augusta, GA (figure 3.2.5-1). Generalized land uses at SRS and in the vicinity are shown in figure 4.1.2.1-1. The residential distribution of SRS employees is discussed in section 4.1.2.7.

SRS land use can be grouped into three major categories: forest/undeveloped, water, and developed facility locations. Ninety-six percent of SRS's area, about 184,000 acres, is undeveloped. Approximately 89 percent of this area is forested (SR DOE, 1991b). A forest management program has been in effect at SRS since 1952, when it was formed through an interagency agreement between DOE (then the AEC) and the U.S. Forest Service. In 1972, DOE designated SRS as a National Environmental Research Park (NERP). Currently, 12,000 acres (6 percent) are designated as NERP set-asides. These areas are specifically protected for environmental research activities that are coordinated through the University of Georgia, Savannah River Ecology Laboratory, or Savannah River Research Center (SR DOE, 1990a). There are no prime farmlands currently under cultivation on SRS.

Land use bordering SRS is primarily forest and agricultural. There is also a significant amount of open water and non-forested wetland along the Savannah River Valley. Incorporated and industrial areas are the only other significant use of land in the vicinity (figure 4.1.2.1-1). SRS land is not zoned by any of the three counties in which it is located. The only adjacent area that has any zoning is the town of New Ellenton. It has two zoning categories that bound SRS, urban development and residential development. The closest residences to the SRS boundary include several located to the west, north, and northeast, within 200 feet of the perimeter.

SRS does not contain any public recreation facilities; however, controlled deer and feral hog hunts occur on SRS each fall, from mid-October through mid-December. The purpose of the hunts is to control the resident deer and feral hog populations and reduce animal-vehicle accidents on SRS. The Operations Recreation Association owns and operates a 210-acre recreation complex approximately 5 miles northwest of SRS.

The viewshed consists mainly of agricultural land use, with some limited residential and industrial areas. DOE facilities are scattered throughout SRS and are brightly lit at night. Viewpoints affected by DOE facilities are primarily associated with the public access roadways, including U.S. 278, State Highway 125, and SRS Road 1. Because of the rolling terrain, normally hazy atmospheric conditions, and heavy vegetation, the DOE facilities are not generally visible from offsite. The new K-Reactor cooling tower will be visible from some distance, especially when operating and emitting a plume. The few offsite areas that do have views of some of the facilities are quite distant (5 miles or more) and have low visual sensitivity levels.

The developed areas of SRS are consistent with a Class 5 VRM designation. The remainder of SRS generally ranges from VRM Class 3 to Class 4.

Environmental Consequences. Nonnuclear functions would be located within existing facilities (see section 3.3.2) and be compatible with existing SRS operations.

The small number of in-migrating employees (see section 4.1.2.7) would have a minimal impact on land resources. Offsite land requirements for residential uses associated with project-related in-migration operations would be approximately 7 acres, and construction land requirements would be approximately 2 acres; these constitute small percentages of the total land available. There are extensive public and private recreational facilities in the region that could easily absorb the resulting increased demand. Impacts to recreational resources would be minor. Impacts to visual resources would be negligible and would not affect VRM classifications because relocated tritium-handling functions would be located within existing structures.

4.1.2.2 Air Quality and Acoustics

Affected Environment. The SRS region has a temperate climate with short, mild winters and long, humid summers. The region is frequently affected by warm and moist maritime air masses (Trewartha, 1954). The annual average temperature at SRS is 66 "F; temperatures vary from an average daily minimum of 37.9 "F in January to an average daily maximum of 90.8 "F in July. The average annual precipitation at SRS is 49.7 inches (NOAA, 1991a).

Ambient Air Quality . SRS is located within the Augusta-Aiken Interstate AQCR. None of the areas within SRS and its surrounding counties is designated as a nonattainment area by the EPA with respect to any of the NAAQS (40 CFR

81.341). The NAAQS and the ambient air quality standards for South Carolina and Georgia are listed in table D2.1.1-1. The South Carolina and Georgia state standards are identical to the NAAQS, except for the annual average total suspended particulate (TSP) standard, for which a NAAQS no longer exists. The South Carolina Department of Health and Environmental Control also has ambient standards for gaseous fluorides (SC DHEC, 1989).

The South Carolina Department of Health and Environmental Control has standards for over 250 HAPs/toxics (SC DHEC, 1991). These provide maximum 24-hr concentrations not to be exceeded at the site boundary. They are divided into three groups depending on toxicity level. The HAPs/toxics described in this section are those currently used at SRS or those anticipated to be used under the Proposed Action.

Ambient air quality at SRS is monitored at five onsite locations. The data presented in table D2.1.5-1 and used in the analysis are considered representative of the background concentrations at SRS.

The principal sources of criteria air pollutants at SRS are the nine coal-burning and four fuel-oil burning boilers for producing steam and electricity (A-, D-, H-, K-, and P-Areas) and fuel and target fabrication (M-Area) and processing facilities (F- and H-Areas). Other emissions include fugitive particulate emissions from coal piles and coal-processing facilities, vehicular emissions, and temporary emissions from various construction-related activities. The emission inventories are included in table D2.1.5-2.

HAP/toxic emissions from various SRS operations include CFC-113, TCA, and nitric acid. Table D2.1.5-3 presents the SRS emission inventory for HAPs/toxics.

The ambient and No Action conditions at SRS are presented in table 4.1.2.2-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. Baseline air quality concentrations from the SRS do not exceed, and are not expected to exceed, any applicable guidelines or regulations.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Normal operations result in the emission of radioactive materials at SRS. These emissions include 253,000 curies of tritium annually. The health effects of these emissions are discussed in section 4.1.2.9. Tritium is the only radionuclide that may be affected by nonnuclear consolidation activities.

Acoustic Conditions . Major noise sources at SRS are primarily located in developed areas, including various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). Noise from these sources would be barely distinguishable from background noise levels at the SRS boundary, which is a considerable distance from the facilities. Major noise sources outside these areas consist primarily of vehicles and rail operations. These are also the major sources of offsite noise attributed to SRS activities and would have an effect on noise levels along the highways through the nearby towns of New Ellenton, Jackson, and Aiken.

A sound-level survey was conducted at SRS in July 1989 and January 1990 to determine background noise levels for major transportation routes near SRS and for a limited number of onsite locations (SR NUS, 1990b). In both surveys, the sound-level data were collected at seven offsite locations and three onsite locations during daytime and nighttime periods for weekdays and weekends. DNL derived from the summer survey data L eq (l-hr) ranged from 62 to 72 dBA for offsite locations and from 54 to 62 dBA for onsite locations. Winter survey data generally showed noise levels slightly lower than those for the summer survey data. The levels observed were higher than those suggested by EPA as representative of rural, small-town, or quiet suburban areas, except in a few cases where insect, traffic, and industrial-facility noise contributions were all minor. Estimated L eq (24-hr) values at all measurement locations were below the EPA guideline level of 70 dBA for protection of the public from hearing loss. Further, the levels described are based on data collected at locations adjacent to roads (50 feet); therefore, these levels are greater than those expected for general background.

The states of Georgia and South Carolina and the counties where SRS is located have not established any noise regulations that specify acceptable community noise levels with the exception of a provision of the Aiken County Nuisance Ordinance, which limits daytime and nighttime noise by frequency band as described in appendix D (section D.2.2). Noise levels at residences near SRS may exceed the EPA guideline level for residential areas as a result of natural sources, such as insects, and are expected to exceed the guideline level for residential areas at residences along major roads where traffic is a major noise source.

Environmental Consequences.

Air Quality . Relocating nonnuclear functions would require renovation of existing facilities and some modification of the Replacement Tritium Facility (RTF) (section 3.3.2). Modification and renovation of these facilities would temporarily increase particulate matter emissions, such as dust and dirt, vehicle emissions, and various other types of construction-related air releases. The increase is minor when compared to overall site emissions (WSRC, 1992b and c), and when added to existing levels, is not expected to exceed applicable air quality standards.

The nonnuclear functions associated with the reservoir surveillance operations wouldbe located in the RTF. All gaseous waste streams leaving the reservoir surveillance operations would pass through the RTF stripper system prior to discharge to the RTF stack system. In addition, the reservoir surveillance operations area heating, ventilation, and air conditioning (HVAC) room exhaust would go to the RTF stack, which is provided with tritium form monitors for elemental and tritium oxide (WSRC, 1992c).

No increase in background air concentrations from the Proposed Action is expected (table 4.1.2.2-2).

Consolidation of the nonnuclear activities at SRS would result in an increase in the emission of tritium. An additional 1,823 curies of tritium would be released annually (MD DOE, 1991a). The health effects of these emissions are discussed in section 4.1.2.9. The nonnuclear consolidation activities would only affect the emission of tritium.

Acoustic Conditions . Effects of the Proposed Action on noise levels during renovation and operations have been evaluated for the major traffic routes around SRS. The changes in traffic volumes are expected to result in an increase of less than 1 dB in peak-hour sound levels along South Carolina Routes 19 and 125. Changes in sound levels along other routes are expected to be less than 1 dB. The slight increase in noise levels along the major access routes is expected to cause little or no increase in annoyance to surrounding communities or individuals.

Noise generated by construction and onsite operation activities is not expected to increase offsite noise levels. Construction activities are limited to renovation of existing buildings in H- and 700-Areas, which are isolated from offsite areas. As required, noise generated by construction equipment and machines, and by operational facilities, equipment, and machines, would not cause ambient noise levels at the site boundary to exceed EPA guidelines.

Although no increase in annoyance is expected offsite from construction and operations, measures would be implemented onsite to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments during construction and operations with hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas and a hearing protection program would be conducted.

4.1.2.3 Water Resources

Affected Environment . This section describes the surface water and groundwater resources at SRS.

Surface Water . Surface water bodies at SRS include the Savannah River, Savannah River Swamp, Upper Three Runs Creek (including its tributaries, Tims Branch and Tinker Creek), Beaver Dam Creek, Four Mile Creek, Pen Branch (including its tributary, Indian Grave Branch), Steel Creek (including its tributary, Meyers Branch), and Lower Three Runs Creek (figure 4.1.2.3-1). All these surface water bodies drain into the Savannah River. With the exception of Tinker Creek, these surface water bodies receive effluent from site operations.

There are more than 190 Carolina Bays scattered throughout the site. Carolina Bays are naturally occurring closed depressions that often hold water. There are no direct discharges to Carolina Bays; however, some do receive stormwater runoff. One bay in the 3/700-Area receives approximately 43,200 GPD of clean overflow water from a fire protection water holding tank.

Two onsite man-made surface water bodies, Par Pond and L-Lake, have served as cooling water reservoirs. Par Pond has a surface area of 2,640 acres and was formed by impounding waters of Lower Three Runs Creek. L-Lake has a surface area of 1,000 acres and was formed by impounding waters of Steel Creek (SR DOE, 1987a).

The Savannah River is the principal surface water body near the site, flowing along a 35-mile stretch of the SRS southwestern boundary. The Savannah River basin is one of the major river systems in the Southeast, draining an area of approximately 10,600 square miles. Stream flow is regulated by five large reservoirs upriver of SRS, the nearest being the Thurmond Reservoir 65 miles upstream (figure 3.2.5-1). The Thurmond Reservoir Dam operates at a water-release level of no less than 3,600 ft 3 /s to meet downstream requirements of SRS. The average flow rate of the river for the 81-year period of record is approximately 10,000 ft 3 /s. The peak historic (1929) flow rate is 350,000 ft 3 /s, and the lowest average annual flow rate is approximately 6,500 ft 3 /s, recorded during the 1985 to 1988 drought (SR DOE, 1990b).

The Savannah River Swamp lies along the river for a distance of 10 miles and averages 1.5 miles in width (approximately 15 square miles). The swamp is separated from the river by a 10-foot high natural levee. Four Mile Creek, Pen Branch, Steel Creek, and Beaver Dam Creek empty into the swamp (SR DOE, 1987a).

Surface water rights in the Savannah River watershed are set by the Doctrine of Riparian Rights; users must not adversely affect downstream quantity or quality (DOE, 1991c). SRS discharges wastewater into the Savannah River and onsite tributaries under a sitewide NPDES permit. Through October 1990, the SRS NPDES permit regulated 76 active NPDES outfalls at locations on the 6 onsite streams and at 6 locations on the Savannah River. In November 1990, another NPDES permit was issued for 5 additional outfalls, bringing the total number of permitted outfalls to 81 (SR DOE, 1991b). These discharges are primarily thermal effluents but also include sanitary and industrial wastes that contain radioactive and nonradioactive constituents.

All SRS streams and their associated wetlands, except Tinker Creek and Upper Three Runs Creek, have been influenced by SRS reactor cooling water discharges. These discharges, 10 to 20 times the natural stream flows, caused the streams to overflow their original banks and to scour and erode the stream channels. Deposition of eroded material has resulted in the creation of large deltas where the streams enter the Savannah River Swamp (SR DOE, 1987a).

When it is operating, K-Reactor discharges cooling water to Indian Grave Branch and Pen Branch. Other discharges to Pen Branch and Indian Grave Branch include nonprocess cooling water, ash basin effluent, powerhouse wastewater, waste treatment plant overflow, reactor process wastewater, and sanitary wastewater, all of which are associated with K-Area operation. In the past, Steel Creek received cooling water effluents from L-Reactor, and Par Pond received cooling water effluent from P- and R-Reactors. P-Reactor is being prepared for transition to EM, and L-Reactor is being placed in a minimal maintenance mode (SR DOE, 1992a). Within H-Area there are 13 NPDES permitted discharge points which discharge to either Upper Three Runs Creek or Four Mile Branch. Effluent wastewater consists of stormwater, nonprocess cooling water, cooling tower blowdown, process water, and treatment plant effluent.

The Effluent Treatment Facility located on the south side of H-Area, collects and treats routine process wastewater, contaminated canyon facility cooling water, and tank farm stormwater from F- and H- Areas. The Effluent Treatment Facility (ETF) removes radioactive and non-radioactive contaminants, except tritium from process effluents (SR DOE, 1991b).

Upper Three Runs Creek receives tritiated wastewater from the facility (SR DOE, 1987a). (The mean flow rate of Upper Three Runs Creek is 106 ft 3 /s.) Discharges from the SRS wastewater treatment facilities average approximately 185 MGY (table 3.2.5-1).

When K-, L-, and P-Reactors and the D-Area Powerhouse were all operational, the maximum SRS withdrawal rate from the Savannah River was approximately 650 MGD. This was primarily used as cooling water in the production reactors and coal-fired steam plants. Approximately 87 percent of this water was returned to the Savannah River via SRS streams. Consumptive water use for these operations was approximately 83 MGD (SR DOE, 1987a).

Construction of the K-Reactor cooling tower is complete and testing will begin inearly 1993. Preliminary estimates indicate that when it is operational, K-Reactor will withdraw between 29 and 43 MGD from the Savannah River and discharge approximately 85 percent of that back into Indian Grave Branch and Pen Branch. This 85 percent consists of both blowdown and bypass water. The percentage of each will be influenced by factors such as weather and season, and thus will fluctuate frequently, perhaps daily. The South Carolina Department of Health and Environmental Control permit for operation of the K-Reactor cooling tower has been issued. The current startup date for the tower was April 1993. Full heat load and more specific withdrawal and discharge information will be available in the summer of 1993.

Surface Water Quality . Much of the contaminated groundwater emerges onsite at streams. Migration from the source of contamination to a surface water body may take from 5 to 30 years. The quantity of tritium migrating from all seepage basins represented 84 percent of the total amount of tritium released to site streams in 1990. Liquid releases of tritium through spills and seepage basin migration generally account for more than 99 percent of the total radioactivity introduced into the Savannah River from SRS activities (SR DOE, 1991b).

In the vicinity of SRS, the Savannah River and onsite streams are Class B streams under the South Carolina Department of Health and Environmental Control Regulations. These regulations define Class B waters as suitable for secondary-contact recreation and as a source of drinking water after conventional treatment. Water from the Savannah River is not used as a source of drinking water within 50 miles downstream of SRS (SR DOE, 1991b).

In 1990, Savannah River water quality and sediment analyses upriver and downriver from SRS showed no significant differences except for fecal coliform, which were higher upriver than downriver. All pesticides and herbicides were found at less than minimum detectable concentrations in the river water and in sediments. The 1990 surface water quality monitoring results for the Savannah River are presented in table 4.1.2.3-1. Aluminum, iron, and manganese had maximum concentrations exceeding listed water quality criteria. However, these maximum concentrations were less than or equal to maximum concentrations monitored upstream from SRS, indicating that the primary source of contamination is upstream. Analytical results for both chemicals and metals were generally within the ranges observed in previous years (SR DOE, 1991b). Water quality would be taken into consideration in future NPDES permitting of all upstream and downstream dischargers, including those at SRS.

The majority of the proposed activities would be located at existing facilities within H-Area. The primary receiving streams in H-Area are Four Mile Creek and Upper Three Runs. The 1990 water quality monitoring results for Four Mile Creek were compared to water quality criteria. The comparison indicated that the maximum concentration of iron (0.74 milligram per liter (mg/L)) was the only nonradiological parameter of the sampling program that exceeded water quality criteria. The average concentration was below the criteria value of 0.3 mg/L. In 1990, tritium was detected downstream of discharges to the creek, at an average concentration of 830,000 picocuries per liter (pCi/L) (SR DOE, 1991b). This concentration exceeds the EPA drinking water maximum containment level (MCL) of 20,000 pCi/L. The primary source of tritium in Four Mile Creek are from F- and H-Area seepage basins. Although the basins are no longer used, radioactivity currently in the groundwater continues to migrate and outcrop to the creek.

The 1990 water quality monitoring results for Upper Three Runs were compared to water quality criteria. The comparison indicated that there were no nonradiological parameters of the sampling program that exceeded water quality criteria. In 1990, strontium-90 was detected at 9.6 pCi/L and tritium was detected at 20,000 pCi/l. These concentrations exceed the EPA drinking water MCL of 8 pCi/L and 20,000 pCi/L, respectively. The tritium concentrations are attributed to Effluent Treatment Facility operations, which do not remove tritium from effluent released to the stream. The source of the strontium is under investigation (SR DOE, 1991b).

Permitted discharges to the Savannah River and the onsite streams are monitored pursuant to NPDES and South Carolina Department of Health and Environmental Control permits. In 1990, SRS had a 99.8 percent NPDES compliance rate with 16 noncompliances out of 6,810 analyses performed. Of the 16 noncompliances, 4 were for total suspended solids, 3 were for oil and grease, 3 were for pH, 2 were for TCE, 2 were for mercury, 1 was for biochemical oxygen demand, and 1 was for fecal coliform. Two pH noncompliances occurred at the same outfall and both TCE noncompliances occurred at the same outfall. All other noncompliances were one-time, one-outfall events (SR DOE, 1991b).

Each noncompliance was reported to the South Carolina Department of Health and Environmental Control in the monthly Discharge Monitoring Report. The monitoring report includes the following information: parameter in noncompliance, location, possible cause, and any corrective action taken (SR DOE, 1991b).

Groundwater . SRS is located in an area of sedimentary rocks that slope southeastward and generally thicken toward the southeast. A number of geologic units contain large amounts of groundwater, and the site relies on this groundwater to supply most of its sanitary and process water needs.

The coastal plain sequence has been divided into a series of aquifers and aquitards and include from bottom to top, Confining System I, Aquifer System I, Confining System I-II, and Aquifer System II (SR Bledsoe, 1990). In the northwest corner of the site, Aquifer Systems I and II coalesce, forming a single system, Aquifer System I/II. These systems are considered Class II aquifers that are current and potential drinking water sources and waters having other beneficial uses.

The water table in H-Area is approximately 20 to 25 feet below the ground surface. The depth of incision of the creeks that allow discharge of water to the surface determines the horizontal direction of groundwater. The vertical direction of groundwater movement is governed by the permeability of the aquitards (confining layers) and the relative difference in hydraulic head between the water-bearing units (SR DOE, 1990a).

Groundwater Quality . The SRS groundwater monitoring program includes analyses for several hundred radioactive and nonradioactive constituents from over 1,100 wells at more than 85 locations.

The radioactive constituents include gross alpha, nonvolatile beta, strontium-89, strontium-90, and tritium. The nonradioactive constituents include volatile organics, herbicides, pesticides, metals, and major ions. The areas of SRS contaminated by radioactive and nonradioactive constituents are shown in figure 4.1.2.3-1. The contaminant plumes near A- and H-Areas contain chlorinated volatile organics, radionuclides, nitrate, and heavy metals. The plume near H-Area also contains sulfate (SR DOE, 1991b).

Groundwater quality at SRS ranges from good to poor. There is no evidence that Aquifer Unit IA has been degraded by SRS operations. Water quality in parts of Aquifers IIA and IIB has deteriorated because of infiltration of radioactive and hazardous contaminants (SR DOE, 1990a). Radionuclide concentrations in SRS groundwater range from below detection limits to 7 billion pCi/L, 140,000 pCi/L, and 2,400 pCi/L for tritium, strontium-89 and -90, and chromium-51, respectively. Typical groundwater quality is shown in table 4.1.2.3-2. Wells RAC-3 and RDB-2D are downgradient from a former acid/caustic basin. Measured values for pH reflect an influence from acid waters disposed of in this basin.

Groundwater Use . SRS is 1 of 56 major municipal, industrial, and agricultural groundwater users identified within a 20-mile radius. The total pumpage for these 56 users averages about 12.9 BGY (SR DOE, 1990b). Groundwater use at SRS totals approximately 4 BGY, which represents about 31 percent of the total groundwater used in the area. To meet future development plans and regulatory requirements, a new production well is planned in the B-Area.

The entire water supply for H-Area is from groundwater. The H-Area tritium-handling operations currently use approximately 0.6 MGD (table 3.2.5-2).

Groundwater Rights . Groundwater rights in South Carolina are traditionally associated with property ownership. The South Carolina Water Resources Commission requires groundwater users pumping more than 1.162 gallons per second (37 MGY) to report their withdrawal rates. SRS groundwater use of approximately 4 BGY exceeds this amount and, consequently, SRS reports its withdrawal rates to the Commission.

Environmental Consequences. The relocation of the tritium-handling functions would not result in the construction of any new buildings at SRS. Some modification would take place within existing facilities. Processes associated with these tritium functions would not generate any new waste streams (WSRC, 1992a, b, and c). A description of the functions to be transferred to SRS and the facility locations selected to house these activities is presented in section 3.3.2.

Surface Water . Activities transferred with the Proposed Action, as well as with the alternatives, would be relocated to existing buildings in areas well outside the 100-year floodplain. Information on the 500-year floodplain is currently unavailable.

The environmental consequences of the construction and operations of the new RTF were assessed in an EA prepared in 1986 (SR DOE, 1992b). This document examined applicable environmental considerations, including floods and flooding, and determined that the environmental impacts would be insignificant.

If an outside construction laydown area is used, surface water runoff would be collected by a stormwater collection system. No impacts to surface water levels are anticipated during the facility modification phase.

As described in appendix B, section B.2, the gas transfer systems process would generate small quantities of an ethanol/water solution. The wastewater is not expected to be hazardous and can be treated at existing facilities. The remaining processes to be transferred would not generate any wastewater effluents.

The additional sanitary wastewater generated by the transferred processes would be approximately 0.3 MGY (table 3.3.2-4). This additional wastewater represents a less than 1 percent increase over the current SRS wastewater generation rate of approximately 185 MGY (table 3.2.5-1). This is not a significant increase in the wastewater generation rate.

If the entire additional 0.3 MGY (0.001 ft^3/s) of wastewater generated were discharged to Four Mile Branch, it would result in a less than 1 percent increase to the mean flow rate of the stream of 16.5 ft^3/s. The mean flow rate of Upper Three Runs Creek is an order of magnitude greater than that of Four Mile Branch, and hence the additional flow in Upper Three Runs Creek would be a much less than 1 percent increase.

Surface Water Quality. SRS was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. There are no new waste streams to be generated due to the Proposed Action. Additionally, there should be no increases in stormwater runoff.

Wastewater would be treated onsite initially in existing treatment facilities having sufficient treatment capacity and later in new facilities that are already planned (WSRC, 1992e).

Due to the nature and relatively small volume of the wastewater generated, there would be no impact to the surface water quality of Four Mile Branch.

Groundwater . H-Area draws its water supply from onsite wells. The amount of water used for building modification would be approximately 600 GPD (table 3.3.2-2). The amount is less than 1 percent of current groundwater use in H-Area of approximately 0.6 MGD. Therefore, it would not be a significant increase in groundwater use.

During operations, 144,000 GPD of water would be required for consolidation activities (table 3.3.2-5). This amount is approximately 25 percent of the current groundwater use by the H-Area tritium-handling operations, approximately 5 percent of the H-Area system capacity, and approximately 1 percent of the total SRS groundwater usage.

Groundwater Quality. No discharge of waste materials to groundwater is planned. However, the H-Area operations historically release in excess of 1,000 curies per year of tritium to surface waters. Through seepage, these releases have the potential to contaminate groundwater, although most of the shallow groundwater flows toward and discharges to streams, minimizing this potential. Wastewater amounts would be minor and transported to sewer systems in existing facilities. All wastewater discharges would comply with NPDES permit requirements.

4.1.2.4 Geology and Soils

Affected Environment. SRS is located in the Upper Atlantic Coastal Plain province of the Aiken Plateau.

SRS lies within Seismic Zone 2A (ICBO, 1991). There are no known capable faults in the immediate region of SRS. Evidence from subsurface mapping and seismic surveys suggests the presence of faults underlying SRS (WSRC, 1991b). However, there is no evidence of recent movement along any of these faults.

There are few geologic concerns associated with SRS. SRS does not lie within 80 miles of any known capable faults, nor does it lie in areas of subsidence, landslides, active volcanism, rapid erosion, or sedimentation. SRS is therefore considered a low geologic hazard area.

SRS lies on bottomland and upland soils of seven soil associations (SR USDA, 1990). Most of the soils are well to excessively drained. The well-drained soils have a sandy surface layer underlain by a loamy subsoil. The somewhat excessively drained soils have a thick, sandy surface layer that extends to a depth of 80 inches or more. Several soil units which cover nearly 17 percent of the plant property have been designated as prime farmland (SR USDA, 1990). All soils have low shrink-swell potentials. Many soils are subject to flooding, ponding, and cutbank caving. Upland soils are subject to moderate water erosion and slight to moderate wind erosion because of their slope. All other soils have a slight water and wind erosion hazard.

Environmental Consequences. SRS lies in an area characterized by geological and soil stability. Consolidation of the tritium-handling functions at SRS would be accomplished within existing buildings, or within the RTF, which is currently preparing for operational startup. There would be no significant alteration of topographic features such as geological landmarks, slopes, rock outcrops, or drainages.

Renovation to accommodate relocated functions would be performed according to seismic building code requirements appropriate to the facility and regional seismicity; therefore, earthquake activity hazards would not increase.

Because no new construction would occur, relocation of the tritium-handling functions to SRS would have no impact on the soils of the site, including prime farmland.

4.1.2.5 Biotic Resources

Affected Environment. Areas within SRS that would be modified by activities associated with the Proposed Action (H-Area and 700-Area) are already developed and do not support natural vegetation or terrestrial wildlife habitat. Adjoining undeveloped lands support primarily upland hardwood pine forest with narrow zones of bottomland hardwood forest in swales and stream valleys (SR Jensen, 1982). Much of the upland hardwood pine forest consists of loblolly pine (Pinus taeda), longleaf pine (Pinus palustris), and slash pine (Pinus elliottii) that has been planted and managed by the U.S. Forest Service. Several areas within SRS have been designated as a National Environmental Research Park (NERP) (section 4.1.2.1) and support a variety of short-term and long-term ecological research activities.

Approximately 43,000 acres of wetlands occur on SRS (DOE, 1991c). These include the roughly 9,400 acre Savannah River Swamp bordering the channel of the Savannah River, an estimated 190 Carolina Bays of various sizes scattered throughout SRS, and numerous large and small wetlands within lowland areas associated with the many streams on SRS. Wetlands do not occur within the pavement and graveled lands in the H-Area or 700-Area, but several areas of wetlands occur adjacent to or in close proximity to each of these areas.

Operation of DOE facilities on SRS, including the present tritium functions, involves surface and groundwater withdrawal and discharge to aquatic ecosystems within and adjacent to the site. Numerous species of fish, macroinvertebrates, and other aquatic biota are present in these aquatic ecosystems (DOE, 1991c; SR DOE, 1984; SR Bennett, 1983). No aquatic habitats occur within the H-Area or 700-Area, but several streams flow through undeveloped lands immediately adjoining these areas.

Several Federally-listed threatened and endangered species are known to occur, or potentially occur, at SRS (DOE, 1991c). A biological assessment prepared in 1984 addressed several Federally-listed species, including the American alligator (Alligator mississippiensis) (a Federally-listed species which is threatened by similarity of appearance and is most commonly found in Par Pond, swamps, and marshes), the red-cockaded woodpecker (Picoides borealis) (a Federal and state-listed endangered species that nests in medium- to old-age living pines), and the American wood stork (Mycteria americana) (a Federal and state-listed endangered species most commonly found in the Savannah River Swamp) (SR Mackey, 1984). Several other Federal and state-listed endangered species occur on SRS, including the bald eagle (Haliaeetus leucocephalus) (observed near Par Pond and L Lake, nested on Pen Branch), the smooth coneflower (Echinacea laevigata) a perennial herb that requires open glade habitat, the peregrine falcon (Falco peregrinus) (rare winter migrant), and the short nose sturgeon (Ancipenser brevirostrum) (spawns in the Savannah River upstream from SRS) (DOE, 1991c). None of these species is expected to inhabit the H-Area, 700-Area, or other such highly developed area, although undeveloped lands in the vicinity of each area could potentially provide suitable habitat for these species.

Environmental Consequences. Temporary minor land disturbance could result from renovating SRS facilities with the Proposed Action. The disturbance would be limited to laydown areas on lawns and paved areas in two existing intensively developed areas within SRS (the H-Area, and 700-Area). All have minimal value as terrestrial wildlife habitat. No undeveloped land would be disturbed by nonnuclear consolidation activities, and these activities would not affect current forestry operations, public hunting, or research activities conducted at the NERP.

Renovation and operation activities would be limited to previously developed areas, and therefore, would not result in impacts to wetlands. Standard erosion control procedures would be implemented before renovation to protect wetlands adjoining the H-Area and 700-Area from potential sedimentation.

The Proposed Action would not significantly affect aquatic biota. Minor increases in water withdrawal from the Savannah River and water discharged to its tributaries resulting from the consolidation facilities (section 4.1.2.3) would not significantly affect aquatic habitats associated with those water bodies. Additional wastewater would be discharged in compliance with the NPDES permit issued by the South Carolina Department of Health and Environmental Control.

Terrestrial or aquatic habitats potentially providing habitat to Federally-listed or South Carolina-listed threatened or endangered species would not be affected by the Proposed Action. DOE has initiated discussions with the FWS and the South Carolina Natural Heritage Program to ensure that renovation and operation activities would affect any listed or special status species in the vicinity.

4.1.2.6 Cultural Resources

Affected Environment. The prehistoric chronology of the SRS area is separated into five broad time periods: Paleoindian (9550-7950 B.C.), Archaic (7950-1050 B.C.), Woodland (1050 B.C.-A.D. 1150), Mississippian (A.D. 1150-1450), and Protohistoric (A.D. 1450-1540) (SR ARP, 1990a). Prehistoric types in the region include villages, base camps, limited activity sites, quarries, and workshops. Over 60 percent of SRS has received some level of cultural resources evaluation (SR Brooks, 1988; SR Brooks, 1987; SR Hanson, 1978a; and SRARP, 1990a; SRARP, 1989a). Over 800 prehistoric sites have been identified at SRS; however, less than 8 percent have been evaluated for NRHP eligibility. Only 10 prehistoric sites have been determined eligible, with concurrence from State Historic Preservation Office (SHPO).

The history of the region has been previously documented (SR Brooks, 1986; SR DePratter, 1987; SR Brooks, 1991). About 400 historic sites have been identified at SRS; approximately 10 percent have been evaluated for NRHP eligibility (SRARP, 1989; 1990a and b; 1991). Only 10 historic sites have been determined eligible, with concurrence from the South Carolina SHPO. The AEC selected South Carolina Site No. 5 in 1950. Construction began at SRS in 1951 and the plant was operational in 1953 (History Associates, 1987). Most of the previously existing historic structures were demolished during the initial establishment of SRS in 1951. The existing nuclear production facilities are not likely to be considered NRHP-eligible because they may lack architectural integrity, may not represent a particular style, and may not be contributing features to the broad historic theme of the Manhattan Project and initial nuclear production.

Native American groups with traditional ties to the area include the Westo, Shawnee, Yuchi, Apalachee, Chickasaw, Creek, and Cherokee (SR DOE, 1991d). Native American resources in the region include villages or townsites, ceremonial lodges, burial sites, cemeteries, and areas containing traditional plants used for certain rituals. The Yuchi Tribal Organization, the National Council of the Muskogee Creek, the Indian People's Muskogee Tribal Town Confederacy, the Pee Dee Indian Association, the Ma Chis Lower Alabama Creek Indian Tribe, and the United Keetoowah Band of the Cherokees have expressed concerns about sensitive Native American resources at SRS. Villages or townsites may contain a variety of sensitive features associated with different ceremonies and rituals; therefore, Pee Dee, Creek, and Yuchi townsites are considered sensitive. The Yuchi and the Muskogee Creek expressed concern that the area contains several plants traditionally used in ceremonies (SR DOE, 1991d).

Environmental Consequences. All tritium-handling functions relocated to SRS would be accommodated within existing structures without new construction. The existing facilities are not likely to be considered NRHP-eligible. Therefore, no NRHP-eligible prehistoric or historic resources or important Native American resources would be affected by either renovation or operation activities.

4.1.2.7 Socioeconomics and Community Services

Affected Environment. The discussion of socioeconomics and community services at SRS is based on the ROI where 93 percent of the SRS employees lived in 1991. The ROI includes Aiken (52 percent), Allendale (1 percent), Bamberg (2 percent), Barnwell (7 percent), Edgefield (1 percent), and Orangeburg (2 percent) counties in South Carolina; and Columbia (11 percent) and Richmond (17 percent) counties in Georgia. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Aiken, SC (26 percent); North Augusta, SC (14 percent); and Augusta, GA (15 percent) (see figure 3.2.5.1-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.2-1 through E3.2-5 provide ROI resource information on residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 75 percent, increasing from 146,087 in 1970 to 256,074 in 1990. Total employment increased from 138,668 to 243,301 between 1970 and 1990, an annual growth rate of 3 percent. The unemployment rates for 1970 and 1990 were 5.1 percent and 5.0 percent, respectively. For the same years, personal income increased from approximately $1.2 billion to $7.6 billion (an annual average of 10 percent), and per capita income increased from $2,959 to $14,446.

In 1990, employment at SRS was 20,230, representing 8 percent of the ROI employment (SR DOE, 1992a). As of September 30, 1992 employment at SRS had increased to 21,478. Under the No Action alternative, future site employment is expected to decrease to approximately 18,500 by the year 2000 (DOE, 1993c). In 1992, the total SRS payroll was estimated to be $771 million (SR DOE, 1992a). Under the No Action baseline, the total payroll is projected to be approximately $664 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 289,000 by 2000 and 300,000 by 2020. The unemployment rates for 2000 and 2020 are projected to be 6.3 percent and 6.2 percent, respectively. For the same years, personal income is projected to increase from approximately $10.6 billion to $13.7 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $18,000 in 2000 to $21,500 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 31 percent to 528,785. During the same period, the South Carolina population increased 35 percent and the Georgia population increased 41 percent. The population in the eight-county ROI is projected to increase from an estimated 583,000 in 2000 to 636,000 by 2020, an annual rate of less than 1 percent.

The largest county population increase (196 percent) occurred in Columbia County between 1970 and 1990, while over the same years, populations in Bamberg and Aiken counties increased 6 percent and 33 percent, respectively. Population in Columbia County is estimated to increase 5 percent between 1990 and 2000 and 10 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Bamberg County population is projected to increase approximately 13 percent between 1990 and 2000 and 9 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The population in Aiken County is expected to increase approximately 10 percent by 2000 and an additional 9 percent by 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, the city of Aiken had the greatest increase in population (48 percent) in the ROI. For the same years, the North Augusta population increased 19 percent and the Augusta population decreased 25 percent.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 70 percent from 122,558 to 208,433. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 10 percent by the year 2000 and an additional 9 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (252 percent) occurred in Columbia County, while the smallest increase (32 percent) occurred in Bamberg County. The number of housing units in Columbia County is expected to increase approximately 15 percent by 2000 and an additional 11 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Bamberg County is expected to increase about 18 percent by 2000 and an additional 9 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 2 percent in the ROI and ranged from approximately 1 percent in Barnwell County to 2 percent in Columbia County. The vacancy rates for rental units averaged 10 percent and ranged from about 7 percent in Allendale County to 11 percent in Aiken County.

Community Infrastructure and Services. The water supply systems operated by the counties of Aiken, Allendale, Bamberg, Edgefield, Orangeburg, Columbia, and Richmond, and the cities of Aiken, Augusta, North Augusta, and Barnwell maintain about 97 percent of the total capacity of the 14 major public systems in the ROI. The majority of these systems draw their raw water supplies from groundwater, but the systems serving Aiken, North Augusta, Columbia County, and Richmond County also draw a portion of their water supplies from surface water. Edgefield County, Orangeburg County, and Augusta utilize only surface water.

The Aiken County (about 16.1 MGD capacity), Aiken (10.3 MGD capacity), and North Augusta (8 MGD capacity) in Aiken County systems had 1989 average daily demands of 55 percent, 84 percent, and 31 percent of capacity, respectively. The systems operated by Allendale County (about 6.8 MGD capacity), Bamberg County (about 3.1 MGD capacity), and the city of Barnwell (about 4.8 MGD capacity) had 1989 average daily demands of 13 percent, 51 percent, and 15 percent of capacity, respectively. The water supply systems operated by Edgefield County (4.4 MGD capacity) and Orangeburg County (11 MGD capacity) had 1991 average daily demands of 57 percent and 54 percent of capacity, respectively. The systems operated by Columbia County (about 16.7 MGD capacity), Richmond County (22 MGD capacity), and the city of Augusta (60 MGD capacity) had 1989 average daily demands of 40 percent, 55 percent, and 47 percent of capacity, respectively.

Aiken is projected to have average daily demands of 86 percent of capacity in 1995 and 88 percent of capacity in 2000. All of these systems are projected to have average daily demands of less than 63 percent of capacity in 1995 and less than 71 percent of capacity in 2000. The counties of Aiken, Bamberg, Orangeburg, and Columbia and the city of Augusta operate wastewater treatment systems that maintain about 93 percent of the capacity of the 10 major public systems in the ROI. The Aiken County system (20 MGD capacity), which also serves the cities of Aiken and North Augusta, had 1989 average daily demands of 45 percent of capacity. The system operated by Bamberg County (4 MGD capacity) had 1989 average daily demands of 13 percent of capacity. The Orangeburg County system (9 MGD capacity) had 1991 average daily demands of 41 percent of capacity. The systems operated by Columbia County (about 5.4 MGD capacity) and the city of Augusta (46.1 MGD capacity) had 1989 average daily demands of 61 percent and 63 percent of capacity, respectively. All of these systems are projected to have average daily demands of less than 66 percent of capacity in 1995 and less than 69 percent of capacity in 2000.

Eighteen school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 640 students in Orangeburg School District #8 to 31,669 students in the Richmond County School District. School districts with enrollments over 1,000 were operating between 83 percent and 105 percent of capacity, but the majority of school districts were operating between 80 percent and 100 percent of capacity. Those school districts operating over 100 percent of capacity were Aiken County (103 percent), Allendale County (103 percent), Orangeburg District #3 (101 percent), and Orangeburg District #7 (103 percent). School districts in Aiken, Allendale, and Columbia counties were operating between 100 percent and 103 percent of capacity. Under the No Action future baseline, the current capacity of the Aiken County School District is projected to be further exceededby the years 1995 and 2000, while the current capacity of the Columbia County School District is projected to be further exceeded by the year 2000. The largest increase is expected to occur in the Aiken County School District, where enrollments are projected to exceed the existing capacity by 4 percent in 1995 and 9 percent in 2000. A smaller increase is expected to occur in the Columbia County School District, where enrollments are projected to exceed the current capacity by less than 1 percent in 2000. Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 18:1, and expenditures averaged $3,378 per pupil. The Georgia average pupil-to-teacher ratio was 16:1, and expenditures averaged $3,731 per pupil. The South Carolina average pupil-to-teacher ratio was 19:1, and expenditures averaged $3,788 per pupil (SC DEd, 1991).

Fifteen hospitals serve the eight-county ROI. In 1991, Barnwell County Hospital was operating close to capacity, while the other hospitals were operating well below capacity (AHA, 1990). In 1990, a total of 1,477 physicians served the ROI. The physician-to-population ratio for the ROI was 2.8:1,000, and ranged from 0.3:1,000 in Allendale County to 5.6:1,000, in Richmond County. The statewide physician-to-population ratio was 1.8:1,000 in South Carolina and 1.9:1,000 in Georgia (AMA, 1990).

Thirteen city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the 8-county ROI was in Richmond County, with 310 sworn officers or 1.6 sworn officers per 1,000 persons. Other large agencies are in the city of Augusta with 157 sworn officers 3.5 sworn officers per 1,000 persons and in Columbia County, with 88 sworn officers 1.3 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.6 per 1,000 persons (FBI, 1991).

Eleven fire departments and 1,104 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Aiken County (221 firefighters; 1.8 firefighters per 1,000 persons) and in Richmond County (166 firefighters; 0.9 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.1 per 1,000 persons (Kapalczynski, 1988; SC FA, 1990).

Local Transportation. Vehicular access to SRS is via South Carolina State Route 125 to the west and south, South Carolina State Route 19 to the north, South Carolina State Route 39 to the northeast, and South Carolina State Route 64 to the east. U.S. Route 278, South Carolina State Route 125, and SRS Road 1 are public roads that traverse SRS. Interstates and highways near SRS are shown in figure 4.1.2.7-1.

Estimated traffic along segments providing access to SRS is projected to contribute to differing service level conditions in accordance with population growth. South Carolina State Routes 64 and 125 and U.S. 278 would generally support congestion-free traffic flow. South Carolina State Route 19, however, would typically experience traffic congestion, with volumes approaching or exceeding the design capacity of the roadway. Along this roadway, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in moderate congestion. In addition, estimated truck traffic into SRS for delivery of supplies and removal of wastes would typically average 196 trips per day. However, the additional traffic volumes associated with continued operation of SRS are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to SRS (GA DOT, 1991b; SC DHwy, 1991).

Rail service in the ROI is provided by the Norfolk Southern Corporation and CSX Transportation. SRS is provided rail access via Robbins Station on the CSX Transportation line. In addition, SRS maintains 50 miles of onsite track for internal uses (SR DOE, 1990a).

Waterborne transportation is available via the Savannah River. The river was last dredged in 1979 and the Corps of Engineers has no future dredging plans. Currently, the Savannah River is used primarily for recreation (SR DOE, 1990a).

Columbia Metropolitan Airport in Columbia and Bush Field in Augusta receive jet air passenger and cargo service from both national and local carriers (SR DOE, 1990a; DOT, 1991). Numerous smaller private airports are located in the ROI.

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 45 to 50 new jobs (DOE, 1993d). The analysis presented in table 4.1.2.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 45 new jobs. The estimate of 50 new jobs is 11 percent higher than the 45 new jobs used in the following analysis, and this higher estimate would result in slightly more economic benefits than the 45 new jobs. The construction, modification, and installation of facilities and equipment for the Proposed Action at SRS would require 100 additional employees during peak construction (SR DOE, 1992a). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 45 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions would be filled through donor transfers, new hires, and internal reassignments. In addition to the jobs created directly by the project, another 219 jobs would be created indirectly during peak construction and 58 additional jobs during operations. The creation of direct and indirect employment would lead to the in-migration of 74 persons during peak construction and 60 persons during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside the regional labor force.

Under the No Action alternative, the current SRS employment level of 21,478 is projected to decline to 18,500 by the year 2000, a decrease of 2,978. The addition of 45 full time equivalent jobs at SRS would be realized as a result of the Proposed Action.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.2.7-1. In the year 2000, this project-related population growth from in-migration would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 583,000, and no cities or counties in the ROI would experience population growth greater than 1 percent.

The less than 1 percent change in population during peak construction would create the need for only an estimated 28 additional housing units, which is not a significant addition. For operations in the year 2000, the less than 1 percent change in population would create the need for only an estimated 23 additional housing units, with no adverse effect on the cities and counties in the ROI.

The estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI. Existing water and wastewater capacities more than exceed the projected demand. Many existing public education facilities are currently approaching 100 percent of capacity. Under current conditions, enrollments will not exceed most school capacities by the years 1995 and 2000 given the No Action future baseline. School districts in Aiken, Allendale, and Orangeburg counties currently exceed their capacities and the Columbia County School District will exceed its capacity by 2000. However, these school capacities will not be affected beyond what would naturally occur with No Action baselinegrowth because the Proposed Action would not add more than 1 percent to enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over the No Action baseline. Additional commercial truck traffic into SRS is estimated to be negligible relative to historic levels, and this truck traffic would occur during non-peak hours. Impacts to the local transportation network serving SRS would be negligible.

4.1.2.8 Waste Management/Pollution Prevention

Affected Environment. Discussion of the SRS waste management baseline is provided in section 3.2.5.3. Because no high-level or TRU wastes are associated with any proposed consolidation activities, no further discussion of high-level or TRU waste generation or management is presented.

The waste management objective at SRS is to contain waste handling, treatment, storage, and disposal within SRS. Exceptions to onsite final disposal are PCBs, which must go to EPA-approved disposal facilities; some types of nonradioactive hazardous waste, which are sent offsite for incineration and disposal at a RCRA-permitted facility until onsite facilities are available; and chlorinated hydrocarbons, lead batteries, and scrap metal, which are sold to commercial recyclers.

LLW is buried at a 100-acre site in the north portion of E-Area, with storage capacity projected to meet SRS and other offsite DOE facilities solid LLW storage/disposal requirements to include LLW from other offsite DOE facilities for the next 20 years.

The SRS facilities designed to treat and dispose of mixed waste includes an interim storage complex called the Mixed Waste Storage Facility, the Waste Solidification and Disposal Facility (planned for 1995), the Consolidated Incineration Facility (planned for 1996), and the new Hazardous Waste/Mixed Waste Disposal Facility (planned for 1998).

The Consolidated Incineration Facility would incinerate SRS hazardous, mixed, and low-level radioactive waste. The incineration of hazardous and mixed waste would enable SRS to comply with RCRA requirements for treatment of hazardous waste prior to disposal. Construction of the Consolidated Incineration Facility began in January 1993 and will be completed in early 1996. The Waste Solidification and Disposal Facility to be located in Y-Area is being planned to treat the slurry from off-gas treatment.

All hazardous waste treatment, storage, and disposal facilities at SRS are either fully permitted, have interim status, or are operating pursuant to enforceable agreements with the regulators, while other waste management facilities are being developed.

Hazardous wastes are manifested and shipped offsite by Department of Transportation (DOT)-registered transporters to RCRA-permitted disposal facilities. Sanitary waste is disposed of in the onsite sanitary waste landfill; the northern expansion section would be utilized from 1992 until 1997 if current generation rates continue. The northern expansion would cease operation when the new onsite sanitary landfill, with a 20-year capacity, becomes operational in 1996. Scrap metal and other selected materials are recycled whenever possible. All other nonhazardous wastes are sent to the sanitary landfill. Asbestos and rubble are also sent to the sanitary landfill. Powerhouse ash is sent to the ash basin and to land reclamation, while domestic sewage is conveyed to the onsite sanitary treatment plant. After sanitary treatment, the process sludge is sent to land reclamation, and the treated effluent discharged to a NPDES-permitted outfall.

SRS has implemented waste minimization and pollution prevention using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. A Chlorinated Solvents Reduction Program has been initiated to evaluate opportunites to reduce or eliminate the use of chlorinated solvents in plant operations. Hazardous waste has been reduced by minimizing the use of chlorofluorocarbons and converting to dry wiping.

Environmental Consequences. Any equipment to be moved to SRS from another site as a result of the Proposed Action would be decontaminated to a level that meets all shipping regulations governing radioactive shipments.

Construction/modification activities involving decontamination are part of routine facility operations at SRS. Project decontamination activities may include removing asbestos piping insulation, floor and ceiling tiles, and asbestos or PCB-contaminated concrete flooring. Such decontamination activities, if identified as necessary, would be performed in accordance with TSCA requirements for handling and disposal of asbestos and PCB wastes. The amount of hazardous construction waste materials is expected to be minimal.

Any soil excavated for subsurface investigations, or as a result of piping modification or replacement of sanitary and industrial drains, would be analyzed for possible contamination before disposal. Uncontaminated soils would be used as fill or disposed of in a local sanitary landfill if considered unsuitable for backfill. Soils found to be contaminated would be referred to the SRS Environmental Restoration Program for subsequent management.

Management of potentially contaminated soil would involve an area inspection, characterization, and evaluation of cleanup activities (if necessary). Cleanup action and compliance follow-up would be conducted, as necessary, to remove and dispose of contaminated soils. Remediation of contaminated areas would be conducted according to accepted guidelines and procedures applicable to the type and extent of contamination. Although remediation activities may have additional project cost implications, no adverse affect to the SRS waste management program is expected.

No new waste streams would be generated as a result of the nonnuclear consolidation. Estimated additional wastes associated with the relocated functions are listed in appendix B, section B.2. Consolidation of the tritium-handling functions at SRS would generate approximately 500 ft^3 of LLW. This amount is insignificant in relation to existing LLW at SRS. A small portion of the LLW is expected to be classified radioactive waste. The LLW would include low-level compactible and noncompactible wastes generated from glove boxes and from decontamination of tritium-contaminated components. These wastes would be repackaged, if necessary, and stored temporarily in 96 ft^3 boxes to minimize radiation exposure and contamination. The wastes would be sent to the E-Area Burial Ground for disposal per DOE Order 5820.2A. The Burial Ground, in combination with the concrete vaults, has adequate capacity to receive the additional LLW generated by proposed nonnuclear consolidation activities.

Small quantities of acid wastewater generated from laboratory operations would be collected in bottles or other suitable containers and treated in another facility that meets the requirements for sampling, monitoring, and neutralizing these wastes.

The disposal of nonhazardous waste would be made onsite at the sanitary landfills in accordance with SRS waste management policies. The additional nonhazardous wastes would have a minor impact on shortening the anticipated operational life of the existing SRS sanitary landfills.

The volume of liquid effluent from the relocated functions is quite small and well within the capacity of the SRS wastewater treatment facility and process sewers. Consequently, there would be minimal impact on the SRS wastewater treatment system and the resulting NPDES-permitted discharges.

Each of the functions transferring to SRS from Mound has been subject to programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities and reduce environmental impacts. Once the transfer of the functions occurs, SRS would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

In summary, additional waste streams generated by the increased nonnuclear manufacturing activities at the SRS are well within the storage, treatment, and disposal capability of existing waste management facilities.

4.1.2.9 Human Health: Facility Operations and Accidents

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.0. Information specific to SRS is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (§4.1.2.2 and 4.1.2.3, respectively), chemical pollutant levels from SRS operations to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Radiological release levels to which the public is exposed are also well below applicable permit, regulatory, and DOE operational requirements (SR DOE, 1991b).

A review of the recent SRS annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The period of the review (1986-1990) was a time during which plant operations were much higher than in the past year and higher than anticipated in the future.

Historical releases of tritium from SRS facilities due to normal operations and accidents are well documented and their effects have been thoroughly studied. Total SRS annual offsite doses from accidental and routine releases for 1984 to 1988 ranged from 0.28 to 0.52 millirem (mrem) effective dose equivalent (a risk of less than 5×10^{-7} fatal cancers from 1 year of operations) to the maximum individual at the site boundary and from 15 to 27 person-rem environmental dose commitment (less than 3×10^{-2} fatal cancers from 1 year of operations) to the population of more than 500,000 individuals living within 80 kilometers of the site, resulting in a frequency of 6×10^{-8}. The Separations Area, where the new tritium functions would be located, accounted for 73 percent of the total releases (WSRC, 1991a).

Most of the Mound tritium-handling functions would be located in the existing tritium extraction and purification facility (Building 232-H) and in the new RTF (Building 233-H). The RTF replaces the tritium-processing and filling functions that have been performed in an existing tritium-filling facility (Building 234-H) that has contributed to historical tritium releases. When the RTF replaces the filling operations in Building 234-H, routine operation of the RTF would substantially reduce atmospheric tritium releases from SRS tritium-handling operations to less than 5 percent of the levels experienced from Building 234-H. Analysis of the most severe credible accident (earthquake) for the RTF indicates a maximum individual dose at the site boundary of 408 mrem effective dose equivalent (a risk of less than 4×10^{-4} fatal cancers) (SR DOE, 1986). This is about 25 percent of the dose that would be received if Building 234-H experienced an equal magnitude earthquake.

Environmental Consequences. The Air and Water Resources sections address the chemical releases associated with relocating tritium-handling functions identified in section 3.3.2 at SRS. As shown, the cumulative impacts from existing releases and the releases of chemicals and radioactive materials associated with relocating these functions at SRS are below applicable permit, regulatory, and DOE operational requirements.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water which may contain hazardous chemicals is pretreated before discharge. Furthermore, discharge of wastewater through NPDES-permitted outfalls which can be attributed to the activities to be relocated at SRS are expected to be below NPDES limits and water quality would not be adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway. For SRS, all possible HAPs were examined and from their assessment only trichlorotrifluoroethane was identified for further analysis based on its toxicity, concentration, and frequency of use. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified a carcinogens. The cumulative Hazard Indexes for SRS (see table F-16 in appendix F) were 6.7×10^{-5} onsite (worker effects) and 9.5×10^{-7} at the site boundary (effect on the public) on an annual basis, and the incremental change Hazard Index due to the Proposed Action was 0 both onsite and at the site boundary. Therefore, the Proposed Action would not contribute to the cumulative Hazard Index at SRS. No cancer risk from hazardous air pollutants was identified.

Normal releases of radioactive materials from SRS result in a total maximum individual annual dose on the public of 0.163 mrem effective dose equivalent (WSRC, 1991a). The resulting risks of potential fatal cancers associated with 1 year of operation would be 7.3×10^{-8}. The dose increment associated with the increase in tritium emissions would be less than 0.001 mrem effective dose equivalent and results in an increased risk of less than 4.5×10^{-10} fatal cancers from one year of operation. A cancer risk of 10^{-6} or less is considered to be acceptable by the EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population.

The average dose to workers at SRS associated with tritium handling activities is 0.27 mrem per year (WSRC, 1993). The dose increment associated with the increased level of tritium-handling activities would be less than 0.011 mrem per year. This would result in an incremental and cumulative cancer risk of 4.9×10^{-9} and 1.3×10^{-7}, respectively.

In summary, these analyses show that no adverse health effects can be expected from the release of hazardous chemicals/chemical pollutants or radioactive materials at SRS attributable to the Proposed Action.

All tritium-handling functions to be relocated to SRS would be performed in an SRS facility with an equal or greater hazard level designation. The risks to workers and the general public from potential accidents at SRS tritium facilities have been thoroughly studied and documented in SARs and are routinely updated in accordance with DOE Orders 5480.21 (DOE, 1991a), 5480.22 (DOE, 1992e), and 54809.23 (DOE, 1992h) to ensure that operations are within an acceptable safety baseline. For tritium functions being relocated to SRS from Mound, the risks due to potential accidents have been analyzed. Conservative worst-case estimates of offsite doses were made assuming: an accidental release occurs (probability equal to one); all of the tritium would be released in an oxide form (the oxide form of tritium is 25,000 times more hazardous than the elemental form); and, the release would be unmitigated (no credit taken for the tritium stripper systems, secondary containment, and favorable dispersion effects of the facilities exhaust stack). Under these assumptions, the estimated offsite dose to the maximum individual at the site boundary ranged from 30 mrem effective dose equivalent for the commercial sales function to 900 mrem effective dose equivalent for the gas transfer systems function (a risk of less than $8x10^{-4}$ fatal cancers). Under more realistic assumptions, the estimated consequences would be less due to the source term reduction afforded by the tritium stripper systems and the reservoir secondary containers, due to the dispersion effects of the facility's exhaust stack, and because a portion of the released tritium could be in the less hazardous elemental form (WSRC, 1992a).

Postulated accidents for the new tritium-handling functions are the same as those identified and analyzed in SARs for tritium facilities existing at SRS; no new accident scenarios were identified. They include accidents associated with an earthquake, tornado, explosion, or fire that have sufficient energy to cause a tritium release. The risk (mathematical product of the accident frequency of occurrence and estimated dose) of an individual receiving the estimated offsite dose from exposure to tritium is reduced by the extent that the accident probability is smaller than one. Under assumptions that incorporate mitigating factors, the probabilities and consequences of these accidents at existing SRS tritium facilities are in the range of $2x10^{-4}$ events/yr and 4,000 mrem dose to the maximum exposed offsite individual (equates to a risk of $7x10^{-7}$ fatal cancers/yr) for a design basis earthquake accident, to 8.8 events/yr and $3x10^{-5}$ mrem dose to the maximum exposed offsite individual (equates to a risk of $3x10^{-10}$ fatal cancers/yr) for a tritium leak accident in the product evacuation system (WSRC, 1992d; SR King, 1987). For comparison purposes, the same maximum individual living on the site boundary received an estimated annual dose of 300 mrem from natural sources with a probability of 1 per year which equates to a risk of 300 mrem/yr ($1x10^{-4}$ fatal cancers/yr) (WSRC, 1991a). A summary of the accident impacts discussed above is presented in table 4.1.2.9-1. Included in the table are the impacts from natural sources of radiation.

The reduction in requirements for nuclear weapons has reduced the tritium operations at SRS. The quantity of tritium in operations and inventories associated with relocating Mound functions to SRS would be below those that currently exist at SRS. Most of the tritium-handling functions to be relocated are the same as or similar to those currently being performed at SRS. The operations would be conducted in an SRS facility designed for tritium handling with an equal or greater hazard level designation (i.e., high hazard facility), and the current accident profile at SRS would not change as a result of relocating these functions. The current chemical accident profile is not affected by the Proposed Action.

4.1.3 Los Alamos National Laboratory

A detailed discussion of LANL's current mission, facility/process description, and waste treatment and management activities is provided in section 3.2.6. The functions and processes associated with the Proposed Action to be consolidated at LANL and the proposed facility modifications required to support each relocated function are discussed in section 3.3.3. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at LANL and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action that supports the following discussion on LANL is also provided in the chapter 4 introduction and section 4.1.

4.1.3.1 Land Resources

Affected Environment. LANL is located approximately 60 miles north-northeast of Albuquerque, NM (figure 3.2.6-1). Generalized land uses at LANL and in the vicinity are shown in figure 4.1.3.1-1. The County of Los Alamos has zoned the entire area of the lab FL (Federal Land) (Los Alamos County, 1990 and 1991). LANL has developed nine land use classifications for their operations (LANL, 1990a). The affected environment for this project consists of six Technical Areas (TA) situated in the western half of LANL, designated TA-3, -16, -21, -22, -35, and -40 (figure 3.2.6-2). There are no prime farmlands on LANL although portions are designated as NERP. The residential distribution of LANL employees is discussed in section 4.1.3.7.

TA-3, called the Central Business District in the Administrative and Technical Services land classification areas, contains the highest density of development and the highest working population at LANL. TA-3 is physically separated from the Los Alamos townsite by the steep-walled Los Alamos Canyon. Multifamily housing is located on the north rim of the canyon, set back approximately 10 feet from the Federal Reservation boundary fence.

TA-16, called Weapons Engineering in the High Explosives (HE) Research, Development, and Testing (RD&T) land classification area, is a remote site located in the southwest corner of LANL. The mission requirements of TA-16 necessitate large blast buffer zones contained within DOE-controlled land and radiation site evaluation circles that extend offsite (LANL, 1990a).

TA-21, called the DP site in the Experimental Science land classification area, contains both plant processing and laboratory functions surrounded by radiation site evaluation circles that partially extend offsite into the Los Alamos townsite (LANL, 1990a).

TA-22, also in the HE RD&T area, is located approximately 1 mile southwest of TA-3. The remote site is used for detonator RD&T for HE. Surrounding open space has been designated for blast buffer zones that do not extend beyond the site boundary (LANL, 1990a).

TA-35, in an Experimental Science land classification area, is also located in a remote area southeast of TA-3. The mission at TA-35 is related to experimental science, special nuclear materials, and laser research. Development is clustered in a dense pattern surrounded by undeveloped open space (LANL, 1990a).

TA-40 abuts the east side of TA-22 and is also in the HE RD&T area. The mission of TA-40 is explosives testing and characterization. The site is remote and surrounded by undeveloped open space with blast buffer zones contained within LANL boundaries (LANL, 1990a).

LANL does not contain any public recreation facilities; however, there are several recreation facilities for LANL personnel.

Development and operation of DOE facilities has disturbed the character of the landscape in their respective areas. The DOE facilities are generally brightly lit at night and highly visible from nearby viewpoints, and are visible from as far away as southeast Santa Fe (approximately 30 miles). The developed areas of LANL are consistent with a Class 5 VRM area designation. The remainder of LANL ranges from a Class 3 to Class 4.

Offsite viewpoints affected by DOE facilities are primarily associated with the Los Alamos townsite and New Mexico State Highways 4, 501, and 502. On a clear day, views can exceed 50 miles. Topographic relief and heavy vegetation provide significant visual screening of LANL facilities, especially from mid- and long-distance viewpoints.

Environmental Consequences. High-power detonators, calorimeter functions, and neutron tube target loading functions would be situated within existing buildings at LANL (see section 3.3.3 and figures 3.3.3-1 through 3.3.3-1f). The high-power detonators function is to be sited within TA-22 and is compatible and consistent with the designated land use classification at LANL (LANL, 1990a). Both the proposed calorimeter functions sited at TA-35 and neutron tube target loading functions at TA-21 are located within an area designated as Experimental Science and are compatible and consistent with this land use classification (LANL, 1990a).

The small number of in-migrating employees (see section 4.1.3.7) would have a minimal impact on land resources. Offsite land requirements for residential use as a result of project-related in-migration would be approximately 4 acres during implementation and 10 acres during operations, and would result in no significant indirect impacts to land use resources. The small in-migration would have no impact on the extensive recreational facilities in the region.

The Proposed Action would place relocated functions in existing buildings. Approximately one-half acre would be required to accommodate temporary construction laydown and parking. The impacts to visual resources would be negligible.

4.1.3.2 Air Quality and Acoustics

Affected Environment. The climate at LANL and in the surrounding region is characterized as a semiarid tropical and subtropical steppe (Trewartha, 1954). Mountain barriers deplete a large portion of the moisture from the maritime air masses from the Pacific Ocean, a condition that contributes to the semiaridness. The annual average temperature in the area is 56.2 "F; average daily temperatures range from 22.3 "F in January to 92.8 "F in July. The average annual precipitation in the area is 8.1 inches. The average monthly precipitation ranges from 0.38 inch in November to 1.51 inches in August (NOAA, 1991c).

Ambient Air Quality . LANL is located in the New Mexico Intrastate AQCR. Areas in LANL and its surrounding counties are designated as attainment with respect to the NAAQS (40 CFR 50). The applicable NAAQS and New Mexico state ambient air quality standards are presented in table D2.1.1-1. Ambient concentration limits for HAPs/toxics have been promulgated by the New Mexico Environmental Improvement Board. The emission rates of HAPs/toxics from existing LANL facilities during 1989 are listed in table D2.1.6-3. The HAPs/toxics described in this section are those currently used at LANL or those anticipated to be used with the Proposed Action.

Ambient air quality within and near the LANL site boundary is currently monitored for TSP and beryllium (LANL, 1990b). Data for 1985 through 1989 indicate that the 24-hr New Mexico TSP standard was exceeded. In addition, a short-term monitoring program for O_3 was conducted during January to June 1986 at a station in the Bandelier National Monument, near the southern site boundary of LANL. Measurements indicated that the New Mexico O_3 standard was exceeded. The ambient air quality data are summarized in table D2.1.6-1.

The principal sources of criteria air pollutants at LANL are: the steam plants and power plant; operations associated with beryllium including machining in shop 4 at area TA-3-39, in shop 13 at area TA-3-102, beryllium shop at area TA-35-213, and beryllium processing facility at area TA-3-141; asphalt plant; burning of HE wastes at the area TA-16 burnground and experimental detonation of conventional explosives; and, the lead-pouring facility for casting lead at area TA-3-38 (LANL, 1990b). Other emissions include fugitive particulate emissions from waste-burial activities and coal piles, other process emissions, vehicular emissions, and temporary emissions from various construction activities. Emission estimates for these sources are presented in table D2.1.6-2.

Normal operations result in the emission of radioactive materials at LANL. These emissions include 14,400 curies of tritium (LANL, 1990b). Operations at LANL are conducted to ensure that releases of radioactive materials result in a total maximum individual annual dose of less than the NESHAP standard of 10 mrem effective dose equivalent. Compliance with NESHAP s is required for DOE facilities. Tritium is the only radionuclide that may be affected by nonnuclear consolidation activities.

The air quality under ambient and No Action conditions at LANL is described in table 4.1.3.2-1. Ambient air quality monitoring data are listed as "maximum background concentrations" and the air dispersion modeling results for existing operations are listed as "No Action concentrations." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of the ozone (1-hour) standard and the 24-hr average concentration of particulate matter, baseline air quality impacts from LANL are well below any applicable guidelines or regulations. The ozone exceedance is typical of urban areas and areas affected by vehicle exhaust. The exceedance of the 24-hr PM_{10} and TSP standards would only occur occasionally, during periods with relatively high winds. The exceedance is typical of semiarid and arid regions with large areas of exposed earth.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions . The major noise sources at LANL include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, vehicles, pistol and rifle firing range, and explosives detonation). No LANL environmental noise survey data are available. At the LANL boundary, away from most of the industrial facilities, noise from most of these sources is barely distinguishable from background noise levels.

Impulsive noise from explosives testing can be heard occasionally in Los Alamos Townsite, White Rock Communities, or Bandelier National Monument. The acoustic environment along the LANL boundary away from traffic noise, although not measured, is expected to be that of a rural location with typical DNL levels in the range of 35 to 50 dBA (EPA, 1974). Traffic is the primary source of noise at the site boundary and at residences near roads. The acoustic environment in the town of Los Alamos is similarly expected to be that of a suburban location with typical DNL in the range of 53 to 62 dBA (EPA, 1974).

The State of New Mexico has not established specific numerical environmental noise standards applicable to LANL. Los Alamos County has adopted a noise ordinance which specifies maximum sound levels in residential areas. (This ordinance is discussed in appendix D). Although the maximum levels specified by the ordinance and the EPA guideline may be exceeded occasionally at the LANL boundary, this is expected to be attributable to traffic noise and not to sources at LANL; the ordinance does not apply to traffic noise.

Environmental Consequences.

Air Quality . The relocated functions would require modification of some facilities (section 3.3.3). The modifications would temporarily increase particulate matter emissions such as dust and dirt and vehicle emissions. The increase, when added to existing levels, is expected to be below applicable standards and would cause no adverse impacts to ambient air quality.

No significant additional emissions of criteria pollutants are expected at LANL. Therefore, the ambient concentration of criteria pollutants as shown in table 4.1.3.2-2 is not expected to change.

Hazardous/toxic air pollutant emissions are expected to be minimal. Consequently, impacts to ambient air quality are predicted to be very low compared to applicable standards and guidelines (table 4.1.3.2-2).

Consolidation of the nonnuclear activities at LANL would increase tritium emissions. An additional 122 curies of tritium would be released annually (PI DOE, 1991b). Operations at LANL would be conducted to ensure that releases of radioactive materials result in a total maximum individual annual dose below the NESHAP standard of 10 mrem effective dose equivalent. The nonnuclear consolidation activitieswould only affect the tritium emissions.

Acoustic Conditions . Effects of the Proposed Action on noise levels during construction and operation have been evaluated for major traffic routes around LANL. The changes in traffic volumes are expected to result in an increase of less than 2 dB in peak-hour sound levels along Route 4 at White Rock and along Route 502 in Los Alamos. Changes in sound levels along other routes are expected to be minor. The increase in noise levels along the major access routes is expected to cause little or no increase in annoyance to communities or individuals.

Noise generated by renovation of existing buildings, placement of transportable offices, and onsite operation activities is not expected to increase offsite noise levels. Noise generated by construction equipment and machines, and by operational facilities, equipment, and machines, is not expected to cause ambient noise levels to exceed EPA guidelines.

Construction workers and personnel working at any of the reconfigured facilities at LANL would be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at LANL.

Although no increase in annoyance is expected offsite from construction and operations, measures would be initiated onsite to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments during construction and operations with appropriate hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas and an effective hearing protection program conducted.

4.1.3.3 Water Resources

Affected Environment. This section describes the surface water and groundwater resources at LANL.

Surface Water. The major surface water body in the immediate vicinity of LANL is the Rio Grande east of the site (figure 3.2.6-2).

The primary surface water features near LANL are intermittent streams. Sixteen drainage areas pass through or start in the LANL site. Most LANL facilities are located well above the streambeds (DOE, 1988). Only those TAs located within canyons would be within the 500-year floodplain.

No surface water is withdrawn at LANL for either drinking water or facility operations. The water supply system for LANL is based on a series of groundwater supply wells and springs (LA DOE, 1988).

Los Alamos, Sandia, and Mortandad canyons currently receive treated industrial or sanitary effluent. Acid-Pueblo Canyon does not receive LANL effluents. Surface waters in these canyons are not a source of municipal, industrial, or agricultural water supply. Only during periods of heavy precipitation or snowmelt would waters from Acid-Pueblo, Los Alamos, or Sandia Canyons extend beyond LANL boundaries and reach the Rio Grande. In Mortandad Canyon, there has been no surface run-off to the laboratory's boundary since studies were initiated in 1960 (LANL, 1990b).

Acid-Pueblo Canyon received untreated and treated industrial effluents from 1944 to 1964. The canyon currently receives treated sanitary effluents from Los Alamos County treatment plants in the upper and middle reaches of the Pueblo Canyon. Los Alamos Canyon has received treated industrial effluents since 1952. During 1989, no liquid discharges were released from the treatment plants in technical area TA-21. The canyon also receives discharge from the sanitary treatment lagoons in area TA-53. The lagoons were modified during 1989, resulting in no discharge in 1990 (LANL, 1992). There were occasional releases of cooling water from the research reactor in the upper reaches of the canyon.

Sandia Canyon receives cooling tower blowdown from the TA-3 power plant and treated sanitary effluents from TA-3. Treated effluents form a perennial stream in a short reach of the upper canyon. Mortandad Canyon receives treated effluent from the industrial waste treatment plant in TA-50.

Existing wastewater generation is approximately 183 MGY (table 3.2.6-1). This effluent emerges from 10 sanitary outfalls and 102 industrial outfalls and is covered under one NPDES permit. Industrial effluent includes power plant discharges (1 outfall), boiler blowdown (2 outfalls), treated cooling wastewater (36 outfalls), noncontact cooling wastewater (19 outfalls), radioactive wastewater (2 outfalls), HE production facilities wastewater (19 outfalls), photographic laboratory rinse wastewater (13 outfalls), and printed circuit board process wastewater (1 outfall) (LANL, 1990b).

A new sanitary wastewater treatment and collection system to replace 8 existing treatment facilities and 30 existing septic tanks is completed. The new treatment plant located at TA-46, will enable reuse of the treated wastewater for cooling water and irrigation. Excess treated effluent is discharged to Canada del Buey under the laboratorie's NPDES permit (LANL, 1992).

In addition to NPDES monitoring, regional, perimeter, and onsite stations are monitored to provide routine surveillance of the effect of operations on surface water quality. This includes monitoring of the canyons that receive NPDES-permitted discharges, as well as the Acid-Pueblo Canyon, which previously received both treated and untreated industrial effluent (LANL, 1990b). Surface water in the canyon is not a source of municipal, industrial or agricultural water supply. Water found in these canyons could only reach the Rio Grande during periods of heavy spring snowmelt or thunderstorms.

Surface Water Quality. In 1989, there were six instances where sanitary discharges were in noncompliance with NPDES permit limits. Four noncompliances occurred at the same outfall; two for total suspended solids, one for biochemical oxygen demand, and one for fecal coliform bacteria. Total suspended solids and biochemical oxygen demand were also in noncompliance at other outfalls. There were four noncompliances for industrial outfalls. Two were for total suspended solids at boiler blowdown outfalls, one was for total suspended solids at a high explosive production facility outfall, and one was for chlorine at a treated cooling wastewater outfall. EPA was notified of these and any other deviations from permit limits in the monthly NPDES sampling results report (LANL, 1990b).

The surface water quality monitoring results for the Rio Grande and four onsite canyons are presented in table 4.1.3.3-1. The monitoring results indicate that only turbidity exceeded listed water quality criteria for all locations. Total hardness and tritium exceed listed water quality criteria for Mortandad Canyon, which does not flow offsite. No runoff or sediment transport has occurred beyond the site boundary since the start of effluent release into the canyon (LANL, 1990b).

Groundwater. The main aquifer consists mainly of sediments of the Santa Fe Group. Nearly all groundwater at LANL is obtained from deep wells that produce water from this aquifer. The Bandelier Tuff, a volcanic unit that lies above the Santa Fe Group, contains fractures that yield small amounts of water to springs. A minor amount of groundwater at LANL is obtained from springs. The aquifers that lie beneath LANL are considered Class II aquifers, having current sources of drinking water and water having other beneficial uses.

The water in the main aquifer moves slowly from the major recharge area in the west to discharge springs in White Rock Canyon along the Rio Grande. The depth to the aquifer ranges from about 1,200 feet on the west to about 600 feet on the east. The total saturated thickness penetrated by production wells ranges up to at least 1,700 feet (LANL, 1984).

Groundwater Quality . Most wells yield fresh water (total dissolved solids less than 500 mg/L), although some wells east of the site have a higher total dissolved solids content (1,000 mg/L or more). The primary, secondary, and radiochemical groundwater quality, as measured at six distribution stations, was in compliance with all Federal and state regulations (LANL, 1989a). No contamination from organic compounds has been detected in the main aquifer (table 4.1.3.3-2).
Groundwater Use . LANL, the adjacent communities of Los Alamos and White Rock, and Bandelier National Monument are entirely dependent on groundwater for their water supply. The water supply is primarily obtained from well fields. About 4.1 MGD are used in the LANL area (table 3.2.6-2).

Groundwater Rights . LANL does not have Federal reserved rights. Existing water rights held by LANL include 5,541.3 acre-feet per year (1.8 BGY). An additional 1,200 acre-feet per year (391 MGY) are purchased from the San Juan-Chama Transmountain Diversion Project of the Bureau of Reclamation. This amount is currently in reservoir storage and would be available (minus an adjustment for evaporation) by way of the Rio Grande. No infrastructure currently exists to allow water to be withdrawn from the Rio Grande for use at LANL.

Over the next 50 years, increases in water use will require one or all of the following: use of the 1,200 acre-feet of San Juan-Chama water, pumping in excess of the 5,514 acre-foot allotment in exchange for release of San Juan-Chama water, or establishment of credit for return flow (LANL, 1989a).

Although water use by the laboratory has decreased by about 1.7 MGY since 1979, water use by the city and county has been increasing by about 13 MGY. Thus, there has been a net growth in overall use of about 0.8 percent per year. Based on this growth rate, the present allotment would be fully used by about the year 2000. If San Juan-Chama water is added, the limit to the total available supply would be reached by about the year 2020 (LANL, 1988c). Recent water usage followed the trend of the 1988 projection, and in 1990 was at 91.5 percent of the allotment.

The preferred course of action is to use the San Juan-Chama water (LANL, 1988c). Ownership of this water has already been established, and this water constitutes an established source. Establishment of return flow credits is secondarily preferred. Return flow is potentially of low cost. The increased water supply obtained from return flow credit, however, would necessarily come from groundwater. There are potential problems in receiving approval for increased withdrawals, particularly because groundwater from the main aquifer discharges to the Rio Grande, and any further groundwater withdrawal has the potential to affect downstream users of Rio Grande water.

Environmental Consequences. A description of the functions to be transferred to LANL and the facility locations selected to house these activities is presented in section 3.3.3.

Surface Water. Reconfiguration activities would take place in TAs atop mesas and would not be affected by a 500-year flood. Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

No surface water would be withdrawn for relocated activities. Impacts to surface water resources associated with runoff and wastewater discharged during modification would be negligible.

The additional sanitary wastewater generated by the transferred processes would be approximately 0.44 MGY (table 3.3.3-4). The increase represents less than 1 percent over the current sanitary wastewater generation rate of 183 MGY (table 3.2.6-1).

Surface Water Quality. LANL was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. As described in sections 4.1.3.8, Waste Management and appendix B, section B3, an incremental increase of less than 1 percent in liquid nonhazardous waste streams would result from the Proposed Action. The additional liquid waste can be accommodated by the new upgraded sanitary wastewater treatment plant and collection system. There should be no impact to surface waters because the treated effluent is of sufficient quality to be used for cooling water or irrigation. Further, the excess treated effluent is discharged to the Canada del Buey, a dry canyon that has only seasonal intermittent flow. There would be no increase in cooling water discharge or significant changes in stormwater runoff from LANL from the Proposed Action.

Groundwater. Water requirements for both the modification and operations phases would be supplied from local groundwater sources. It is projected that 5,500 GPD of water would be needed during the 3-year modification period (table 3.3.3-3). This amount is less than 1 percent of the current groundwater use of 4.1 MGD, and would not be a significant increase.

During operations, an additional 1,840 GPD of water would be required (table 3.3.3-5), which is less than 1 percent of the present groundwater use of 4.1 MGD. The projected water requirements for modification and operations would not constitute significant increases in the total amount of groundwater currently withdrawn by LANL and would not affect water supply in the area. This additional amount would still be below the LANL maximum allotment of 1.8 BGY, and would be approximately 0.2 percent of the remaining available allotment of 0.3 BGY.

Groundwater Quality. No process wastes would be discharged directly to the groundwater and all wastewater discharges would be required to comply with NPDES permit requirements. Given normal safeguards and precautions, no adverse impacts to groundwater quality are expected to result from the Proposed Action.

4.1.3.4 Geology and Soils

Affected Environment. LANL is located on the Pajarito Plateau. The surface of the plateau is dissected by deep, southeast-trending canyons separated by long, narrow mesas.

LANL lies within Seismic Zone 2B (ICBO, 1991). The strongest earthquake in the last 100 years within a 50-mile radius was estimated to have a magnitude of 5.5 to 6 and an MMI of VII. Studies suggest that several faults have produced seismic events with a magnitude of 6.5 to 7.8 in the last 500,000 years. LANL operates a seismic hazards program which monitors seismicity through a seismic network and conducts studies in paleoseismology. These studies have determined the presence of three faults in the area that are considered active as defined by 10 CFR 100, appendix A. These form the Pajarito fault system, which includes the Pajarito, Water Canyon, and Guaje Mountain faults. The Guaje Mountain fault had movement on it between 4,000 and 6,000 years ago. There is no evidence of movement along the Pajarito fault system during historical times (LA DOE, 1979). The 100-year earthquake at Los Alamos is regarded as having a magnitude of 5, with an event of of magnitude 7 being the maximum credible earthquake. These values are currently used in design considerations at Los Alamos (LA Gardner, 1987).

Geological concerns associated with the LANL area include potential downslope movements in association with regional seismic activity. Although isolated rockfalls commonly occur from the canyon rims, landslides are an unlikely hazard.

LANL is underlain by soil types varying in texture from clay and clay loam to gravel. Over 95 percent of the soils are developed on acidic volcanic rocks (LA USDA, 1978). Because of the topographic relief of the Pajarito Plateau, rock outcrops occur on greater than 50 percent of the site area.

Water and wind erosion of these soils varies from slight to severe depending on slope, soil grain size, amount of disturbance, and degree of protection. Shrink-swell potential ranges from low to high, correlating with the amount of swelling clays present (LA USDA, 1978). No soils in Los Alamos County have been designated prime farmland or Soil of Statewide Importance for New Mexico.

Environmental Consequences. All new functions would be accommodated within existing structures. All laydown areas would be either inside existing buildings or in existing paved areas; therefore, no impacts to geologic features would occur.

During implementation and operations of the new functions, seismic activity in the area poses a potential hazard to the facilities andpersonnel at LANL. Secondary effects from seismic activities, such as soil liquefaction or landslides, are not expected because of the depth of groundwater and relatively stable topography on top of the mesas. Rockfalls could occur along the cliffs at the edge of the mesas. Modifications of site facilities to accommodate the new functions would meet standards for Seismic Risk Zone 2B in the Uniform Building Code (ICBO, 1991). Hazards resulting from the return of volcanism during implementation and operations are unlikely. Because there would be no new construction, relocation of functions to LANL would have no impact on the soils of the site.

4.1.3.5 Biotic Resources

Affected Environment. Terrestrial habitats within undeveloped areas of LANL support six major vegetative communities: juniper-grassland, pinyon pine-juniper, ponderosa pine, mixed conifer, spruce-fir, and subalpine grassland. Undeveloped areas within LANL provide habitat for a diversity of terrestrial wildlife, described in detail in an environmental impact statement (EIS) prepared for the continued operation of LANL in 1979 (LA DOE, 1979). LANL was designated a NERP in 1976.

National Wetland Inventory (NWI) maps (LA FWS, 1990a-d) indicate that wetlands within LANL are restricted to several canyons containing the Rio Grande or its tributaries. Most of the wetlands shown on the NWI maps have been designated as temporary or seasonal.

Aquatic habitats on LANL are limited to the Rio Grande and several springs and intermittent streams in the canyons. These habitats currently receive NPDES-permitted wastewater discharges (LA DOE, 1988). Fourteen species of fish are known to inhabit the roughly 6-mile reach of the Rio Grande between LANL and Cochiti Lake (NM DGF, 1992). The springs and streams on the site support limited, if any, aquatic life.

Seventeen Federally-listed or New Mexico-listed threatened, endangered, or candidate species potentially occur in the vicinity of LANL (NM DGF, 1990). Four of these species have been observed on LANL, including the bald eagle (*Haliaeetus leucocephalus*) (a Federally-listed endangered species that roosts along the Rio Grande); the peregrine falcon (*Falco peregrinus*) (a Federally-listed endangered species that historically nests in the northeast corner of LANL); the northern goshawk (*Accipiter gentilis*) (a Federal candidate Category 2 species that forages in the northwest corner of LANL); and the giant helleborine orchid (*Epipactis gigantea*) (a state-listed endangered species that occurs near springs in White Rock Canyon). Five other species occur in close proximity to LANL and are likely to exist onsite (LA DOE, 1992).

Environmental Consequences. Minor permanent and temporary land disturbance would result from relocation activities associated with the Proposed Action. Disturbance would be limited to land within several of the fenced technical areas. Because of the high degree of land development, these areas are not significant habitat for terrestrial wildlife. No undeveloped areas would be disturbed by the Proposed Action. Relocation activities would not affect research activities conducted at the LANL NERP. No areas potentially containing wetlands or other aquatic habitats would be affected by renovation or operations of the facilities. Operations of the consolidation facilities would not require water withdrawals from aquatic habitats, and minor increases in wastewater reaching the LANL canyons (section 4.1.3.4) would not significantly affect aquatic habitats within those canyons.

No terrestrial or aquatic habitats potentially providing habitat to Federally-listed or New Mexico-listed threatened or endangered species would be disturbed by the Proposed Action. DOE has initiated discussions with the FWS and the New Mexico Department of Game and Fish to ensure that renovation and operations of the facilities would not result in impacts to any listed or special status species in the vicinity.

4.1.3.6 Cultural Resources

Affected Environment. The prehistoric chronology for the LANL area consists of six broad time periods: Paleoindian (10,000-4000 B.C.), Archaic (5500 B.C.-A.D. 600), Early Developmental (A.D. 600-900), Late Developmental (A.D. 900-1100), Coalition (A.D. 1110-1325), and Classic (A.D. 1325-1600) (LA Cordell, 1979). Prehistoric site types identified in the vicinity of LANL include large multi-room pueblos, pithouse villages, field houses, talus houses, cave kivas, shrines, towers, rockshelters, animal traps, hunting blinds, water control features, agricultural fields and terraces, quarries, rock art, trails, campsites, windbreaks, rock rings, and limited activity sites (LA USDA, 1987). Approximately 75 percent of LANL has been inventoried for cultural resources (LANL, 1990a). Coverage for some inventories has been less than 100 percent; however, about 60 percent of LANL has received 100 percent coverage. Over 975 prehistoric sites have been recorded; about 95 percent of these sites are considered eligible or potentially eligible for the NRHP.

The history of the region has been documented (Los Alamos County, 1978). Over 50 historic resources have been recorded at LANL; more than 95 percent are considered eligible or potentially eligible for the NRHP. The existing LANL facilities have been extensively modified and refurbished since 1942 (LA Kunetka, 1979). The existing facilities are not likely to be considered NRHP-eligible because they may lack architectural integrity and may not be representative of a particular architectural style. However, some of the facilities may be NRHP-eligible based on their association with the broad historic theme of the Manhattan Project and initial nuclear production.

Native Americans with concerns in this area include the San Ildefonso, San Juan, Santa Clara, Nambe, Tesuque, Pojoaque Pueblos east of Los Alamos, and Jemez and Cochiti Pueblos (LA Arnon, 1979; LA Edelman, 1979a and b; LA Lambert, 1979; LA Ortiz, 1979; LA Spiers, 1979). Native American resources on LANL may consist of prehistoric sites with ceremonial features such as kivas, village shrines, petroglyphs, or burials; all of these site types or features would be of concern to local groups. Consultation with the San Ildefonso, San Juan, Santa Clara, Tesuque, Nambe, and Pojoaque Pueblos has been initiated by DOE for this project.

Environmental Consequences. Native Americans with concerns in the project area and the SHPO were provided copies of the Preapproval Review Copy of this EA. The New Mexico SHPO and Native Americans were asked to review the EA and submit comments on the potential of the Proposed Action having any effect on important Native American resources or NRHP-eligible prehistoric or historic resources. Only one Native American group responded to the request for comments. Based on the response of Native American groups and the New Mexico SHPO to the preapproval review process for the EA, no important Native American resources or NRHP-eligible prehistoric or historic resources were identified. Therefore, no adverse effects to cultural resources are expected.

4.1.3.7 Socioeconomics and Community Services

Affected Environment. The discussion of socioeconomics and community services at LANL is based on an ROI where 88 percent of LANL employees lived in 1991. The ROI includes Los Alamos (48 percent), Rio Arriba (21 percent), and Santa Fe (19 percent) counties in New Mexico. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Espa¤ola (10 percent) and Santa Fe (16 percent), (see figure 3.2.5.2-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.3-1 through E3.3-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 144 percent, increasing from 34,467 in 1970 to 84,107 in 1990. Total employment increased from 31,155 to 79,846 between 1970 and 1990, an annual growth rate of 5 percent. The unemployment rates for 1970 and 1990 were 9.6 percent and 5.1 percent, respectively. For the same years, personal income increased from approximately $324.7 million to $2.3 billion (an annual average of 10 percent), and per capita income increased from $3,396 to $15,348.

Between 1975 and 1990, employment at LANL increased from 5,094 to 7,622, representing 10 percent of the ROI employment in 1990 (LA DOE, 1991b). As of September 30, 1992, employment at LANL had increased to 7,450. The prepared Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in work force associated with the budget reductions is only estimated at this time. With the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to decrease to 7,200 by the year 2000 (DOE, 1993c). In 1992, the total LANL payroll was estimated to be more than $383 million (LA DOE, 1991b). With the No Action baseline, the total payroll is projected to be approximately $373 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 99,000 by 2000 and 106,000 by 2020. The unemployment rates for 2000 and 2020 are projected to be 6.0 percent and 5.8 percent, respectively. For the same years, personal income is projected to increase from approximately $3.1 billion to $4.2 billion, an annual average of about 2 percent. Per capita income is projected to increase from an estimated $19,000 in 2000 to $22,000 in 2020.

Population. In 1991, more than half of the LANL workforce resided in the unincorporated communities of Los Alamos and White Rock in Los Alamos County. Between 1970 and 1990, the population in the ROI increased 61 percent to 151,408. During the same period, the New Mexico population increased 49 percent. The population in the 3-county ROI is projected to increase from an estimated 169,000 in 2000 to 191,000 by 2020, an annual rate of less than 1 percent.

The largest county population increase (84 percent) occurred in Santa Fe County between 1970 and 1990, while during the same years, population in Los Alamos County increased 19 percent. Population in Santa Fe County is estimated to increase 11 percent between 1990 and 2000 and 14 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Los Alamos County population is projected to increase approximately 23 percent between 1990 and 2000 and an additional 14 percent between 2000 and 2020, an annual growth rate of 1 percent.

The unincorporated communities of Los Alamos and White Rock in Los Alamos County are included in the county population analysis. Between 1970 and 1990, the population in Espa¤ola increased 85 percent. For the same years, the Santa Fe population increased 36 percent.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 124 percent from 28,344 to 63,386. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 11 percent by the year 2000 and an additional 13 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (157 percent) occurred in Santa Fe County, while the smallest increase (61 percent) occurred in Los Alamos County. The number of housing units in Santa Fe County is expected to increase approximately 12 percent by 2000 and an additional 14 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Los Alamos County is expected to increase about 9 percent by 2000 and an additional 12 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 1 percent in the ROI and ranged from less than 1 percent in Los Alamos County to 1 percent in Rio Arriba and Santa Fe counties. The vacancy rates for rental units averaged 8 percent and ranged from about 5 percent in Los Alamos County to 13 percent in Rio Arriba County.

Community Infrastructure and Services. The DOE at LANL and the cities of Santa Fe and Espa¤ola operate water supply systems in the ROI. LANL and Espa¤ola draw all of their raw water supplies from groundwater, while Santa Fe utilizes both groundwater and surface water.

LANL's system is the primary supplier in Los Alamos County and had 1988 average daily demands of about 83 percent of its current groundwater allotment of 4.92 MGD. Santa Fe's system (18 MGD capacity) in Santa Fe County had 1991 average daily demands of 49 percent of capacity. Espa¤ola's system in Rio Arriba County had 1991 average daily demands of 67 percent of its 1.5 MGD capacity.

Under current conditions, LANL's system is projected to experience average daily demands of 92 percent of its current allotment in 1995 and 101 percent of its current allotment in 2000. The average daily demands on Santa Fe's system are projected to be about 53 percent of capacity in 1995 and 56 percent of capacity in 2000. Espa¤ola's system is projected to have average daily demands of about 70 percent and 74 percent of capacity in 1995 and 2000, respectively.

Los Alamos County Utilities, Santa Fe, and Espa¤ola all operate wastewater systems in the ROI. Los Alamos County Utilities had 1991 average daily demands of 42 percent of its 3.1 MGD capacity. The 1991 average daily demands on Santa Fe's system were 92 percent of its 6.5 MGD capacity, while Espa¤ola had 1991 average daily demands of 99 percent of its capacity (about 1 MGD).

Espa¤ola plans to increase its system capacity to 1.6 MGD by 1993 and is projected to have average daily demands of 64 percent of capacity in 1995 and 66 percent of capacity in 2000. Los Alamos County Utilities has two modifications planned, a decrease in capacity by 1993 and an increase in capacity by 1996, which would result in a net decrease in capacity to about 2.8 MGD by 1996. Los Alamos County Utilities is projected to have average daily demands of 67 percent of capacity in 1995 and 63 percent of capacity in 2000. The average daily demands on Santa Fe's systems are projected to be about 97 percent and 102 percent of current capacity in 1995 and 2000, respectively.

Seven school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 493 students in the Jemez Mountain School District to 12,556 students in the Santa Fe School District. School districts in Los Alamos, Rio Arriba, and Santa Fe counties with enrollments of over 1,000 were operating between 89 percent and 100 percent of capacity. However, current capacities in Los Alamos and Santa Fe counties are projected to be exceeded by the years 1995 and 2000 under the No Action future baseline. The largest increases are expected to occur in the Santa Fe County school districts, where enrollments are projected to exceed current capacities by 38 percent in 1995 and 45 percent in 2000. Smaller increases are expected to occur in the Los Alamos County School District, where enrollments are projected to exceed the current capacity by 21 percent in 1995 and 35 percent in 2000. Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 18:1, and expenditures averaged $3,323 per pupil. The statewide average pupil-to-teacher ratio was 18:1, and expenditures averaged $3,137 per pupil (NM DEd, 1990).

Five hospitals serve the three-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 366 physicians served the ROI. The physician-to-population ratio for the ROI was 2.4:1,000 and ranged from 0.9:1,000 in Rio Arriba County to 2.9:1,000, in Santa Fe County. The statewide physician-to-population ratio was 2.1:1,000 (AMA, 1990).

Six city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the three-county ROI was in Santa Fe, with 126 sworn officers or 2.3 sworn officers per 1,000 persons. Other large agencies are in Santa Fe County with 60 sworn officers or 0.6 sworn officers per 1,000 persons, or and Los Alamos County, with 33.5 sworn officers, or 1.8 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.5 per 1,000 persons (FBI, 1991).

Three fire departments and 258 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Los Alamos County (130 firefighters; 7.2 firefighters per 1,000 persons) and in the city of Santa Fe (102 firefighters; 1.0 firefighters per 1,000 persons). The average number of firefighters in the ROI was 1.7 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to LANL is provided by Pajarito Road; East Jemez Road; U.S. Route 84; and New Mexico State Routes 4, 501, and 502.

Estimated traffic along segments providing access to LANL is projected to contribute to differing service level conditions in accordance with population growth. New Mexico State Route 4 would generally support congestion-free traffic flow. New Mexico State Routes 501 and 502 would support stable flow. Along these roadways, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in minor congestion. In addition, estimated truck traffic into LANL for delivery of supplies and removal of wastes would typically average 72 trips per day. However, the additional traffic volumes associated with continued operation of LANL are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to LANL (LANL, 1990a).

Other modes of transportation within the ROI include public transportation systems and railways. Although no public bus service exists in Los Alamos County, a non-profit bus system provides regular scheduled service between White Rock, LANL, and the Los Alamos townsite (LANL, 1990a). The nearest railroad is the Atchison, Topeka, and Santa Fe Railroad (LA DOE, 1979; NM Hwy, 1991c). No navigable waterways within the ROI are capable of accommodating waterborne transportation of material shipments to LANL.

The ROI receives jet air passenger and cargo service from both national and local carriers at Albuquerque International Airport (DOT, 1991). The Santa Fe Municipal Airport and Los Alamos Airport serve local air traffic.

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 115 to 125 new jobs (DOE, 1993d). The analysis presented in table 4.1.3.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 115 new jobs. The estimate of 125 new jobs is 10 percent higher than the 115 new jobs used in the following analysis and this higher estimate would result in slightly more benefits than the 115 new jobs. The construction, modification, and installation of facilities and equipment for the Proposed Action at LANL would require 60 additional employees during peak construction (LA DOE, 1992). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 115 full time equivalent jobs for hourly and salaried personnel in 2000. These positions would be filled through donor transfers, new hires, and internal reassignments (DOE, 1993b). In addition to the jobs created directly by the project, another 144 jobs would be created indirectly during peak construction and 179 additional jobs during operations. The creation of direct and indirect employment would lead to in-migration of 45 persons during peak construction and 154 persons during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force.

Under the No Action alternative, the current LANL employment of 7,450 persons is projected to decrease to 7,200 by the year 2000, a decrease of 250. The addition of 115 full time equivalent jobs at LANL would be realized as a result of the Proposed Action.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.3.7-1. In the year 2000, this project-related population growth from in-migration would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 169,000, and no cities or counties in the ROI would experience a population growth greater than 1 percent.

The less than 1 percent change in population during peak construction would create the need for only an estimated 17 additional housing units, which is not a significant addition. For operations in the year 2000, the less than 1 percent change in population would not create a need for additional housing units beyond a 1 percent increase. In past years, housing units have been built at an annual rate of 4 percent. Therefore, the additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

Under the No Action future baseline, Santa Fe's wastewater system would exceed current capacity by 1995 and the LANL current water system allotment would be exceeded by the year 2000. However, the less than 1 percent estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI beyond what would naturally occur under the No Action baseline. Some existing public education facilities are currently approaching 100 percent of capacity. Under current conditions, enrollments will exceed capacities by the years 1995 and 2000 given the No Action future baseline. However, these school capacities will not be affected beyond what would naturally occur under the No Action baseline growth because the Proposed Action would not add more than 1 percent to enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over the No Action baseline. Additional commercial truck traffic into LANL would be negligible relative to historic levels, and this truck traffic would occur during non-peak hours. Impacts to the local transportation network serving LANL would be negligible, as well.

4.1.3.8 Waste Management/Pollution Prevention

Affected Environment. Discussion of the LANL waste management baseline is provided in section 3.2.6.3. Because no TRU wastes are associated with any of the proposed activities that would be consolidated, no further discussion of TRU waste generation or management is presented.

Current LLW management activities at LANL requires development of a 60- to 70-acre site for new landfills to replace the existing landfill at LANL. A portion of the expansion area for the existing landfill has been contaminated by a chemical plume from the hazardous chemical disposal site, which restricts further development. The new landfill is required to ensure continued operation of laboratory activities that generate LLW and to provide safe isolation of the wastes. Construction completion is anticipated in late 1996.

A new HE wastewater treatment facility at LANL must also be constructed in order to comply with RCRA and NPDES regulations. The planned project would eliminate approximately 20 HE sumps and outfall lines which do not comply with Federal regulations and permits. If these existing sumps are not upgraded, HE operations at LANL could be curtailed under No Action. Construction completion is anticipated in late 1995.

LANL has constructed a new sanitary wastewater treatment plant and collection system to replace 8 existing treatment facilities and 30 existing septic tanks to centralize and consolidate sanitary wastewater treatment at LANL. The plant and collection system meets the requirements of the Laboratory's Federal Facilities Compliance Agreement, and meets all current and expected future standards and regulations required by the EPA.

Waste minimization has been implemented by LANL's Environmental Management Division using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. A Waste Minimization and Pollution Prevention Awareness Plan was completed in 1991. Major waste generating operations have been prioritized by severity of hazard and volume, to determine which generating systems to address. Also, halogenated solvent substitution has been evaluated for a number of research processes.

Environmental Consequences. Any equipment moved to LANL from another site due to the Proposed Action would be decontaminated prior to shipment. Construction debris and scrap metals from demolition of existing interior utilities and partitions would be disposed of as sanitary waste or sold/recycled as scrap.

Construction/modification activities involving decontamination are part of routine facilities operations at LANL. Project decontamination activities may include the removal of asbestos piping insulation, floor and ceiling tiles, and asbestos- or PCB-contaminated concrete flooring. Such decontamination activities, if identified as necessary, would be performed in accordance with TSCA requirements for handling and disposal of asbestos and PCB wastes. The amount of hazardous construction waste materials is expected to be minimal.

Should any soil excavation occur as a result of piping modification or replacement of sanitary and industrial drains, the soils would be analyzed for possible contamination before disposal. Uncontaminated soils would be used as fill or disposed of in a local sanitary landfill if considered unsuitable for backfill. If soils are found to be contaminated, the location would be referred to the LANL Environmental Restoration Program for subsequent management. Management of potentially contaminated soil would involve an area inspection, characterization, and evaluation of cleanup alternatives (if necessary). Cleanup action and compliance follow-up would be conducted as necessary to remove and dispose of contaminated soils. Remediation of contaminated areas would be conducted according to accepted guidelines and procedures applicable to the type and extent of contamination. Although remediation activities may have additional project cost implications, no adverse affects to the LANL waste management program are expected.

Wastes generated from the consolidation of operations are outlined in appendix B, section B.3 and would be disposed of through LANL's existing Environmental Management Division. The activities under the Proposed Action would increase Los Alamos's liquid and solid LLW streams by 30 gallons per year and 200 ft^3 per year which are insignificant amounts when compared to current annual LLW streams. There are no liquid or solid mixed wastes being generated as part of the Proposed Action. With the addition of the planned 60- to 70-acre landfill site, the additional LLW due to the Proposed Action to be treated or disposed of at LANL would be accommodated.

Under the Proposed Action, LANL would increase its hazardous waste streams by 7,508 gallons per year of liquid and 305 ft^3 per year of solid hazardous waste. Approximately 3,200 gallons, primarily HE-contaminated wastewater, will be stored and sent to the incinerator or flashpad (TA-16), where it is burned. The remaining ash residue is considered nonhazardous and is disposed of in the industrial non-RCRA landfill. Up to approximately 3,800 gallons per year of nonhalogenated solvent waste streams, of which about 20 percent is acetone with a small amount of ethanol, will be generated. The remainder of the waste is water. The solvent waste would also be burned at TA-16 and the nonhazardous residue disposed of in the industrial non-RCRA landfill. A future option of offsite treatment/Disposal could be pursued.

All HE solid hazardous waste and potentially contaminated HE waste is delivered by LANL to the incinerator or flash pad (TA-16), where it is burned. Ash residue that exhibits hazardous characteristics is treated, and when nonhazardous, disposed of in the industrial, non-RCRA landfill. LANL has 31 hazardous waste management units located at 7 different sites operating under state and Federal regulations promulgated in accordance with RCRA. At any given time, existing storage areas would have sufficient excess capacity to handle the additional hazardous waste streams. Other liquid and solid hazardous wastes are packaged, manifested, and shipped by a DOT-registered transporter to RCRA-approved commercial facilities. Consequently, the impacts on the LANL hazardous management storage and handling capacities and current operating permits would be minimal.

Each of the functions transferring to LANL from Mound, Pinellas and RFP have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities and reduce environmental impacts. Once the transfer of the functions occurs, LANL would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goal, and strategies for preventing or minimizing additional generation of pollutants.

An increase of less than 1 percent in liquid nonhazardous waste streams would result from the Proposed Action. The additional nonhazardous liquid waste can be handled with the existing and planned upgraded sanitary wastewater treatment plant and collection system. The additional solid nonhazardous waste due to the Proposed Action is approximately 3 percent of current disposal volume.

4.1.3.9 Human Health: Facility Operations and Accidents

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.1. Information specific to LANL is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (§4.1.3.2 and 4.1.3.3, respectively), the chemical pollutant levels from LANL operations to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Radiological pollutant levels to which the public is exposed are also below applicable permit, regulatory, and DOE operational requirements (LANL, 1990b).

A review of the recent LANL annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The period of the review (1986-1990) was a time during which site operations were much higher than in the past year and higher than anticipated in the future.

Environmental Consequences. The Air and Water Resources sections discuss the chemical releases associated with relocating the tritium handling, special products, HE, and beryllium technology and pit support functions identified in section 3.3.3 to LANL. As shown, the cumulative impacts resulting from existing releases and the releases of chemicals and radioactive materials associated with relocating these functions at LANL are below applicable permit, regulatory, and DOE operational requirements.

Water from processes that generate hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated before discharge. Furthermore, discharge of wastewater through NPDES-permitted outfalls which can be attributed to the activities to be relocated at LANL are expected to be below NPDES limits. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For normal operations at LANL, all possible HAPs were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, ammonia, chromium trioxide, dimethylformamide, 1,4 dioxane, formaldehyde, isopropyl alcohol, methylene chloride, TCE, methyl ethyl ketone, and nitric acid. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk which is calculated only for those chemicals identified as carcinogens. The cumulative Hazard Indexes for LANL (see table F-13a) were 0.0465 onsite (worker effects) and 0.0044 at the site boundary (effect on the public) on an annual basis, and the incremental change to the Hazard Indexes due to the Proposed Action were both 0 for onsite and at the site boundary. Therefore, the Proposed Action would not contribute to the cumulative Hazard Indexes at the LANL site.

Four of the chemicals identified, 1,4 dioxane, formaldehyde, methylene chloride, and TCE, are considered to be carcinogens and the cancer risk to individuals for each was calculated. The combined risk for the carcinogens was calculated as 1.5×10^{-6} onsite (worker) and 1.2×10^{-7} at the site boundary (public) (see table F-13b). The increment change due to the Proposed Action contributed no additional risk either onsite or at the site boundary. The cancer risk of 1.5×10^{-6} for the onsite worker is primarily the result of the use of TCE in the current operations (No Action); the Proposed Action would not increase the risk to workers. Solvents posing reduced risk will be substituted for TCE.

Operations are conducted to ensure that normal releases of radioactive materials from LANL result in a total maximum individual dose on the public of less than 10 mrem effective dose equivalent (LANL, 1990b). The resulting risks of potential fatal cancers associated with 1 year of operations would be less than 4.5×10^{-6} to that individual. The annual dose increment associated with the increase in tritium emissions due to the Proposed Action would be less than 0.1 mrem effective dose equivalent and results in an increased risk of less than 4.5×10^{-8} potential fatal cancers from 1 year of operations. Mitigation measures, currently underway, would reduce the dose from the Los Alamos Meson Physics Facility by a factor of 6. The new resulting cumulative dose would result in a risk of less than 7.9×10^{-7} potential fatal cancers from 1 year of operations. Risks less than 10^{-6} are acceptable by EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population. When risks are greater than 10^{-6}, appropriate measures are required to reduce the risk to less than 10^{-6}. The average doses to workers at LANL associated with tritium-handling activities would be less than those at SRS since the tritium inventories and level of tritium-handling activities at LANL would be much less than those at SRS. Based on worker dose experience at SRS (see section 4.1.2.9), the average dose to workers at LANL is expected to result in incremental and cumulative doses of less than 0.011 and 0.281 mrem, respectively. This would result in an incremental and cumulative cancer risk of less than 4.9×10^{-9} and 1.3×10^{-7}, respectively.

Tritium-handling, explosive, and activities similar to the beryllium and pit support functions have been analyzed previously for accidents at LANL in the site EIS (LA DOE, 1979). The accidents analyzed included explosions and the release of tritium, beryllium, and plutonium. Both natural and man-made external initiating events were considered (e.g., human errors, fires, explosions, and aircraft crashes).

The neutron tube target loading function would be located in the Tritium Salt Laboratory in TA-21, Building 209. The Tritium Salt Laboratory is an operating tritium facility that has an inventory of approximately 100 grams of tritium. The tritium inventory requirements for the neutron tube target loading activities are about 2 grams, which represents an insignificant addition to the amount of tritium in the Tritium Salt Laboratory.

Radioactive materials are routinely stored, handled, processed, and tested at LANL. Additionally, explosives are also routinely stored, handled, processed, manufactured, and tested at LANL. Safety procedures and requirements have been developed and implemented for storing, handling, processing, manufacturing, and testing radioactive and explosive materials, as appropriate. These procedures and requirements limit the amount of materials that can be used or stored in one location, as well as material proximity to site boundaries or other materials.

Currently, beryllium inventories at LANL total approximately 1,852 lb, and include 80 lb in powder form and 2 lb of beryllium oxide. Data for the period 1985 through 1989 indicate ambient concentrations for beryllium at LANL are significantly below the Federal standard of 0.01 "g/m 3 over a 30-day period (LANL, 1990b). Transferring the beryllium technology function to LANL would result in a cumulative inventory of 10,200 lb, of which only 200 lb would be powder. The powder material is the only form capable of producing adverse health effects. However, there have been significant improvements in the safety procedures for handling beryllium, and the crystal structure of beryllium powder now used in industry has a much lower toxicity than that used during the early days (1940-1950) of the industry (Rossman, 1991). Employee exposure limits will be maintained below applicable standards and acceptable concentrations established by OSHA.

Projected workloads of the tritium-handling, explosive, and plutonium operations and inventories at LANL would be reduced. Therefore, including the operations and inventories that would be moved from the other DOE sites to LANL, operations and inventories would be below those that currently exist at LANL. As discussed in section 3.3.3, the tritium-handling, explosive, and beryllium technology and pit support functions involve operations and chemicals that are the same as those currently being performed and used at LANL.

Based on the above discussions, the current accident profile at LANL would not change as a result of the Proposed Action.

4.1.4 Y-12 Plant

A detailed discussion of the Y-12 Plant's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.7. The functions and processes associated with the Proposed Action to be consolidated at Y-12 and the proposed facility modifications required to support each relocated function are discussed in section 3.3.4. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at Y-12 and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action which supports the following discussion on Y-12 is also provided in the chapter 4 introduction and section 4.1.

4.1.4.1 Land Resources

Affected Environment. The Oak Ridge Reservation (ORR) and Y-12 are located approximately 20 miles west of Knoxville, TN (figure 3.2.7-1). Generalized land uses at ORR and in the vicinity are shown in figure 4.1.4.1-1.

Land uses within ORR generally fall under one of four major land use classifications: industrial, forest/undeveloped, public/quasi-public, and water. ORR contains three major operations areas: Y-12, the Oak Ridge National Laboratory (ORNL or X-10), and the K-25 site. These areas account for approximately 11,665 acres or about 33.1 percent of the total site acreage. Numerous other support facilities are scattered throughout ORR. An additional 1,200 acres (3.5 percent) are used for security buffer zones around the various facilities. About 790 acres (2.2 percent) of ORR's land are classified as public and consist mainly of the Clark Center Recreational Park, numerous small public cemeteries, and onsite public roads (Y-12 DOE, 1989). The remaining area, about 21,577 acres (61.2 percent), consists of forested undeveloped land. There are no prime farmlands on ORR.

Approximately 13,590 acres of ORR undeveloped land are designated as a NERP. This is one of five DOE NERPs primarily used for environmental research to study the impact of human activities on the environment (Y-12 MMES, 1991c).

Except for the city of Oak Ridge on the northeast, land use bordering ORR is predominately rural and used largely for residences, small farms, forest land, and pasture land. Several residences are adjacent to the ORR boundary approximately 1,300 feet north of Y-12; the closest house is within 100 feet of the boundary. The residential distribution of ORR employees is discussed in section 4.1.4.7.

ORR contains one recreation facility, Clark Center Recreational Park, which is open to the public. Clark Center Recreational Park is located on 90 acres along an embayment of Melton Hill Lake, about 2 miles south of Y-12. Facilities include a boat ramp and two softball fields. Deer hunting is permitted on ORR to control the resident deer population and reduce animal-vehicle accidents.

Development of the three major operations areas at ORR has disturbed the character of the landscape within their respective areas. The onsite DOE facilities are brightly lit at night, with lighting at the three major operations areas especially visible. Views affected by DOE facilities are primarily associated with the public access roadways and the bluffs on the opposite side of the Clinch River. Some partial views of the water treatment plant facilities can be seen from the urban areas of the city of Oak Ridge. Views are limited by the hilly terrain, heavy vegetation, and generally hazy atmospheric conditions.

The three major ORR operations areas are consistent with a Class 5 VRM designation. The remainder of the ORR ranges from Class 3 to Class 4.

Environmental Consequences. The locations of the beryllium technology and pit support functions are shown in figure 3.3.4-1. The relocated functions would be compatible with existing operations.

The number of in-migrating employees (see section 4.1.4.7) would have a minimal impact on land resources for residential use. Offsite land requirements would be 8 acres during implementation and 1 acre during operations. This represents only a small percentage of the total developable land available for residential uses. Because the Proposed Action would result in a slight population increase (section 4.1.4.7), impacts on recreational resources would not be expected, nor would VRM classification be affected. Because all relocated beryllium functions would be placed within existing structures, the impact to visual resources would be negligible.

4.1.4.2 Air Quality and Acoustics

Affected Environment. The climate at ORR and in the surrounding region is characterized as humid, subtropical, with warm summers (Trewartha, 1954) and generally mild winters. Moderate annual precipitation is evenly distributed throughout the year. The annual average temperature at ORR is 57.5 "F; temperatures vary from an average daily minimum of 27.7 "F in January to an average daily maximum of 87.2 "F in July. The average annual precipitation measured at ORR is 54.8 inches (NOAA, 1991b).

Ambient Air Quality . ORR is located within the Eastern Tennessee-Southwestern Virginia Interstate AQCR. This AQCR is designated as attainment by the EPA with respect to the NAAQS (40 CFR 81.343) for PM_{10}, CO, and SO_2, and designated as nonattainment for NO_2. The NAAQS and Tennessee state ambient air quality standards are listed in table D2.1.1-1.

The Tennessee Department of Environment and Conservation provides guidance for the evaluation of HAPs/toxics (TN DH&E, 1991b). The list of HAPs/toxics is identical to those promulgated by Title III of the CAA. The acceptable ambient concentration is defined as 10 percent of the threshold limit value (TLV) or permissible exposure limit (PEL), whichever is the most restrictive. For those "high-risk pollutants," the acceptable ambient air concentration is defined as 1 percent of the TLV or PEL, whichever is the most restrictive. The HAPs/toxics described in this section are those currently used at Y-12 and those anticipated to be used with the Proposed Action.

Ambient air quality at Y-12 is monitored at two locations. The data from these monitoring stations for 1989 and 1990 are presented in table D2.1.7-1. To achieve a conservative estimate, the maximum background concentrations were used in the analysis.

The principal source of criteria air pollutants at Y-12 is the steam plant. Other sources include fugitive particulate emissions from coal piles, other process emissions, vehicular emissions, and temporary emissions from various construction processes (Y-12 MMES, 1987). HAP emissions occur from various laboratories and manufacturing facilities. The emission inventories are included in tables D2.1.7-2 and D2.1.7-3.

The air emissions also include trace amounts of the HAP beryllium. Compliance testing was performed in 1990 in accordance with applicable Tennessee Department of Environment and Conservation regulations. Testing showed that emissions from Y-12 were less than 3.5 grams per 24-hr period. A "less-than" number was reported because the results of the individual stack tests were below the detection limits of the laboratory analysis. The regulation states that emissions to the atmosphere shall not exceed 10 grams of beryllium during a 24-hr period.

Normal operations result in the emission of radioactive materials at Y-12. These emissions would not be affected by nonnuclear consolidation activities.

The air quality under ambient and No Action conditions at Y-12 is shown in table 4.1.4.2-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. Baseline air quality concentrations at ORR exceed applicable guidelines or regulations for TSP and SO_2.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions. The major noise sources within ORR include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, paging systems, construction and materials-handling equipment, and vehicles). At the site boundary, away from most of these industrial facilities, noise from these sources would be barely distinguishable from background noise levels. Sound-level measurements have been made around ORR in the process of testing sirens and in preparing support documentation for the Atomic Vapor Laser Isotope Separation site (Y-12 Cleaves, 1991). The acoustic environment along the ORR site boundary in rural areas and at nearby residences away from traffic noise is typical of a rural location, with the DNL in the range of 35 to 50 dBA. Areas near the site within the city of Oak Ridge are typical of a suburban area with the DNL in the range of 53 to 62 dBA (EPA, 1974). The primary noise source at the site boundary and at residences near roads is traffic. During peak hours, plant traffic is a major contributor to traffic noise levels in the area.

The State of Tennessee has not established specific numerical environmental noise standards applicable to ORR. The city of Oak Ridge has specified allowable noise levels at property lines as described in appendix D (section D2.2.). Noise levels at the residences adjacent to the ORR boundary are not expected to exceed the EPA guideline level for residential areas as a result of any noise sources at ORR. Noise levels can be expected to exceed the EPA guideline along major roads as a result of traffic noise and may exceed the limits set for streets.

Environmental Consequences.

Air Quality. The transfer of the beryllium technology function from RFP would involve modifying existing buildings and facilities within Y-12 (section 3.3.4). Renovation of these facilities would temporarily increase particulate matter, emissions such as dust and dirt, and vehicle emissions. This increase, although relatively minor when compared to overall site emissions and when added to existing levels, is not expected to exceed applicable air quality standards. Appropriate mitigative actions, such as increased watering, would be implemented to minimize emissions.

The combined beryllium operations include beryllium machining, assembly, testing, and inspection. The exhaust from all beryllium operations is ducted into a special filter system. The air emissions of criteria pollutants from beryllium operations total only about 0.2 ton per year, including primarily VOC and NO_X (Y-12 DOE, 1992b). Consequently, resulting impacts to the ambient air quality are predicted to be low compared to applicable standards and guidelines. Concentrations of criteria pollutants would be the same as shown in table 4.1.4.2-2.

Estimated beryllium emissions associated with the transferred beryllium functions are 1.4×10^{-10} lb/hr or 3.3×10^{-9} lb in a 24-hr period, assuming continuous operation (Y-12 DOE, 1992b). This is well below the emission rate limit of 10 grams (0.02 lb) in a 24-hr period.

Consolidation of the nonnuclear activities at Y-12 would not increase radionuclide emissions.

Acoustic Conditions. Changes in noise levels during renovation and operations have been estimated for the major traffic routes around Y-12. The estimates are based on existing traffic volumes and projected changes in volumes as a result of Proposed Action changes in employment at ORR. These changes in traffic volumes are predicted to result in an increase of less than 1 dB in peak-hour sound levels along Route 62 through Oak Ridge and Route 95. Changes in sound levels along other routes are also estimated to be less than 1 dB. The increased noise levels along the major access routes are expected to cause little or no increase in annoyance to surrounding communities or individuals.

Noise generated by renovation of existing buildings and operations is not expected to increase offsite noise levels. Noise generated by renovation work, and from operational facilities, equipment, and machines, would not cause ambient noise levels at the site boundary to exceed EPA guidelines, which are set to protect the public and workers from the effects of broadband environmental noise and to prevent hearing loss.

Although no increase in annoyance is expected offsite from construction and operations, measures would be implemented onsite to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments during construction and operations with appropriate hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas and a hearing protection program would be conducted.

4.1.4.3 Water Resources

Affected Environment. This section describes the surface water and groundwater resources at ORR in the vicinity of Y-12.

Surface Water . There are four major sub-drainage basins on ORR which flow into the Clinch River: Poplar Creek, East Fork Poplar Creek, Bear Creek, and White Oak Creek (Y-12 DOE, 1990b). Each drainage basin takes the name of the major stream flowing through the area.

Discharges from Y-12 affect water quality and flow in Kerr Hollow Quarry, McCoy Branch, East Fork Poplar Creek, and Bear Creek (Y-12 MMES, 1991b). Y-12 is located at the headwaters of Bear Creek and East Fork Poplar Creek. Bear Creek, East Fork Poplar Creek, and the Clinch River are shown in figure 3.2.7-2.

Water levels in the Clinch River in the vicinity of ORR are regulated by a system of dams operated by the Tennessee Valley Authority; fluctuations of the river affect the lower reaches of some of the tributary streams at ORR. The system of dams also controls flooding in the Clinch and Tennessee rivers near ORR. Norris Dam, constructed in 1936, is approximately 31 miles upstream of ORR. Melton Hill Dam, completed in 1963, controls the flow of the Clinch River near ORR. Watts Bar Dam is on the Tennessee River near the lower end of the Clinch River (Y-12 DOE, 1986).

Tennessee Valley Authority has performed flood studies along the Clinch River, Bear Creek, and East Fork Poplar Creek (Y-12 TVA, 1991). Portions of Y-12 are subject to flooding, from both the 100-yr and 500-yr floods.

Water is taken from the Clinch River at a pump station at river mile 41.7 (Melton Hill Lake). This pump station provides the water supply for the DOE water treatment system that serves Y-12, ORNL, the Scarboro facility, and the city of Oak Ridge. Total withdrawals from the Clinch River by Y-12 operations are approximately 7 MGD (see table 3.2.7-2).

Effluents from the facilities include surface water runoff, cooling water discharges, and treatment plant effluents. The current Y-12 NPDES permit includes 240 discharges that require compliance monitoring. The Y-12 NPDES permit expired in May 1990; the application for renewal was submitted in November 1989 (Y-12 MMES, 1991b). It is expected that the draft permit will be available in early 1993 (Y-12 DOE, 1992b). The Federal Facilities Agreement between DOE and EPA addresses selection of corrective measures and schedules for implementation of activities to reduce the impacts from current and historical operations on the receiving streams at ORR (Y-12 DOE, 1990b). The current Y-12 wastewater generation rate is approximately 12.4 MGY (table 3.2.7-1).

Surface Water Quality . The streams and creeks on ORR are classified for usage purposes by the Tennessee Department of Conservation. Most of the streams on ORR are classified for fish and aquatic life, irrigation and livestock watering, and wildlife (TN DOC, 1991).

Water quality in ORR streams is affected by treated sanitary wastewater discharges, cooling water blowdown, stormwater, and surface runoff and groundwater transport of contaminants from land disposal of wastes (Y-12 MMES, 1991c). The surface water bodies monitored by the three installations include White Oak, Bear, East Fork Poplar, and Poplar Creeks, which are all tributaries of the Clinch River (Y-12 MMES, 1991b). Water samples are collectedand analyzed for radiological and nonradiological parameters in accordance with the NPDES permit requirements. Routine surface water monitoring not required by the NPDES permit is also performed (Y-12 MMES, 1991b).

The 1990 monitoring results for the Clinch River (downstream of all ORR outfalls) are presented in table 4.1.4.3-1. As noted in the table, the maximum concentration of plutonium-239/240 exceeded 4 percent of the DOE Derived Concentration Guides. The DOE guide is expressed at 4 percent to correlate to EPA's drinking water standards, which are set at concentrations that yield no more than 4 mrem/yr dose equivalent; this is not an enforceable limit. The average and maximum iron concentrations, the maximum manganese concentration, and pH also exceeded water quality criteria. However, monitoring at Melton Hill Dam indicated that the maximum concentrations of iron, manganese, and pH also exceeded water quality criteria upstream of ORR.

In 1990, Y-12 was 98 percent in compliance with NPDES permit limits with 97 noncompliances. The three major areas of noncompliance were treatment facilities (29 percent), creek outfalls (27 percent), and administrative errors (22 percent). Y-12 was well within limits for all radiological parameters (Y-12 MMES, 1991b).

No nonradiological parameters were detected in exceedance of permit limitations at NPDES monitoring locations for Kerr Hollow Quarry. Exceedances for oil and grease were noted for the Bear Creek and McCoy Branch NPDES discharges. At McCoy Branch, pH also exceeded the permit limitations. In East Fork Poplar Creek, non-compliances were noted for oil and grease, pH, total suspended solids, cyanide, nickel, iron, and temperature (Y-12 MMES, 1991b).

Corrective actions relating to the NPDES program include identifying candidate facilities for the installation of wastewater treatment technologies and the removal of sources of nonpoint pollution. The water quality of the streams at ORR is expected to improve as remediation of nonpoint sources of contamination, such as inactive waste sites and waste storage areas, is completed. These projects include the rehabilitation of sanitary sewer lines to prevent infiltration of contaminated groundwater, the removal and/or treatment of effluents to storm drains to remove residual chlorine, and the remediation of sites that may be contributing to surface water contamination. Regulation and monitoring of discharges that are not currently regulated are also expected to occur under a new NPDES permit (Y-12 MMES, 1991b).

Groundwater . ORR is located in an area of sedimentary rocks of widely varying hydrological character. Shallow groundwater is in close hydraulic communication with surface waters, and solution features are common in the carbonate hydrostratigraphic units. With respect to the shallow aquifer system, groundwater basins in the region are restricted to small areas because of the topography and geologic structure characteristic of the Valley and Ridge Province.

Aquifers at ORR include surficial and bedrock aquifers. The surficial aquifer consists of man-made fill, alluvium, and residuum from weathered bedrock. Bedrock aquifers occur in carbonates and low-yield sandstones, siltstones, and shales.

Carbonate rocks are the most important aquifers in terms of water production and storage capacity. Water in the carbonate rock units is produced primarily from the zone of solution, which is in the upper 350 feet of the units. The noncarbonate sandstones and shales, although fractured, are not as productive hydrologically as the carbonate rocks and decrease greatly in their ability to transmit water at depths greater than 100 feet. The Copper Ridge Dolomite and the Maynardville Limestone form the major aquifer system in Bear Creek Valley.

Depth to groundwater varies because of steep gradients of beds and variations in topography. Depths to water at most places are from a few feet to about 200 feet.

Recharge occurs over most of the area but is most effective where overburdened soils are thin or permeable. In the area near Y-12, recharge into the carbonate rocks is mainly along Chestnut Ridge.

Groundwater Quality . Background groundwater quality at ORR is generally good in the surficial aquifer zones and poor (because of high total dissolved solids) in the bedrock aquifer at depths over 1,000 ft. Water in the surficial aquifer is typically a nearly neutral to moderately alkaline calcium bicarbonate type (Y-12 Moore, 1988).

Groundwater in Bear Creek Valley near Y-12 contains contamination. Contamination at Y-12 includes hazardous chemicals and radionuclides (mostly uranium), used primarily in the weapons production process. The contaminated sites in need of environmental restoration include past-practice waste disposal sites, waste storage tanks, spill sites, and contaminated inactive facilities (Y-12 DOE, 1991b). The groundwater quality in the surficial aquifer at ORR is summarized in table 4.1.4.3-2. A map showing the extent of groundwater contamination at Y-12 is not available.

Groundwater Use . Because of the abundance of surface water and its proximity to the points of use, almost no groundwater is used at ORR. Only one supply well exists on the reservation; it provides a supplemental supply during extended drought to an aquatics laboratory. There are no sole-source, Federally protected, or EPA Class I aquifers beneath ORR. All aquifers at ORR are considered Class II.

Groundwater Rights . The State of Tennessee does not issue permits or allotments or otherwise regulate groundwater use.

Environmental Consequences. The consolidation of nonnuclear activities would occur within existing buildings. A description of the functions to be transferred to Y-12 and the facility locations selected to house these activities is presented in section 3.3.4.

Surface Water . Relocating beryllium and pit support functions to Y-12 would utilize portions of the current plant that are above the 500-year floodplain (Y-12 DOE, 1992b). Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Because consolidation of activities at Y-12 would occur within existing buildings, no adverse impacts to surface water from runoff during the modification phase are expected (Y-12 DOE, 1991b).

Modification activities would require an additional 200 GPD of water (table 3.3.4-3), which is less than a 1-percent increase in the current water demand at Y-12 of 7 MGD. Operations for the beryllium and pit support functions would require an additional 1,000 GPD of water (table 3.3.4-5). This would result in an increase of less than 1-percent in the current demand.

The additional sanitary wastewater discharged by the transferred processes would be approximately 3,600 GPY (table 3.3.4-4). This increase would represent less than 1 percent over the current sanitary wastewater generation rate of approximately 12.4 MGY. The wastewater generated from the transferred operations would be conveyed to the Y-12 Central Pollution Control Facility or the Y-12 West End Treatment Facility for processing (Y-12 DOE, 1991b). The approximately 3,600 GPY of additional treated wastewater would be discharged to East Fork Poplar Creek. If the entire estimated annual discharge were released in a single day to East Fork Poplar Creek, there would be an increase of less than 1 ft^3/s of the average flow of 51.4 ft^3/s. If the total amount were released to Bear Creek in, one day, it would result in a similar negligible change in stream flow. No adverse impacts to the flow of receiving waters are expected.

Surface Water Quality . The site was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. Future NPDES permits would be written after review of the current water quality and how it is affected by discharges from Y-12, including the transferred technologies. In addition, discharges from the treatment plants are required to meet all permit limits; therefore, no impacts to water quality areexpected.

Groundwater . No groundwater would be used at Y-12 given the plentiful surface water supplies; therefore, no impact on groundwater levels are expected. Groundwater Quality . Because there would be no direct discharge of process waste to groundwater, and wastewater would be treated at either the Y-12 Central Pollution Control Facility or at the Y-12 West End Treatment Facility before being released to surface waters, no impacts on groundwater quality are expected.

4.1.4.4 Geology and Soils

Affected Environment. ORR lies in the Valley and Ridge Province of east-central Tennessee. The topography consists of alternating valleys and ridges that have a northeast-southwest trend, with most of the reservation facilities occupying the valleys. The area is drained by the Clinch River, which bounds the reservation on the northeast, southeast, and southwest. Y-12 lies in Bear Creek Valley.

All faults in the vicinity of ORR have been inactive since the late Paleozoic period. There is no evidence of capable faults in the ORR area.

The Oak Ridge area lies at the boundary between Seismic Zones 1 and 2A (ICBO, 1991). Since the New Madrid earthquakes of 1811 to 1812, 26 other earthquakes (MMI III to VI) have been felt in the Oak Ridge area. The Charleston earthquake of 1886 had an MMI of VI at Oak Ridge. An earthquake centered in Giles County, Virginia, in 1886 produced an MMI of IV to V at Oak Ridge. The closest seismic event occurred in 1930, 5 miles east, and had an MMI of V at the site (Y-12 Staub, 1991).

Y-12 lies on soils of the Armuchee-Montevallo-Hamblen, Fullerton-Claiborne-Bodine, and Lewhew-Armuchee-Muskinghum associations. Soil erosion due to past land use has ranged from slight to severe. Wind erosion is slight and shrink-swell potential is low to moderate. Finer-textured soils of the Armuchee-Montevallo-Hamblen association, when drained, have been designated prime farmland (Y-12 USDA, 1942; 1981).

Environmental Consequences. All new functions would be accommodated in existing structures; therefore, no impact on geologic features is expected.

Major seismic activity and associated mass movement and subsidence are unlikely to occur during the renovation or operation phases, because although ground shaking has occurred at ORR due to earthquakes in other parts of the country, faults in the area have not been active since the late Paleozoic. Renovation and remodeling of plant facilities to accommodate the functions to be transferred would be performed according to the appropriate seismic design requirements; therefore, the earthquake activity hazard would not increase. Because there would be no outdoor construction, relocation of functions to Y-12 would have no impact on the soils of the site.

4.1.4.5 Biotic Resources

Affected Environment. No natural terrestrial habitat occurs within the intensively developed Y-12 area, but the undeveloped ORR lands surrounding the area provide habitat for terrestrial wildlife typical of eastern Tennessee (Y-12 ORNL, 1991b). ORR, including undeveloped areas surrounding Y-12, has been designated as a Wildlife Management Area and public deer hunts are conducted. Several areas within ORR have also been designated as a NERP (section 4.1.4.1) and support a variety of short-term and long-term ecological research activities.

NWI maps identify several wetlands in the undeveloped lands surrounding Y-12. Artificial ponds near the east and west borders of Y-12 are open-water wetlands. The Bear Creek channel southwest of Y-12 is an intermittent streambed wetland bordered by a wide swath of forested wetlands (Y-12 FWS, 1981). A more detailed wetlands inventory performed for ORR confirms the existence of these wetlands and also shows several small or narrow areas of wetlands within and surrounding the Y-12 area (Y-12 ORNL, 1991a).

Lands within and surrounding Y-12 drain to the Clinch River, which forms the eastern and southern boundary of ORR. Bear Creek, a tributary to the Clinch River, originates immediately southwest of Y-12 as an intermittent stream (Y-12 FWS, 1981). East Fork Poplar Creek originates immediately northeast of Y-12. After leaving the Y-12 area, it flows first northwest and then southwest before entering Poplar Creek. Because of headwater contamination, aquatic diversity is reduced in the upper reaches of Bear Creek (Y-12 Loan, 1985). Minnows, suckers, and bluegills are the predominant types of fish found in both Bear Creek and East Fork Poplar Creek; however, overall, the diversity and number of species present is greater in the latter stream (Y-12 Ryan, 1988).

Several Federally- and state-listed threatened and endangered species may occur in natural habitats on ORR (Y-12 Kroodsma, 1987). The peregrine falcon (*Falco peregrinus*), a Federally- and state-listed endangered species, may occur as a rare migrant or winter visitor. Two Federally- and state-listed endangered bat species, the Indiana bat (*Myotis sodalis*) and the gray bat (*Myotis grisescens*), are potential residents at ORR. Although no bald eagles (*Haliaeetus leucocephalus*), a Federally- and state-listed endangered species, are known to nest on ORR despite the presence of large lakes that provide suitable habitat, they have been seen on the site on rare occasions.

Aquatic habitats on ORR and in the adjoining reach of the Clinch River are unsuitable for several Federal and state-listed endangered or threatened mollusk and fish species known to occur in Anderson and Roane Counties (Y-12 Kroodsma, 1987).

Environmental Consequences. Temporary land disturbance could result from renovation of the Y-12 facilities. This disturbance would be limited to laydown areas on lawns and paved areas within Y-12 that, due to the high degree of land development, are of no significant value as habitat for terrestrial wildlife. No natural vegetation or terrestrial wildlife habitats surrounding Y-12 would be lost or modified. The relocated beryllium functions would be consistent with the existing industrial mission of Y-12 and would not result in an increased human presence in natural habitats in the surrounding areas of ORR.

Renovation activities would be limited to previously developed areas, and therefore would not affect wetlands.

No aquatic habitat within or in the vicinity of Y-12 would be affected by the relocated beryllium functions. Minor increases in water withdrawal from the Clinch River and water discharged to its tributaries resulting from the consolidation facilities (section 4.1.4.3) would not significantly affect aquatic habitats associated with these water bodies. Any additional wastewater would be discharged in compliance with NPDES permit limits.

No terrestrial or aquatic areas potentially providing habitat to Federally-listed or Tennessee-listed threatened or endangered species would be affected by the Proposed Action. DOE has initiated discussions with the FWS and Tennessee Department of Environment and Conservation to determine whether the relocated beryllium functions would pose any impacts to threatened or endangered species at ORR or surrounding areas.

4.1.4.6 Cultural Resources

Affected Environment. The prehistoric chronology of the Oak Ridge area has been divided into five time periods: Paleoindian (10,000-8000 B.C.), Archaic (8000-900 B.C.), Woodland (900 B.C.-A.D. 900), Mississippian (A.D. 900-1450), and Protohistoric (A.D. 1450-1673) (Y-12 Chapman, 1985). More than 20 cultural resources surveys have been conducted on ORR (Y-12 ORNL, 1984). About 90 percent of the reservation has received at least reconnaissance-level studies; less than 5 percent has been intensively surveyed. Most studies have occurred along the Clinch River and adjacent tributaries. Prehistoric sites recorded include villages, burial mounds, camps, quarries, chipping stations, limited activity locations, and shell scatters (Y-12 Chapman, 1985). Over 65 prehistoric sites have been recorded at ORR (Y-12 Fielder, 1974; Y-12 Schroedl, 1990). About 10 prehistoricsites may be considered potentially eligible for the NRHP; most sites have not yet been evaluated.

The history of the region has been previously documented (Y-12 Robinson, 1950; Y-12 Creekmore, 1967; Y-12 Hall, 1989). In 1942, 866 tracts of land and the communities of Scarboro and Wheat were acquired for the Manhattan Project (Y-12 Fielder, 1977). Construction of the Clinton Engineer Works began in 1943. The Y-12 Electromagnetic Plant; the X-10 area, containing the experimental air-cooled plutonium pile and separation facilities; and the K-25 gaseous diffusion plant were completed by 1945 (Y-12 DOE, 1990a). The town of Oak Ridge was a planned community, designed in three phases. By 1945, the town had a population of 75,000, which greatly exceeded the original planned community estimate of 13,000 (Y-12 Johnson, 1981; Y-12 Robinson, 1950). Several historic resources surveys have been conducted at ORR (Y-12 ORNL, 1984; Y-12 Fielder, 1977). Historic resources include archaeological remains and standing structures. Documented structures include cabins, barns, churches, gravehouses, springhouses, storage sheds, smokehouses, log cribs, privies, henhouses, and garages. Archaeological remains consist primarily of foundations, roads, and trash scatters. Sixty-five pre-1942 cemeteries also occur at ORR (Y-12 Robinson, 1950). Over 240 historic resources have been recorded at ORR and about 20 of those sites may be considered potentially NRHP-eligible (Y-12 Fielder, 1977; Y-12 Schroedl, 1990). The X-10 Graphite Reactor, Freels' cabin, and two church structures are considered eligible for, or listed on, the NRHP. Several buildings and facilities at ORR are associated with the Manhattan Project and may be potentially eligible for the NRHP.

The Overhill Cherokee occupied portions of the Tennessee, Hiwassee, Clinch, and Little Tennessee River valleys by the 1700's. Conflicts with the British, and later the Americans, resulted in the loss of Cherokee villages and eventual treaties and land concessions. By 1838, most of the remaining Cherokee were forcibly moved to the Oklahoma territory (Y-12 Chapman, 1985). By 1866, Colonel William Thomas established the Qualla Cherokee Reservation in North Carolina (Y-12 Creekmore, 1967). Resources which may be important to Native American groups include prehistoric and historic villages, ceremonial lodges, cemeteries, burials, and traditional plant gathering areas.

Environmental Consequences. All beryllium technology and pit support functions relocated to Y-12 would be accommodated within three existing structures with no new construction. Therefore, no NRHP-eligible prehistoric or historic resources, or important Native American resources would be affected by renovation or operation activities.

4.1.4.7 Socioeconomics and Community Services

Affected Environment. The discussion of socioeconomics and community services at Y-12 is based on an ROI where 94 percent of Y-12 employees lived in 1991. The ROI includes Anderson (33 percent), Blount (2 percent), Knox (36 percent), Loudon (6 percent), and Roane (17 percent) counties in Tennessee. Within these counties, the following key cities have been included in the analysis: Clinton (7 percent), Knoxville (32 percent), and Oak Ridge (21 percent) (see figure 3.2.5.3-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.4-1 through E3.4-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 42 percent, increasing from 195,220 in 1970 to 277,630 in 1990. Total employment increased from 196,657 to 326,059 between 1970 and 1990, an annual growth rate of 3 percent. The unemployment rates for 1970 and 1990 were 3.3 percent and 4.6 percent, respectively. For the same years, personal income increased from approximately $1.5 billion to $9 billion (an annual average of 9 percent), and per capita income increased from $3,228 to $15,892.

Although employment levels at ORR have since 1970 and are projected to increase further, employment at the Y-12 Plant has decreased. Between 1970 and 1990, employment at the Y-12 Plant decreased from 6,776 to 6,599 (Y-12 DOE, 1991c). As of September 30, 1992, employment levels at Y-12 have decreased to 5,384. The proposed Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in work force associated with the budget reductions is only estimated at this time. Under the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to decrease to approximately 4,200 by the year 2000 (DOE, 1993c). In 1992, the total Y-12 payroll was estimated to be more than $184 million (Y-12 DOE, 1991c). Under the No Action baseline, the total payroll is projected to decrease to $145 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 319,000 by 2000 and 330,000 by 2020. The unemployment rates for 2000 and 2020 are projected to be 7.0 percent and 7.1 percent, respectively. For the same years, personal income is projected to increase from approximately $12.9 billion to $16.5 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $21,000 in 2000 to $24,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 23 percent to 568,450. During the same period, the Tennessee population increased 24 percent. The population in the five-county ROI is projected to increase from an estimated 626,000 in 2000 to 694,000 by 2020, at an annual rate of less than 1 percent.

The largest county population increase (35 percent) occurred in Blount County between 1970 and 1990, while during the same years, populations in Anderson and Knox counties increased 13 percent and 22 percent, respectively. Population in Blount County is estimated to increase 9 percent between 1990 and 2000 and 11 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Anderson County population is projected to increase 15 percent between 1990 and 2000 and 11 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The population in Knox County is expected to increase approximately 9 percent by 2000 and an additional 11 percent by 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, the city of Clinton had the greatest increase in population (87 percent) in the ROI. For the same years, the Oak Ridge and Knoxville populations decreased 15 percent and 5 percent, respectively.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 49 percent from 156,925 to 233,181. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 10 percent by the year 2000 and an additional 11 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (54 percent) occurred in Knox County, while the smallest increase (23 percent) occurred in Blount County. The number of housing units in Knox County is expected to increase approximately 5 percent by 2000 and an additional 11 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Blount County is expected to increase about 4 percent by 2000 and an additional 11 percent by 2020, an annual increase of 2 percent.

In 1990, the homeowner vacancy rates averaged 2 percent in the ROI and ranged from approximately 1 percent in Anderson County to 2 percent in Blount County. The vacancy rates for rental units averaged 8 percent and ranged from about 7 percent in Loudon County to 10 percent in Roane County.

Community Infrastructure and Services. The water supply systems operated by ORR, Clinton, Alcoa, Maryville, Knoxville, the First Utility District of Knox County, the West Knox Utility District, the Hallsdale-Powell Utility District, the Loudon Utilities Board, the Tellico Area Service System, the Lenoir City Utilities Board, Rockwood, Harriman, and Kingston maintain about 96 percent of the capacity of the 17 major public systems in the ROI. All of these systems utilize surface water for their raw water supplies.

In Anderson County, ORR's system (32.1 MGD capacity) had 1991 average daily demands of 57 percent of capacity. Clinton's system (about 2.3 MGD capacity), also in Anderson County, had 1988 average daily demands of 65 percent of capacity. In Blount County, the systems operated by Alcoa (24 MGD capacity) and Maryville (6 MGD capacity) had 1991 average daily demands of 31 percent and 50 percent of capacity, respectively. In Knox County, the systems operated by Knoxville (63.6 MGD capacity), the First Utility District of Knox County (14 MGD capacity), the West Knox Utility District (8.5 MGD capacity), and the Hallsdale-Powell Utility District (about 6.3 MGD capacity) had 1991 average daily demands of 52 percent, 42 percent, 47 percent, and 64 percent of capacity, respectively. Loudon Utilities Board's (8.7 MGD capacity) and the Tellico Area Service system's (3.5 MGD capacity), both in Loudon County, had 1991 average daily demands of 56 percent and 37 percent of capacity, respectively. The Lenoir City Utilities Board's system (3 MGD capacity), also in Loudon County, had 1988 average daily demands of 32 percent of capacity. In Roane County, the systems operated by Rockwood (6 MGD capacity) and Kingston (2 MGD capacity) had 1991 average daily demands of 28 percent and 20 percent of capacity, respectively. Harriman's system (3 MGD capacity), also in Roane County, had 1988 average daily demands equal to 55 percent of capacity. All of these systems are projected to have average daily demands of less than 68 percent of capacity in 1995 and less than 70 percent of capacity in 2000.

Oak Ridge, Clinton, Maryville, Knoxville, the Hallsdale-Powell Utility District, the First Utility District of Knox County, the West Knox Utility District, the Loudon Utilities Board, the Lenoir City Utilities Board, Rockwood, Harriman, and Kingston operate wastewater treatment systems in the ROI. In Anderson County, the systems operated by Oak Ridge (about 5.9 MGD capacity) and Clinton (about 2.1 MGD capacity) had 1991 average daily demands of 85 percent and 34 percent of capacity, respectively. In Blount County, the Maryville system (10 MGD capacity) had 1991 average daily demands of 62 percent of capacity. In Knox County, the systems operated by Knoxville (about 62.9 MGD capacity), the First Utility District of Knox County (5 MGD capacity), the West Knox Utility District (4 MGD capacity), and the Hallsdale-Powell Utility District (about 5.6 MGD capacity) had 1991 average daily demands of 70 percent, 94 percent, 62 percent, and 70 percent of capacity, respectively. The Loudon Utilities Board's (7.6 MGD capacity) and Lenoir City Utilities Board's system's (2 MGD capacity) in Loudon County had 1991 average daily demands of 67 percent and 56 percent of capacity, respectively. In Roane County, the systems operated by Rockwood (1.5 MGD capacity) in 1991 and Harriman (1.5 MGD capacity) in 1988 had average daily demands of 100 percent of capacity. Kingston's system (1 MGD capacity), also in Roane County, had 1991 average daily demands of 8 percent of capacity.

The Oak Ridge system is projected to have average daily demands of 88 percent of capacity in 1995 and 91 percent of capacity in 2000. The First Utility District of Knox County plans to expand its system capacity to 10 MGD and is projected to have average daily demands of less than 55 percent of capacity in 1995 and in 2000. The Harriman and Rockwood systems are currently operating at capacity and both are projected to have average daily demands of 103 percent and 107 percent of capacity in 1995 and 2000, respectively. All other systems are projected to have average daily demands of less than 74 percent of capacity in 1995 and less than 80 percent of capacity in 2000.

Eleven school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 1,122 students in the Clinton City Elementary School District to 54,943 students in the Knox County School District. In 1990, 7 out of the 11 school districts operated between 105 percent and 127 percent of capacity. Among these seven districts were Roane County (127 percent), Anderson County (116 percent), and Knox County (109 percent). The remaining from districts operated between 91 percent and 99 percent of capacity. On average, school districts in all counties were operating above capacity, and the ROI average was 110 percent of capacity. Current capacities are expected to be further exceeded by the years 1995 and 2000 with the No Action future baseline. The largest increases are expected to occur in the school districts located in Roane County, where enrollments are projected to exceed current capacities by 37 percent in 1995 and 47 percent in 2000. Knox County is currently expounding school facilities. Other planned expansions in the near future are not known. The average pupil-to-teacher ratio for the ROI was 19:1, and expenditures averaged $3,031 per pupil. The statewide average pupil-to-teacher ratio was 19:1, and expenditures averaged $3,518 per pupil (TN DEd, 1990).

Fifteen hospitals serve the five-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 1,332 physicians served the ROI. The physician-to-population ratio for the ROI was 2.3:1,000, and ranged from 0.6:1,000 in Roane County to 2.9:1,000 in Knox County. The statewide physician-to-population ratio was 2.1:1,000 (AMA, 1990).

Twelve city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agencies in the five-county ROI were in the city of Knoxville, with 296 sworn officers or 1.8 sworn officers per 1,000 persons; and in Knox County, with 165 sworn officers or 0.5 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.3 per 1,000 persons (FBI, 1991).

Thirty fire departments and 1,342 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in the city of Knoxville (363 firefighters; 2.2 firefighters per 1,000 persons) and in Knox County Rural Metro (292 firefighters; 0.9 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.4 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to the Y-12 Plant is via Bear Creek Valley Road. Tennessee State Routes 58, 62, 95, and 162 pass through ORR and are open to the public.

Estimated traffic along segments providing access to Y-12 is projected to contribute to differing service level conditions in accordance with population growth. Tennessee State Route 95, however, and to a lesser extent Tennessee State Routes 61, 170, and Bear Creek Valley Road, would typically experience traffic congestion, with volumes approaching the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in minor congestion. In addition, estimated truck traffic into Y-12 for delivery of supplies and removal of wastes would typically average 40 trips per day. However, the additional traffic volumes associated with continued operation of Y-12 are relatively minor and would not substantially affect local transportation conditions.

Road reconstruction, widening, modification of interchanges, and new interchange construction projects are plannedfor segments of Bear Creek Valley Road, Scarboro Road, and Tennessee State Routes 58, 62, and 95 (TN DOT, 1992a and b; Y-12 DOE, 1989).

No public transportation service exists in the city of Oak Ridge. Other modes of transportation within the ROI include railways and waterways. Railroad service in the ROI is provided by CSX Transportation and the Norfolk Southern Corporation. Two branch lines serve ORR. Waterborne transport in the ROI is via the Clinch River, which provides an alternative mode of transportation to the Oak Ridge area. The Clinch River waterway has rarely been used for DOE business and no designated port facilities exist for such purpose.

The McGhee Tyson Airport in Knoxville, 40 miles from ORR, receives jet air passenger and cargo services from both national and international carriers. The closest air transportation facility to Oak Ridge is Atomic Airport in Oliver Springs. Numerous other private airports are located throughout the ROI (DOT, 1991).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. The construction, modification, and installation of facilities and equipment for the Proposed Action at the Y-12 Plant would require 80 additional employees during peak construction (Y-12 DOE; 1992a). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 10 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993c). These positions would be filled through donor transfers, new hires, and internal reassignments. In addition to the jobs created directly by the project, another 167 jobs would be created indirectly during peak construction and 13 additional jobs during operations. This direct and indirect employment would lead to the in-migration of 58 persons during peak construction and 13 persons during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force.

Under the No Action alternative, the current Y-12 employment level of 5,384 is projected to decline to 4,200 by the year 2000, a decrease of 1,184. The addition of 10 full time equivalent jobs to Y-12 would be realized as a result of the Proposed Action.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.4.7-1. In the year 2000, this project-related population growth from in-migration would represent a less than 1-percent increase over the projected ROI baseline population of 626,000, and no cities or counties in the ROI would experience population growth greater than 1 percent.

The less than 1-percent change in population during peak construction would create the need for only an estimated 22 additional housing units. For operations in the year 2000, the less than 1-percent change in population would not create a need for additional housing units beyond a 1-percent increase. In past years, housing units have been built at an annual rate of 2 percent. Therefore, the additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

Under the No Action future baseline, two small wastewater systems (Harriman and Rockwood) would exceed their current capacities by 1995. However, the estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI. Existing water and wastewater capacities more than exceed the projected demand. School districts in all counties are currently operating above capacity. However, these school capacities will be affected only slightly beyond what would naturally occur under the No Action baseline growth because the Proposed Action would not add more than 1 percent to school enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over the No Action baseline. Additional commercial truck traffic into Y-12 would be negligible relative to historic levels, and this truck traffic would occur during nonpeak hours. Impacts to the local transportation network serving Y-12 would be negligible.

4.1.4.8 Waste Management/Pollution Prevention

Affected Environment. Discussion of the Y-12 waste management baseline is provided in section 3.2.7.3. Because no TRU wastes are associated with any of the proposed consolidation activities, no further discussion of TRU waste generation or management is presented.

Waste management activities at Y-12 include the operation of seven processing facilities: packaging, certification, and staging; industrial waste compaction; classified waste treatment; oil/solvent treatment; sludge and soil processing; Class III LLW treatment; and, decontamination. Y-12 has submitted RCRA permit applications to environmental regulators for each hazardous waste treatment, storage, or disposal facility. As of 1990, 20 Part B permit applications and six postclosure applications have been filed for Y-12 facilities. After the issuance of final RCRA permits by the State of Tennessee, Y-12 facilities would be fully permitted under RCRA and subject to stringent guidelines specified in 40 CFR Part 264. The facilities are inspected regularly by EPA, the State of Tennessee, DOE, and/or internal auditors to ensure RCRA compliance. Y-12 is currently operating under RCRA interim status.

At Y-12, waste minimization has been implemented using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. Y-12 has initiated a Chlorinated Solvents Reduction Program to evaluate opportunities to reduce or eliminate the use of chlorinated solvents in plant operations. The program focuses on less hazardous chemicals as substitutes for methylene chloride, tetrachloroethylene, methyl chloroform, and trichlorofluoroethane, which are the most widely used chlorinated solvents in the plant. Y-12 reduced its purchases and use of these chemicals by 97 percent, from 89,000 gallons in 1985 to 3,090 gallons in 1991. Several projects contributed to this reduction including the substitution of a nonhazardous, water-based coolant for tetrachloroethylene and the use of ultrasonic cleaners to replace methyl chloroform in degreasing operations. In late 1990, the use of a nonchlorinated solvent (Solvent 140) was initiated for cleaning and degreasing operations. The use of this solvent has decreased the use of chlorinated solvents by several thousands of gallons.

Additionally, Y-12 has developed a process which could potentially reduce the volume of RCRA hazardous sludge at the West End Treatment Facility by approximately 95 percent. This process neutralizes and removes precipitates as the first step in the West End Treatment Facility process to remove hazardous constituents from the process stream. Solids generated in subsequent steps and operations in the treatment process would be nonhazardous solid waste.

Environmental Consequences. The beryllium technology and pit support functions would generate various types of waste due to construction related building modifications and equipment installation. No mixed waste would be generated as a result of relocated nonnuclear functions. Approximately 807 ft^3 of LLW metallic, LLW nonmetallic, classified, and nonhazardous nonmetallic wastes would be generated as a result of the modification and installation of facilities and equipment for the Proposed Action at Y-12.

All radiologically contaminated non-RCRA metallic waste would be transferred to the Y-12 salvage yard. Wherepossible, the metallic waste would be placed into boxes for storage at the salvage yard.

Site preparation and demolition work would generate approximately 575 ft^3 of classified wastes, which may include LLW and hazardous materials, both metallic and nonmetallic. These wastes would be bagged if hazardous and placed in six 4 ft x 6 ft x 4 ft metal boxes for classified storage.

Floor and wall penetrations, roof demolition, and construction scraps in radioactive areas would generate approximately 192 ft^3 of nonmetallic LLW. The nonmetallic, non-RCRA, non-TSCA LLW would be sent to a local commercial compaction/incineration facility for processing to greatly reduce the volume of material to be stored. After processing, the nonmetallic LLW would be placed in 4 ft x 6 ft x 4 ft metal boxes. The boxes would be maintained outdoors in the old salvage yard and would eventually be transferred to the above-grade storage pads.

The building modifications would result in various beryllium-contaminated metallic wastes (duct work, conduit, etc.) and construction debris, which would be stored in 4 ft x 6 ft x 4 ft metal boxes in a special facility at Y-12 site. Some of the piping removed as a result of the modifications may be contaminated with asbestos. The pipes would be treated the same as beryllium-contaminated wastes. The various pieces of equipment currently located in the area designated to become the beryllium technology facility are contaminated. This equipment would be cleaned externally, and where necessary, some equipment would be disassembled and placed in metal boxes for permanent storage in a special facility.

It is anticipated that in the near future, metallic LLW wastes can also be sent offsite for volume reduction through compaction or smelting operations which would greatly reduce storage space required. Noncompactible metallic wastes may also be decontaminated through chemical leaching processes or surface cleaning methods. Some small amount of LLW with a very low radioactivity content may meet the waste acceptance criteria for onsite disposal. The majority of the waste would require eventual disposal in an offsite LLW landfill. Waste containing dusts or other friable material would be stabilized in grout before storage.

Construction and new equipment installation debris from non-radioactive areas would generate 40 ft^3 of noncontaminated nonmetallics such as concrete and wood. These wastes would be disposed of onsite in the Y-12 Sanitary Landfill #2.

As outlined in appendix B, section B.4, the transfer of the beryllium technology and pit support work from RFP to Y-12 would generate some liquid and solid wastes. Approximately 4,210 gallons of the additional beryllium-contaminated liquid hazardous waste are aqueous wastes that can be treated onsite. Aqueous wastes would be generated by machining operations, ultrasonic cleaning, and powder-handling operations. This aqueous waste would be shipped to the Y-12 Central Pollution Control Facility for beryllium removal. The batch operation nature of the Central Pollution Control Facility and the anticipated volume of beryllium operations generated process water are such that the Central Pollution Control Facility would have adequate capacity to treat the additional waste stream without any resulting environmental impacts.

Can dissolution operations would generate less than 500 GPY of beryllium-contaminated nitric acid solutions. These aqueous wastes would be sent to the Y-12 West End Treatment Facility. The West End Treatment Facility has 3 million gallons of tank treatment capacity and 1.5 million gallons of sludge storage tank capacity, which is adequate to treat the additional waste stream without any resulting environmental impacts.

Quantities of excess beryllium recyclable scrap would be consolidated into ingot form and stored onsite in the short-term or sold to commercial buyers. No adverse environmental impacts are expected.

Beryllium-contaminated solid wastes cannot currently be placed in the Y-12 landfill because it is only permitted for beryllium oxide. Therefore, the wastes must either be treated and converted to beryllium oxide prior to burial or the landfill permit must be modified by the State of Tennessee to include the addition of beryllium. If Y-12 is not successful in amending its permits, this waste would be processed at a local commercial facility, via compaction or incineration, to significantly reduce the volume of wastes to be stored.

Beryllium machining operations would generate less than 100 gallons annually of liquid organic waste. Machining and other operations would generate some amounts of beryllium-contaminated combustibles and other solid wastes such as filters. While some of the beryllium-contaminated solids could be sent offsite to a local commercial incinerating/compacting facility for volume reduction, small quantities of beryllium-contaminated organic liquid and solid wastes would be stored long-term onsite. This would require continuous management of the waste. An alternative would be to process the liquid organics in the K-25 Plant TSCA incinerator and ship solids offsite to a "secure" (RCRA-type) hazardous landfill permitted to handle such waste. The ability to ship either waste form offsite is predicated on being able to declare a "no-radiation added" status for the waste streams. A rigorous readiness review of the waste-generating facilities, processes, and equipment, and their origins, is required to obtain the desired status. While dedicated, uranium-free areas would be set up to handle the operations generating the waste streams identified, and certain processing equipment would be moved from RFP and/or other areas of Y-12. Whether these economically desirable equipment moves would impact the ability to declare a "no-radiation added" status is unknown at this time. However, if "no-radiation added" status cannot be declared, then the wastes would be processed as low-level radioactive contaminated wastes.

Pit support function components would be manufactured in radiological areas and on uranium-contaminated equipment; thus, the liquid (water based machining coolants) and solid (scrap metals) wastes would be processed as LLW. The relocated pit support function would increase the quantity of LLW generated at Y-12, but the amount is expected to be small (less than 1 percent).

While clean scrap metal was sold to the public in 1990, Y-12 is now restricted from sending any scrap metals offsite. Scrap metal sorting continues, however, in anticipation of future provisions for clean scrap metal consolidation/recycling/resale.

Each of the functions transferring to Y-12 from RFP have been subject to RFP programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities and reduce environmental impacts. Once the transfer of the functions occurs, Y-12 would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

In summary, the magnitude of additional waste streams generated as a result of the increases in nonnuclear manufacturing activities at Y-12 are well within the storage, treatment, and disposal capability of existing waste management facilities.

4.1.4.9 Human Health: Facility Operations and Accidents

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.1. Information specific to Y-12 is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (§4.1.4.2 and 4.1.4.3, respectively), the chemical pollutant levels from Y-12 operation to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Radiological pollutant levels to which the public is exposed are well below applicable permit, regulatory, and DOE operational requirements (Y-12 MMES, 1991b).

A review of the recent Y-12 annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future.

Environmental Consequences. The Air and Water Resources sections discuss the chemical releases associated with relocating the beryllium technology and pit support functions identified in section 3.3.4 to Y-12. As shown, the cumulative impacts resulting from existing releases and the releases of chemicals associated with relocating the beryllium technology and pit support function at Y-12 are below applicable permit, regulatory, and DOE operational requirements.

Water from processes that generate hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated before discharge. Furthermore, discharges of wastewater through NPDES-permitted outfalls which can be attributed to the activities to be relocated at Y-12 are expected to be below NPDES limits. Water quality would not be adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For normal operations at Y-12, all possible HAPs were examined and only chlorine and trichlorotrifluoroethane were identified for further analysis based on their toxicity, concentration, and frequency of use. The Hazard Index, a summation of the Hazard Quotient for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects are expected (non-cancer) to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction,(see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified as carcinogens. The cumulative Hazard Indexes for Y-12 (see table F-17) were 0.0186 onsite (worker effects) and 0.0005 at the site boundary (effect on the public) on an annual basis. The incremental change Hazard Indexes due to the Proposed Action were both 0 for onsite and at the site boundary. Therefore, the Proposed Action would not contribute to the cumulative Hazard Indexes at the Y-12 site.

Consolidation of the nonnuclear activities at Y-12 would not increase radionuclide emissions.

In summary, these analyses show that no adverse health effects are expected from the release of hazardous chemicals/chemical pollutants at Y-12 as a result of the Proposed Action.

Beryllium compounds are currently stored at Y-12. The transfer of the beryllium technology function to Y-12 would result in a maximum increase of less than 2 percent in the total beryllium inventory. Additionally, there have been significant improvements in the safety procedures for handling beryllium, and the crystal structure of beryllium now used in industry results in a much lower toxicity (Rossman, 1991) than the form of beryllium used between 1940 and 1950. Employee exposure limits will be maintained below applicable standards and acceptable concentrations established by OSHA.

As discussed in section 3.3.4, the beryllium technology and pit support functions involve activities and chemicals that are the same as or similar to those that are currently being performed in Y-12 facilities designed for these activities. Therefore, the current accident profile at Y-12 would not change as a result of relocating these functions to Y-12.

4.1.5 Sandia National Laboratories, New Mexico

A detailed discussion of SNL's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.8. The functions and processes associated with the Proposed Action to be consolidated at SNL and the proposed facility modifications required to support each relocated function are discussed in section 3.3.5. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at SNL and the environmental assessment methodologies for each resource or issue discussed below is presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on SNL, is also provided in the chapter 4 introduction and in section 4.1.

4.1.5.1 Land Resources

Affected Environment. SNL is located approximately 7 miles southeast of downtown Albuquerque, NM (figure 3.2.8-1). Generalized land uses at SNL and in the vicinity are shown in figure 4.1.5.1-1. There are no prime farmlands on SNL. The residential distribution of SNL employees is discussed in section 4.1.5.7.

SNL has developed 13 functional operations zones. The affected environment consists of 2 TAs, at the western end of SNL, designated TA-I and TA-III (figure 3.2.8-2). These TAs are within the following functional zones: Administration, Component Development, Defense Programs, Energy Programs, Exploratory Systems, Micro-Electronics, Parking, Pedestrian Corridors, Pulsed Power Sciences, Research, Site Support, Technical Support, and Testing (SNL, 1989).

TA-I is the most intensively developed of the SNL TAs, containing administrative and support facilities; project engineering, research, and component activities; and special laboratories and shops (SN DOE, 1991d).

The Kirtland Air Force Base (KAFB) cantonment, the most heavily developed area on the base, is adjacent to TA-I. U.S. Air Force (USAF) accompanied base housing is located west and north of TA-I. Various KAFB facilities and operations, including flight operations, are located west of TA-I. USAF flight operations are collocated with the civilian commercial aircraft operations of Albuquerque International Airport. The runway and taxi ways are owned and managed by the city of Albuquerque (SN USAF, 1990). The airport Accident Potential Zone (APZ)-1 extends east beyond the runway clear zone to the edge of the TA-I boundary, with APZ-2 extending across TA-I (SN DOE, 1991d). Flight operations of the airport are regulated by the Federal Aviation Administration, which does not use APZs (SN Greiner, 1989).

The USAF granted an exemption for the development of an all-new Air Installation Compatible Use Zone study at KAFB. The base, however, is directed to monitor all development in its vicinity to ensure compatibility with base flying missions (SN USAF, 1978; 1987a and b). The USAF Air Installation Compatible Use Zone Land Use Guidelines reflect land use recommendations. The Land Use Guidelines for APZ-1 and APZ-2 do not recommend uses that are highly labor intensive; involve explosive, fire, toxic, corrosive, or other hazardous characteristics; or that occupy high-density offices (SN USAF, 1985).

DOE has analyzed the probability of an aircraft crashing into the Explosives Components Facility, which is under construction within APZ-2. DOE has concluded, in an EA prepared for the project, that a 10^{-2} to 10^{-4} probability exists, and issued a FONSI (SN DOE, 1992a). Planning for other DOE facilities has utilized the same methodology and findings.

The land north of SNL, except for vacant land on both sides of Tijeras Canyon east of TA-I and some unmanned utility facilities, is part of the urbanized city of Albuquerque. The urban land use consists of a mixture of residential, commercial, industrial, institutional, and various supporting public uses. The closest residence to the KAFB boundary is 20 feet to the north. An industrial park is currently being developed immediately east of the KAFB Eubank Gate and TA-I. Commercial uses are primarily concentrated along Central Avenue and Gibson Boulevard, north of the site (SN USAF, 1990). SNL does not contain any public recreation facilities.

The viewshed consists mainly of the south side of Albuquerque, Cibola National Forest, and rural rangeland. Development of the SNL and KAFB facilities has heavily disturbed the character of the landscape within their respective areas. The facilities are brightly lit at night and highly visible from various viewpoints. Viewpoints affected by DOE facilities are primarily associated with the residential areas in southeast Albuquerque and short sections of northbound I-25 and westbound I-40. Visual impacts to the following areas are lessened because of distance: 2 to 3 miles from the residential area to the northeast, 3 to 5 miles from the I-25 viewpoint, and 2 to 3 miles from I-40. The impact from I-40 is also lessened by intervening urban development.

The developed SNL and KAFB facilities are consistent with a Class 5 VRM area designation. The remainder of SNL ranges from a Class 3 to Class 4 VRM designation, except for the DOE-leased U.S. Forest Service land. The Forest Service has identified the DOE withdrawal area as ranging from management Class R (Retention) to Class PR (Partial Retention) (SN USDA, 1978). These classes are equivalent to VRM Class 1, Class 2, and Class 3.

Environmental Consequences. Neutron generators, cap assemblies, thermal batteries, and milliwatt heat source surveillance functions would be sited within modified existing buildings at SNL (see section 3.3.5 and figure 3.3.5-1). The introduced facilities would be consistent with the SNL Site Development Plan and compatible with other ongoing operations within their respective technical areas. An existing laydown area of approximately 2 acres would be used for renovation activities in TA-I (figure 3.3.5-1). The laydown area, existing Building 957, and Building 905 are sited within the USAF APZ-2. A recently approved environmental assessment and FONSI for Building 905 determined there were no known land use conflicts (SN DOE, 1992a) and, consequently, no land use impacts are anticipated for these facilities. The proposed Shelf Life Storage Facility would be situated within Building 6730 in a remote area of TA-III (figure 3.3.5-1). The siting and proposed use of this building are consistent with Federal plans, policies, and controls (SNL, 1989 and SN DOE, 1992d).

The number of in-migrating employees described in section 4.1.5.7 would be small enough that existing accommodations of the host community of Albuquerque should be able to absorb the increase without significant development of land for residential use. Offsite land requirements would be approximately 4 acres during the modification phase and 13 acres during the operations phase.

There are extensive public and private recreational facilities in the region that could easily absorb the increased demand resulting from project-related in-migration. Impacts to regional recreational facilities would be negligible. Because relocated facilities would be placed in modified existing buildings, the impacts to visual resources would be negligible.

4.1.5.2 Air Quality and Acoustics

Affected Environment. The climate at SNL and in the surrounding region is characteristic of a semiarid steppe (Trewartha, 1954). The annual average temperature in the area is 56.2 "F; temperatures vary from an average daily minimum of 22.3 "F in January to an average daily maximum of 92.8 "F in July. The average annual precipitation is 8.1 inches (NOAA, 1991b).

Ambient Air Quality. SNL is located within the Albuquerque-Mid Rio Grande New Mexico Intrastate AQCR. Portions of the AQCR are designated as nonattainment by the EPA for CO (40 CFR 81.332). The AQCR is designated attainment for the other criteria pollutants. The NAAQS and New Mexico State ambient air quality standards are given in table D2.1.1-1.

Ambient concentration limits for HAPs/toxics have been promulgated by the New Mexico Environmental Improvement Board. These limits are enforced by the Bernallio County Albuquerque City Air Control Board. The emission rates of HAPs/toxics from existing SNL facilities during 1991 are listed in table D2.1.8-3. The HAPs/toxics described in this section are currently used at SNL or those anticipated to be used under the Proposed Action.

Ambient air quality near SNL is monitored for PM 10 , CO, and NO 2 . The data from the monitoring stations are presented in table D2.1.8-1. To achieve a conservative estimate, the maximum background concentrations as measured at these stations were used in the analysis. Note that the New Mexico ozone standard is exceeded. This is common in urban areas.

The principal sources of criteria air pollutants at SNL are the steam plant, paint shops, toxic machine shop, process development laboratory, and the emergency diesel generator plant, at TA-I; and the explosive testing at TA-II (SNL, 1988). Other emissions include fugitive particulate emissions from waste-burial activities, other process emissions, vehicular emissions, and temporary emissions from various construction activities. HAP/toxics emissions at SNL occur from laboratories and miscellaneous operations and consist primarily of TCA, toluene, and xylene. The emission inventories are included in tables D2.1.8-2 and D2.1.8-3.

Normal operations result in the emission of radioactive materials at SNL. These emissions include 160,000 pCi of tritium annually (SNL, 1991). The health effects of these emissions are discussed in section 4.1.5.9. Tritium is the only radionuclide that may be affected by nonnuclear consolidation activities.

Air quality under ambient and No Action conditions at SNL is shown in table 4.1.5.2-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of ozone, baseline air quality concentrations at SNL do not exceed, and are not expected to exceed, any applicable guidelines or regulations. It is believed that the contribution of SNL operations to ozone concentrations is negligible.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions . The major noise sources within SNL include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, vehicles, and explosives detonation). Explosives testing is conducted at TA-III and in nearby Coyote Test Field. Sound-level measurements have not been made at SNL for explosives testing. Sound levels from aircraft operations at Albuquerque Airport/KAFB have been analyzed (SN USAF, 1990; SN Greiner, 1989). At the site boundary adjoining the urban areas of Albuquerque, noise from sources at SNL would be barely distinguishable from background noise levels. The acoustic environment along the SNL site boundary adjoining urban areas of Albuquerque and in the nearby residential areas was assumed to be that of an urban location with typical DNL in the range of 58 to 72 dBA (EPA, 1974), except where levels are higher due to aircraft operations. The primary sources of noise in these areas are traffic and aircraft operations. The acoustic environment in the rural areas adjoining SNL was assumed to be that of a rural location with typical DNL in the range of 35 to 50 dBA (EPA, 1974), except where higher due to aircraft operations and explosive testing.

The State of New Mexico has not established specific numerical environmental noise standards applicable to SNL. The city of Albuquerque has adopted a Noise Ordinance that specifies a maximum sound level in residential areas as described in appendix D, section D.2.2.8. Noise levels at residences near SNL, especially those along major roads, may exceed EPA guidelines for residential areas due to traffic and aircraft noise.

Environmental Consequences.

Air Quality . Renovation and modification activities (section 3.3.5) would temporarily increase particulate matter emissions such as dust and dirt, and vehicle emissions. This increase, although relatively small when compared to overall site emissions and when added to existing levels, is not expected to exceed applicable air quality standards.

Air emissions from the manufacture of neutron generators would result from production operations. Available information indicates that no additional emissions of criteria pollutants are associated with the transfer of these activities (FDI, 1993). Hazardous/toxic air pollutant emissions from the manufacture of neutron generators are about 4 tons per year. The potential emission rates are listed in table D3.1.1-2. Ambient air quality impacts of these emissions, none of which exceeds the applicable standards or guidelines, are shown in table 4.1.5.2-2.

Relocation of the thermal battery manufacturing facility would not require any major new construction (FDI, 1993). Therefore, no construction-related air quality impacts would occur with this function.

Air emissions from operation of the thermal battery backup production functions would be negligible. Small-volume batch cleaning operations would be performed using aqueous terpene-based cleaners (e.g., citracline or d'limonene) (SN FDI, 1992). Cleaning operation releases would cause negligible impacts on air quality.

Consolidation of the nonnuclear activities at SNL would increase tritium emissions. An additional 5 curies of tritium would be released annually (PI DOE, 1991b). The health effects of these emissions are discussed in section 4.1.5.9. The Proposed Action would only affect radionuclide tritium emissions. Acoustic Conditions . The effect of the Proposed Action on noise levels during construction and operations has been evaluated for the major traffic routes around SNL. The changes in traffic volumes are expected to result in an increase of less than 1 dB in peak-hour sound levels along Eubank Boulevard, Gibson Avenue, and Louisiana Boulevard. Changes in sound levels along other routes are expected to be minor. The increase in noise levels along the major access routes are expected to cause little or no increase in annoyance to surrounding communities or individuals.

Noise generated by renovation of existing buildings and onsite operations activities are not expected to increase in offsite noise levels. Noise generated by renovation work, and from operational facilities, equipment, and machines, is not expected to cause ambient noise levels at the site boundary to exceed EPA guidelines set to protect the public from the effect of broadband environmental noise and against hearing loss.

Construction workers and personnel working at any of the reconfigured facilities at SNL would be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at SNL.

Although no increase in annoyance is expected to occur offsite from construction and operations, measures would be implemented onsite to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments during construction and operations with appropriate hearing protection devices meeting OSHA standards. As required, noise levels would be measured in worker areas and a hearing protection program conducted.

4.1.5.3 Water Resources

Affected Environment. This section describes the surface water and groundwater resources at SNL.

Surface Water . SNL is located within KAFB on the Albuquerque East Mesa. The mesa slopes gently southwest to the Rio Grande, the primary drainage channel for the area. The average flow of the Rio Grande is 1,008 ft 3 /s (SN DOE, 1988). No perennial streams flow through the SNL area. The two primary surface channels at SNL are Tijeras Arroyo and the smaller Arroyo del Coyote (figure 3.2.8-2). The Arroyo del Coyote joins the Tijeras Arroyo to discharge into the Rio Grande approximately 5 miles from the western edge of KAFB. Both arroyos flow intermittently during spring snowmelt or following thunderstorms (SN DOE, 1988). Springs in the eastern mountains provide a perennial flow in the upper reaches of Tijeras Arroyo. Most of this flow evaporates or percolates into the soil before reaching KAFB.

The primary component of the natural drainage system, Tijeras Arroyo, separates TA-I, -II, and -IV from TA-III, -V, and the Coyote Test Field. Stormwater runoff is drained from the SNL Technical Areas by a combination of overland flow, natural channels, open drainage ditches, culverts, and storm sewers.

High peak flows of short duration characterize floods in the area. High-intensity summer thunderstorms produce the greatest flows, but flooding is not considered a high probability at KAFB. The southeast corner of TA-IV and the east side of TA-II lie within the 500-year floodplain of Tijeras Arroyo (SNL, 1989).

SNL contains over 15 miles of sewer lines interconnected with those of KAFB. SNL has five categorical pretreatment operations and three general wastewater streams discharging to the city of Albuquerque wastewater treatment plant. Discharges by SNL are regulated by the city of Albuquerque Public Works Department, Liquid Waste Division, under the authority of the city's Sewer Use and Wastewater Control Ordinance. The city's ordinance is approved by the EPA in accordance with the CWA, as amended (SNL, 1991). Total flow from SNL is estimated to be 200 MGY (table 3.2.8Ä1).

To comply with EPA regulations, the city of Albuquerque has implemented an industrial wastewater pretreatment program. This program requires SNL to obtain permits for wastewater discharges to the city's wastewater treatment plant. These permits specify the required quality of discharges and the frequency of reporting the results of the monitoring (SNL, 1991).

In 1990, SNL did not comply with permit limits on 18 different occasions. Seven noncompliances for fluoride and four noncompliances for pH occurred at Building 858. A compliance schedule to correct these violations was submitted to the city of Albuquerque and the corrective construction was started on September 4, 1990. The remaining seven noncompliances were for pH at different discharge points (SNL, 1991).

SNL discharges stormwater from oil storage tank areas and building basements to two lagoons, permitted under the New Mexico Water Quality Control Commission Regulations as implemented by the New Mexico Environmental Improvement Board. However, the discharge plan does not list any limits for sample parameters.

Surface Water Quality . As a part of the annual surface water monitoring program, samples are obtained from stations upstream and downstream of SNL in the Rio Grande and from Coyote Springs. The upstream station on the Rio Grande is at Corrales Bridge, and the downstream station is at the Isleta Indian Reservation, considerably downstream of the influent point of Tijeras Arroyo (SNL, 1991). Stormwater flowing into Tijeras Arroyo is the only significant surface water flow into the Rio Grande from the site; stormwater monitoring is conducted twice a year at SNL. Rio Grande water samples are analyzed for gross alpha, gross beta, total uranium, cesium-137, and tritium. Results from the 1990 annual monitoring are presen ted in table 4.1.5.3-1. Concentrations of radionuclides in surface waters do not exceed applicable standards. No nonradiological monitoring is conducted in Tijeras Arroyo or in the Rio Grande.

Groundwater . SNL lies within the north-south trending Albuquerque basin. The principal aquifer of the Albuquerque basin is the Valley Fill aquifer. The Valley Fill consists of unconsolidated and semiconsolidated sands, gravels, silts, and clays that vary in thickness from a few feet adjacent to the mountain ranges to over 21,000 feet at a point 5 miles southwest of the KAFB airfield (SN Engineering, 1981). The Valley Fill aquifer is considered a Class IIa aquifer, having a current source of drinking water and waters having other beneficial uses.

The regional water table is separated by a fault complex that divides the area into a deep region on the west side of the complex and a shallower region on the east side. The depth to groundwater ranges from 50 to 100 feet on the east side of the fault complex and from 380 to 500 feet on the west side (SN DOE, 1992b). Based on available data, the apparent direction of groundwater flow west of the fault complex is generally to the north and northwest. The direction of groundwater flow east of the fault complex typically is west toward the fault system (SNL, 1991).

Sources of recharge to the aquifer include precipitation, snowmelt along the margins of the basin, underflow from adjacent areas such as the Hagen Basin, and seepage from streams, canal drains, surface reservoirs, and applied crop irrigation water.

Groundwater Quality . Groundwater monitoring at SNL has been conducted since 1985. Overall, the groundwater in this region has been classified as a calcium bicarbonate chemical type with a pH ranging from 6.08 to 8.84 and an alkalinity range of 49 to 0.40 mg/L. The east side wells are characterized by lower pH than the west side wells. Currently, no monitoring wells are in the proposed project area. The closest well is located approximately 0.25 miles southeast of the area and has an August 1990 depth-to-water reading of 498 feet.

The Chemical Waste Landfill has been identified as a source of groundwater contamination. The groundwater near the Mixed Waste Landfill may contain some groundwater contamination. A monitoring well network was established at the Chemical Waste Landfill in the summer of 1985. A monitoring well network was established at the Mixed Waste Landfill beginning in 1988, but sampling did not begin until late 1990. These areas are not located near buildings that house DOE DP activities.

Concentrations of TCE and metals were found above the water quality criteria established by the New Mexico Water Quality Regulations at the Chemical Waste Landfill. Elevated concentrations of total organic compounds (TOC) and phenolics were found at the Mixed Waste Landfill (SN DOE, 1992b). It is possible that the results for phenolics are inaccurate, since this parameter was also detected in blank samples. Because these areas are not located near buildings that house DOE DP activities, a map of the areas of groundwater contamination was not provided. Groundwater monitoring results for radiological parameters are summarized in table 4.1.5.3-2. All parameters are less than water quality criteria.

Groundwater Usage and Rights . No groundwater rights have been established through the Office of the State Engineer. SNL uses approximately 1 MGD of water (see table 3.2.8-2). Thirty percent of the water used at SNL is purchased from the city of Albuquerque and the rest is pumped from KAFB wells. KAFB pumped over 1.6 billion gallons of water from its production wells in 1990 (SN DOE, 1992b), of which 0.7 MGD or 256 MGY was used by SNL.

The city of Albuquerque has annual consumptive water rights of 7.2 BGY. Half of the water that is pumped from the ground is discharged to the Rio Grande. In addition, the city of Albuquerque also has 15 BGY consumptive water rights to the San Juan River.

KAFB has groundwater rights of 2 BGY. They also have the option of purchasing 10 percent of their water from the city of Albuquerque. Currently, they are operating at an 80 percent capacity.

Environmental Consequences. A description of the functions to be transferred to SNL and the facility locations selected to house these activities is presented in section 3.3.5.

Surface Water . Nonnuclear functions would be relocated to portions of TA-I and -III that are above the 500-year floodplain (SNL, 1989). Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

The additional wastewater generated by the transferred processes is approximately 3.2 MGY (table 3.3.5-4). This wastewater increase represents less than 2 percent over the current sanitary wastewater generation rate of 200 MGY. There would be no impacts to surface water flow because all wastewater would be collected and discharged to the city of Albuquerque's sewer systems. Treated wastewater would meet or exceed standards of the city of Albuquerque, Sewer Use and Wastewater Control Ordinance (SN FDI, 1992).

Surface Water Quality. SNL was selected to receive nonnuclear consolidation activities based on the compatibility between current and relocated operations. There would be no new waste streams added or special waste handling capability required. There would be no impacts to surface water quality because all wastewater would be discharged to the city of Albuquerque's sewer systems. Furthermore, there would be no change in stormwater runoff due to the Proposed Action.

Groundwater . Water requirements for both the modification and operations phases of relocated functions would be supplied from local groundwater sources at KAFB. During the modification phase, approximately 3,900 GPD of water would be required (table 3.3.5-3). This amount is less than 1 percent of the current groundwater withdrawal (1 MGD) from the KAFB wells. It is projected that an additional 25,000 GPD of water would be required to operate the facilities (table 3.3.5-5). This amount is less than 3 percent of the current groundwater withdrawal from KAFB wells.

Groundwater Quality . There are no plans for direct discharge of process wastes to groundwater. Given normal safeguards and precautions, there would be no impacts to groundwater quality.

4.1.5.4 Geology and Soils

Affected Environment. SNL lies on a sequence of sedimentary, igneous, and Precambrian basement rocks. The northern and western sections of SNL rest on Miocene to Quaternary gravels, sands, silts, and clays deposited in the basin formed by uplift of the mountains to the east. The eastern portion of SNL is primarily underlain by Precambrian rocks (SN SAIC, 1985).

The eastern portion of SNL is cut by the Tijeras, Hubble Springs, Sandia, and Manzano faults. Both the Tijeras and Sandia faults, which intersect on the site, are considered capable faults (SN ES, 1981).

SNL is located in Seismic Zone 2B (ICBO, 1991). The facility is situated in a region of high seismic activity but low magnitude and intensity. Available records indicate that more than 1,100 earthquakes have occurred during the past 127 years. However, during the past century, only three have caused damage at Albuquerque. Intensities have been as high as an MMI of VII, which can cause damage.

Possible geological concerns include potential ground shaking and rupturing associated with regional seismic activity and the two capable faults intersecting on the site. Statistical studies indicate that a nondamaging earthquake (MMI less than III) may be expected every 2 years, with a damaging event every 100 years.

Modification and renovation of existing facilities to accommodate the new functions would be in accordance with standards for DOE facilities in Seismic Rise Zone 2B, including standards DOE 6430.1A and 4 CRL 15910.

SNL is located on soils of the Bluepoint-Kokan, Madurez-Wink, Tijeras-Embudo, Kolob-Rock outcrop, and the Seis-Orthids associations (SN USDA, 1977). The Bluepoint-Kokan soils are excessively drained, sandy, and gravelly soils. The Madurez-Wink soils are well-drained and loamy. The Tijeras-Embudo soils are well-drained, loamy, and gravelly. The Kolob-Rock outcrop association in the eastern portion of SNL includes deep, moderately to very steep, well-drained, loamy, and stony soils and basalt, sandstone, and limestone rock outcrops. The Seis-Orthids association includes shallow to moderately deep soils on level to very steep slopes that are well-drained, very cobbly, stony, and very stony, loamy.

The hazard of blowing soils on the terraces and pediments is severe. Future water erosion hazards are moderate on the alluvial fans, foothills, and highlands (SN USDA, 1977). Although no soils are classed prime farmland, finer grained soils of the Bluepoint-Kokan Soil Association along Tijeras Arroyo are classified Farmland of Statewide Importance (Irrigated) by the State of New Mexico.

Environmental Consequences. All new functions would be accommodated in existing modified structures. During implementation, approximately two acres would be temporarily required for a laydown area. The extent of disturbance is not considered significant and no impacts to geologic features would occur.

No geological hazards or soil conditions would adversely affect modification of the buildings or operations of new functions at SNL. Major seismic activity and associated mass movement and subsidence are unlikely to occur during the implementation or operational phases, because seismic activity in the region is generally of low frequency and magnitude. Renovation of plant facilities to accommodate the new functions would meet standards for Seismic Risk Zone 2B in the Uniform Building Code (ICBO, 1991).

4.1.5.5 Biotic Resources

Affected Environment. Most undeveloped lands within TA-I and -III of SNL support grassland vegetation (SN DOE, 1992e). Terrestrial wildlife using grassland habitats on SNL are typical of similar habitats in central New Mexico. The size and diversity of wildlife populations is thought to be limited by the poor availability of water (SN DOE, 1992e). An inventory of wildlife species on KAFB (including SNL) has been recently updated (SN DOE, 1990).

No wetland inventories have been performed for SNL and no NWI maps have been published. Several springs exist on KAFB including Sol se Mete Spring, Coyote Springs, and G Spring (SN DOE, 1992e). These are associated with canyons and arroyos. No springs exist in TAs I-V and none are located within permitted land to which SNL has access.

Potential aquatic habitat within KAFB is limited to arroyos and canyons and the few springs associated with them. The nearest major perennial aquatic habitat is the Rio Grande, located approximately 5 miles to the west. No Federally-listed threatened or endangered species are known to occur on SNL. The peregrine falcon (Falco peregrinus), a Federally- and state-listed endangered species, could potentially occur in the mountainous areas of KAFB surrounding SNL, but the likelihood is low because of the poor quality habitat for this species. The grama grass cactus (Pediocactus papyracanthus), a Federal Candidate Category 2 and state-listed endangered species, is known to occur in grasslands on KAFB similar to those occurring on SNL. The spotted bat (Euderma maculatum), also a Federal Category 2 and state endangered species, has a low probability of occurrence on SNL. SNL lies within the breeding range of several Federal Candidate bird species (SN DOE, 1992e).

Environmental Consequences. Temporary land disturbance could result from renovation of SNL facilities under the Proposed Action. The disturbances would be limited to laydown areas on lawns and paved areas within existing developed areas that are of minimal value as habitat for terrestrial wildlife. No undeveloped areas within SNL would be disturbed by the Proposed Action.

Very small releases of tritium to the atmosphere could occur during operations (SN FDI, 1992). However, as discussed in section 4.1.5.9, these releases would not significantly affect human health. Because studies have indicated that no other organisms are more sensitive than man to radiation (SN NRC, 1979), the radionuclide releases would not significantly affect terrestrial organisms.

No areas potentially containing wetlands or other aquatic habitats would be affected by renovation or operation of the new facilities. Water demands would be met through groundwater withdrawal and not from surface water withdrawal within or surrounding SNL. Process wastewater would be discharged to the local municipal system rather than to the natural surface waters containing aquatic habitats (SN FDI, 1992).

No terrestrial or aquatic areas potentially providing habitat for Federal- or New Mexico-listed threatened or endangered species would be affected by the Proposed Action. DOE has initiated discussions with the FWS and the New Mexico Department of Game and Fish to ensure that renovation or operation of the facilities would not affect any listed or special status species in the vicinity.

4.1.5.6 Cultural Resources

Affected Environment. The prehistoric chronology for the SNL area consists of three broad time periods: Paleoindian (10,000-5500 B.C.), Archaic (5500 B.C.-A.D. 1), and Anasazi (A.D. 1-1600) (SN Mariah, 1988; SN Hoagland, 1992). Prehistoric site types include pueblos, pithouse villages, rockshelters, hunting blinds, agricultural terraces, quarries, lithic and ceramic scatters, lithic scatters, and hearths. About 22 percent of SNL/DOE-controlled lands have been intensively inventoried for cultural resources (SN Hoagland, 1992); another 28 percent received less intensive surveys. Because techniques and procedures varied greatly between projects in these areas, most surveys are not considered adequate (SN Hoagland, 1992; SN Mariah, 1988). All five DOE TAs have been intensively surveyed; no prehistoric sites were recorded. Sixty-four prehistoric sites have been recorded in DOE-owned or -controlled lands beyond the five TAs. About 88 percent of these sites are considered eligible or potentially eligible for the NRHP.

The history of the region has been previously documented (SN Mariah, 1988; SN Furman, 1990; SN Hoagland, 1992). Historic resources identified in the vicinity of SNL are associated with early mining, ranching and sheepherding activities, commercial ventures, or transportation routes (SN Mariah, 1988). All five DOE TAs have received intensive cultural resources inventory; two historic sites were recorded. These sites were small historic trash scatters and are not eligible for the NRHP. Twenty-three historic resources have been recorded in DOE-owned or -controlled lands outside of the five TAs; about 65 percent are considered eligible or potentially eligible for the NRHP.

SNL was established in 1945 as the Z Division of the Los Alamos Scientific Laboratory (SN Furman, 1990; SN Hoagland, 1992). TA-I originally consisted of temporary WWII structures and wooden framed buildings; more permanent buildings were constructed in 1948. Construction in TA-II was initiated in 1948, including two buildings (Buildings 904 and 907) used to assemble the first hydrogen bomb. Test facilities were developed in TA-III from 1954 through 1960 (SN Furman, 1990; SN Hoagland, 1992). Numerous buildings and structures in TAs -I, -II, and -III were built between 1945 and 1960; most are associated with the AEC, and as such, may be considered NRHP-eligible. Buildings in TAs -III, -IV, and -V may also qualify for eligibility to the NRHP when they are 50 years old. The New Mexico SHPO has requested that buildings in these areas be evaluated at that time. Buildings 904 and 907 may be considered potentially NRHP-eligible because of their association with the assembly of the first hydrogen bomb (SN Hoagland, 1992).

Native Americans with concerns in this area include the Sandia Pueblo, north of Albuquerque, and the Isleta Pueblo, south of KAFB (SN Brandt, 1979; SN Ellis, 1979; SN Hoagland, 1992). Native American resources on SNL/DOE-controlled lands may consist of prehistoric sites with ceremonial features such as kivas, village shrines, petroglyphs, or burials; all of these site types or features would be of concern to local groups. Consultation with the Isleta and Sandia Pueblos has been initiated by DOE for this project and is an ongoing process (SN Hoagland, 1992).

Environmental Consequences. Native Americans with concerns in the project area and the SHPO were provided copies of the Preapproval Review Copy of the EA. The New Mexico SHPO and Native Americans were asked to review the EA and submit comments on the potential of the Proposed Action having any effects on important Native American resources or NRHP-eligible prehistoric or historic resources. Only one Native American group responded to the request for comments. Based on the response of Native American groups and the New Mexico SHPO to the preapproval review process for the EA, no important Native American resources or NRHP-eligible prehistoric or historic resources were identified. Therefore, no adverse effects to cultural resources are expected.

4.1.5.7 Socioeconomics and Community Services

Affected Environment. The discussion of socioeconomics and community services at SNL is based on an ROI where 96 percent of the SNL employees lived in 1991. The ROI includes Bernalillo (91 percent), Valencia (3 percent), and Sandoval (2 percent) counties in New Mexico. Within the ROI, the key city of Albuquerque (86 percent) has also been included in the analysis (see figure 3.2.5.4-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.5-1 through E3.5-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 132 percent, increasing from 133,798 in 1970 to 310,252 in 1990. Total employment increased from 124,605 to 293,905 between 1970 and 1990, an annual growth rate of 4 percent. The unemployment rates for 1970 and 1990 were 6.9 percent and 5.3 percent, respectively. For the same years, personal income increased from approximately $1.3 billion to $9.4 billion (an annual average of 10 percent), and per capita income increased from $3,438 to $15,992.

Between 1970 and 1990, employment levels at SNL increased from 6,440 to 7,536, representing 3 percent of the ROI employment in 1990 (SN DOE, 1991c). Changes in mission requirements have historically led to fluctuations in employment levels over the period. For example, employment decreased to 5,542 in 1975 and increased to 7,051 by 1985. As of September 30, 1992, employment levels at SNL had increased to 8,473. The prepared Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in work force associated with the budget reductions is only estimated at this time. With the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to increase to 8,500 by the year 2000 (DOE, 1993c). In 1992, the total SNL payroll was estimated to be approximately $399 million (SN DOE, 1991c). Under the No Action baseline, the total payroll is projected to be approximately $401 million by the year 2000. The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 380,000 by 2000 and 408,000 by 2020. The unemployment rates for 2000 and 2020 are projected to be 6.0 percent and 5.9 percent, respectively. For the same years, personal income is projected to increase from approximately $14.1 billion to $19.0 billion, an annual average of less than 2 percent. Per capita income is projected to increase from an estimated $21,000 in 2000 to $25,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 58 percent to 589,131. During the same period, the New Mexico population increased 49 percent. The population in the 3-county ROI is projected to increase from an estimated 682,000 in 2000 to 771,000 by 2020, an annual rate of less than 1 percent.

The largest county population increase (262 percent) occurred in Sandoval County between 1970 and 1990, while during the same years, populations in Valencia and Bernalillo counties increased 12 percent and 52 percent, respectively. In the same period, the population in the city of Albuquerque increased 58 percent. Population in Sandoval County is estimated to increase 8 percent between 1990 and 2000 and 12 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Valencia County population is projected to increase 1 percent between 1990 and 2000 and 12 percent between 2000 and 2020, an annual growth rate of less than 1 percent. Population in Bernalillo County is projected to increase approximately 18 percent by 2000 and an additional 13 percent by 2020, an annual growth rate of about 1 percent.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 110 percent from 114,977 to 241,683. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 16 percent by the year 2000 and an additional 13 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase (395 percent) in housing units occurred in Sandoval County, while the smallest increase (45 percent) occurred in Valencia County. The number of housing units in Sandoval County is expected to increase approximately 19 percent by 2000 and an additional 12 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Valencia County is expected to increase about 12 percent by 2000 and an additional 12 percent by 2020, an annual increase of less than 1 percent.

In 1990, homeowner vacancy rates averaged 2 percent in the ROI and ranged from 2 percent in Bernalillo County to 3 percent in Valencia County. The vacancy rates for rental units averaged 10 percent and ranged from about 8 percent in Sandoval County to 15 percent in Valencia County.

Community Infrastructure and Services . The water supply system operated by Albuquerque maintains about 92 percent of the total capacity of the 5 systems identified in the ROI. Albuquerque draws all of its raw water supplies from groundwater and had 1991 average daily demands of 42 percent of its 280 MGD capacity. Albuquerque is projected to experience average daily demands of 44 percent of capacity in 1995 and 47 percent of capacity in 2000.

Albuquerque's wastewater treatment system has a current capacity of 61 MGD, about 90 percent of the combined capacity of the 5 systems identified in the ROI. The 1991 average daily demands on Albuquerque's system were 87 percent of capacity. Albuquerque plans to increase its system capacity to 72 MGD by 1993 and is projected to have average daily demands of 78 percent of capacity in 1995 and 83 percent of capacity in 2000.

Six school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 514 students in the Jemez School District to 86,653 students in the Albuquerque School District. School districts with enrollments of over 1,000 were operating between 80 percent and 100 percent of capacity. School districts in Bernalillo and Sandoval counties were operating, on average, at 74 percent and 100 percent of capacity, respectively. However, current capacities are projected to be exceeded by 1995 and 2000 under the No Action future baseline. The largest increases are expected to occur in the school districts in Sandoval County, where enrollments are projected to exceed current capacities by 159 percent in 1995 and 169 percent in 2000. Smaller increases are expected to occur in the Albuquerque School District in Bernalillo County, where enrollments are projected to exceed the current capacity by 28 percent in 1995 and 39 percent in 2000. Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 18:1, and expenditures averaged $3,192 per pupil. The statewide average pupil-to-teacher ratio was 18:1, and expenditures averaged $3,137 per pupil (NM DEd, 1990).

Twenty hospitals serve the three-county ROI. In 1990, Valencia County hospitals were operating close to capacity, while Bernalillo and Sandoval County hospitals were operating well below capacity (AHA, 1990). In 1990, a total of 1,724 physicians served the ROI. The physician-to-population ratio for the ROI was 2.9:1,000 and ranged from 0.6:1,000 in Valencia County to 3.4:1,000 in Bernalillo County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990, DOC, 1991b).

Five city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the three-county region was in the city of Albuquerque, with 793 sworn officers, or 2.1 sworn officers per 1,000 persons. Other large agencies are in Bernalillo County with 209 sworn officers (0.4 sworn officers per 1,000 persons) and Sandoval County with 26 sworn officers (0.4 sworn officers per 1,000 persons). The average number of sworn officers in the ROI was 1.8 per 1,000 persons (FBI, 1991).

Four fire departments and 1,152 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in the city of Albuquerque (450 firefighters; 1.2 firefighters per 1,000 persons) and in Bernalillo County (390 firefighters; 0.8 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.0 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to SNL is provided by Louisiana Blvd., Wyoming Blvd., Eubank Blvd., Gibson Blvd., and South Valley Rd. via Broadway Blvd.

Estimated traffic along segments providing access to SNL is projected to contribute to differing service level conditions in accordance with population growth. Eubank, Gibson, Louisiana, Wyoming, and, to a lesser extent, Broadway, Boulevards would typically experience traffic congestion, with volumes approaching or exceeding the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be restricted and potential disruptions to traffic flow could be caused by accidents or maintenance activities, resulting in considerable congestion. In addition, estimated truck traffic into SNL for delivery of supplies and removal of wastes would typically average 120 trips per day. However, the additional traffic volumes associated with continued operation of SNL are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to SNL (NM Hwy, 1991a and b).

Other modes of transportation within the ROI include public transportation systems and railways. Public transport to SNL is provided by Sun Tran (SN AED, 1989). Rail service to SNL and KAFB is provided via a spur from the Atchison, Topeka, and Santa Fe Railroad (NM Hwy, 1991c). No navigable waterways exist within the ROI.

The Albuquerque Aviation Department owns and operates the Albuquerque International Airport, located on KAFB. Albuquerque International Airport receives jet air service from both national and local carriers. Numerous smaller private airports are also located throughout the ROI (DOT, 1991).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 385 to 390 new jobs (DOE, 1993d). The analysis presented in table 4.1.5.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 385 new jobs. The estimate of 390 new jobs is 2 percent higher than the 385 new jobs used in the following analysis, and this higher estimate would result in slightly more economic benefits than the 385 new jobs. The construction, modification, and installation of facilities and equipment for the Proposed Action at SNL would require 95 additional employees during peak construction (FDI, 1993). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 385 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions would be filled through donor transfers, new hires, and internal reassignments. In addition to the jobs created directly by the project, another 218 jobs would be created indirectly during peak construction and 555 additional jobs during operations. This direct and indirect employment would lead to in-migration of 70 persons during peak construction and 515 persons during operations. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force.

Under the No Action alternative, the current SNL employment level of 8,473 would be projected to increase to 8,500 by the year 2000, an increase of 27. The addition of 385 full time equivalent jobs at SNL would be realized as a result of the Proposed Action.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.5.7-1. In the year 2000, this project-related population growth from in-migration would represent an increase of less than 1 percent over the projected ROI baseline population of 682,000, and no cities or counties in the ROI would experience population growth greater than 1 percent.

The less than 1-percent change in population during peak construction would create the need for only an estimated 27 additional housing units. For operations in the year 2000, the less than 1-percent change in population would not create a need for additional housing units beyond a 1-percent increase. In past years, housing units have been built at an annual rate of 4 percent. Therefore, the additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

The estimated additional population during peak construction and operations would not affect any community infrastructure and services in the ROI. Existing water and wastewater capacities more than exceed the projected demand. Some existing public education facilities are currently approaching 100 percent of capacity. Although school enrollments will exceed capacities by the years 1995 and 2000 these capacities will be affected only slightly beyond what would naturally occur under the No Action baseline growth because the Proposed Action would not add more than 1 percent to enrollments during construction or operations. Existing health care resources are more than adequate to accommodate the projected population increases during peak construction and operations. Current staffing levels for police and fire services in the ROI are adequate to support the projected population increases, while maintaining current service standards, because none of the cities or counties would grow by more than 1 percent over the No Action baseline. Additional commercial truck traffic into SNL would be negligible relative to historic levels, and this truck traffic would occur during non-peak hours. Impacts to the local transportation network serving SNL would be negligible.

4.1.5.8 Waste Management/Pollution Prevention

Affected Environment. Discussion of the SNL waste management baseline is provided in section 3.2.8.3. Because no TRU wastes are associated with any of the proposed nonnuclear consolidation activities, no further discussion of TRU waste generation and management is presented.

LLW at SNL is generated in both technical and remote test areas as a result of research and development activities. Most of the LLW consists of contaminated equipment and combustible decontamination materials and cleanup debris. All generated LLW is temporarily stored at generator sites or above ground in transportation containers at the TA-III disposal site. All LLW packages are currently onsite pending approval of transport by commercial carriers to the NTS for burial.

Mixed wastes include radioactively contaminated oils and solvents, and radioactively contaminated or activated lead or other heavy metals. Other mixed wastes may be generated as a result of weapons tests. The 6,000 ft^2 Radioactive and Mixed Waste Management Facility will have a centralized packaging and storage function for LLW and mixed waste. Mixed waste will be stored at the facility until accepted for disposal at the NTS or Waste Isolation Pilot Plant site. Processing at the Radioactive and Mixed Waste Management Facility will include activities required to comply with the waste acceptance criteria and Federal regulations. Wastes are stored at this facility until suitable treatment and disposal facilities are available for the disposal of these wastes in accordance with the provisions of RCRA. SNL is aiding DOE in developing a compliance agreement to be negotiated with the EPA, Region VI Field Office. DOE and SNL are assessing their responsibilities as outlined in the Federal Facilities Compliance Act and may enter into similar agreements with the State of New Mexico.

Hazardous/toxic chemical wastes are generated at SNL by the numerous research and development activities conducted throughout the facilities. The Hazardous Waste Management Facility can store 70,000 gallons of liquid and solid hazardous wastes at one time. There are no active onsite disposal facilities for hazardous/toxic wastes at SNL. All RCRA-regulated wastes are packaged, manifested, and shipped offsite by DOT-registered transporters for disposal at RCRA-permitted treatment and disposal facilities.

SNL contains over 15 miles of sewer lines interconnected with those of KAFB. Pretreated industrial wastewater effluent and sanitary sewage are discharged to the city of Albuquerque sewer system in compliance with NPDES permit discharge limits. Solid sanitary waste is collected and taken to the KAFB sanitary landfill on a regular basis.

At SNL, the initial stages of waste minimization and pollution prevention have been implemented using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. A Waste Minimization and Pollution Prevention Awareness Plan was completed in December 1991. In 1993, process waste assessments on all processes at SNL are expected to be completed, and formal waste minimization opportunity assessments will be initiated. Halogenated solvent substitution is currently being evaluated for a number of research processes.

Environmental Consequences. Any equipment to be moved to SNL from another site as a result of the Proposed Action would be decontaminated prior to shipment.

Construction debris and scrap metals would result from demolition of existing interior utilities and partitions, and would be disposed of as sanitary waste, or sold/recycled as scrap. No radioactive contamination is present, only chemical residues resulting from the use of mineral acids in the facility. Debris from modifying Building 870 may contain as much as 10 yd of concrete and 50 tons of steel contaminated by previous operations. These materials would be managed and disposed of as hazardous waste, packaged and manifested in accordance with all applicable regulatory requirements, and shipped by a DOT-registered transporter to an offsite RCRA-permitted disposal facility. Building 870 may also generate 120 yd of asbestos. Buildings 841, 860, 878, and 894 may generate 10, 10, 5, and 2 yd of asbestos, respectively. Asbestos waste would consist primarily of floor tile, pipe insulation, and ceiling tile, and would be disposed of in an approved asbestos landfill in accordance with the provisions of TSCA.

Soil excavation within Building 870 would occur as a result of removing portions of existing foundations and concrete footings and constructing new footings and foundations to support the new second-story addition. The soils in the potential excavation area are suspected to be contaminated; however, the characteristics and extent of the contamination and the volume of soil needing excavation and possible treatment and disposal is unknown at this time.

Soil excavation would also be required for the replacement of sanitary and industrial drains within the building. As required, the soils would be analyzed for possible contamination before disposal. Uncontaminated soils would be used as fill or disposed of in a local sanitary landfill if considered unsuitable for backfill. If soils are found to be contaminated, the location would be referred to the SNL Environmental Restoration Program for subsequent management. Management of potentially contaminated soil would involve an area inspection, characterization, and evaluation of cleanup alternatives (if necessary). Cleanup action and compliance follow-up would be conducted as necessary to remove and dispose of contaminated soils. Remediation of contaminated areas would be conducted according to accepted guidelines and procedures applicable to the type and extent of contamination. Although remediation activities may have additional project cost implications, no adverse affects to the SNL waste management program are expected.

Wastes generated as a result of the relocated functions are outlined in appendix B, section B.5. Operation wastes from the manufacture of neutron generators may be in the form of liquids, gases, or solids. Effluent wastewaters in the form of liquid sanitary sewage, process and industrial wastewater, and radioactive wastewater (tritiated water) would result from the manufacture of the neutron generators. No increase in sanitary sewage is expected from the operation of the thermal battery facility because no additional increase in personnel is required. Existing sanitary tie-ins and the chemical drain system would be utilized because no increase in chemical wastewater volume is expected from the battery facility.

Sanitary sewage would be sent directly to KAFB sanitary sewer system and then to the city of Albuquerque sanitary sewer to be treated at the municipal wastewater treatment facility. The estimated sanitary sewage flow attributed to the Proposed Action is 35,000 GPD (12.25 MGY based on 350 days per year). The city of Albuquerque sanitary sewer and municipal wastewater treatment plant has adequate capacity to handle the estimated (less than 1-percent increase) sanitary sewage flow. However, the 35,000 GPD increase represents a change in flow characteristics for one of the existing SNL permits. Permit modification will require routine review and approval by the city of Albuquerque.

A chemical drain system in Building 870 serves all nonradioactive chemical and industrial wastewater streams in the building. The chemical drain system would utilize gravity drainage through double-walled pipe in accessible concrete trenches, or utilize the gravity system to lined collection sumps from which it would be pumped through an above ground piping system. The chemical drain system would transport process and industrial wastewater to the chemical wastewater collection/neutralization facility outside the building. This facility neutralizes the acidic or basic wastewater to standards meeting or exceeding the city of Albuquerque's Wastewater Utility Division, Sewer Use and Wastewater Control Ordinance. Chemical wastewater volume due to the Proposed Action is estimated at 70,000 GPD (24.5 MGY based on 350 days per year).

There are no low-level or mixed wastes generated from thermal battery production or milliwatt heat source surveillance. Approximately 1,252 gal/yr of additional liquid hazardous waste (less than 1-percent) and 209 ft 3 /yr of additional solid hazardous wastes (less than 5 percent) from the consolidation functions would be generated at SNL. Waste would be accumulated in local accumulation areas and then transferred to the existing onsite permitted hazardous waste storage area. The hazardous wastes from the Thermal Battery Facility would require the Chemical and Waste Storage Building to manage an additional four to five 55-gallon drums per month. The Chemical and Waste Storage Building has a maximum capacity of 1,090 drums. Because hazardous wastes are periodically shipped offsite, the consolidation would not adversely affect SNL hazardous waste management operations.

It was estimated that less than 100 GPY of wastewater, potentially contaminated with tritium, would be generated by neutron generator operations at SNL. These wastes would be collected at the source in drums. This water would be treated by solidification or an approved alternate technology and disposed of at an approved site. The 294 ft 3 of additional solid LLW represents a less than 13-percent increase.

The cap assemblies operation proposed for transfer to SNL would result in the generation of a small quantity of solid LLW scrap from machining operations. This scrap material may possibly exhibit the characteristic of toxicity, in which case it would be classified as a mixed waste. No liquid radioactive or liquid mixed waste is expected to be generated. The expected generation rate of the solid LLW scrap is approximately 18 grams per year. The scrap contains minute quantities of radioactive and hazardous substances. In an 18 gram quantity of this solid waste, the radioactive component, which has a relatively low specific activity, has an estimated weight of 100 milligrams (mg) and the hazardous component, which is a compound of arsenic, has an estimated weight of 18 mg. It is unlikely that this waste material exhibits the characteristic of toxicity, as described in 40 CFR 261.24 (which is necessary for it to be classified as a mixed waste), because the arsenic compound is found in the scrap material in an insoluble form (the radioactive constituent is also bound). However, the toxicity characteristic leaching procedure (TCLP) must be performed in accordance with appendix II of 40 CFR 261 to make this determination. If the solid material is determined to be a mixed waste, treatment of this waste, if necessary to eliminate the characteristic of toxicity, would have to be identified prior to generation or it would have to be included in a Federal

Facility Compliance Agreement, consistent with the Federal Facility Compliance Act .

Each of the functions transferring to SNL from Mound and Pinellas have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities and reduce environmental impacts. Once the transfer of the functions occurs, SNL would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site specific reduction goals, and strategies for preventing or minimizing generation of pollutants.

The additional waste streams generated as a result of the increases in nonnuclear manufacturing activities at SNL would be well within the storage, treatment, and disposal capability of existing waste management facilities.

4.1.5.9 Human Health: Facility Operations and Accidents

General discussions of impacts to the public and the environment, worker exposures, and accidents are presented in section 4.1. Information specific to SNL is presented below.

Affected Environment. As discussed in the Air and Water Resources sections (§4.1.5.2 and 4.1.5.3, respectively), the chemical pollutant levels from SNL operations to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Exposures to members of the public associated with radiological releases are also well below applicable permit, regulatory, and DOE operational requirements (SNL, 1991). A review of the recent SNL annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future.

Environmental Consequences. The Air and Water Resources sections discuss the chemical releases associated with relocating the neutron generators, cap assemblies, thermal batteries, and special products functions identified in section 3.3.5 to SNL. As shown, the cumulative impacts resulting from existing releases and the release of chemicals associated with relocating these functions at SNL are below applicable permit, regulatory, and DOE operational requirements.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated to remove the toxicants before combining with sanitary wastewater and discharge to the city of Albuquerque wastewater treatment plant. Furthermore, all stormwater releases of the pollutants are below NPDES limits and surface water quality is not adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For normal operations at SNL, all possible HAPs were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, chromium trioxide, methylene chloride, nickel chloride, toluene, TCA, and TCE. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk which is calculated only for those chemicals identified as carcinogens. The cumulative Hazard Indexes for SNL (see table F-18a) were 0.0479 for onsite (worker effects) and 0.0024 at the site boundary (effect on the public) on an annual basis and the incremental changes in Hazard Indexes due to the Proposed Action were 0.046 for onsite and 0.0023 at the site boundary. Therefore, the Proposed Action cumulative Hazard Indexes at the site are well below a value of 1.0.

Two of the chemicals identified, methylene chloride and TCE, are considered to be carcinogens and the cancer risk to individuals for each was calculated. The combined risk for the carcinogens was calculated as 6.0×10^{-6} onsite (worker) and 3.0×10^{-7} at the site boundary (public) (see table F-18b). The incremental change due to the Proposed Action contributed the entire risk; however, the concentrations of methylene chloride and TCE did not include mitigation controls on the emissions and a single source term was used. Therefore, the excess cancer risk to workers is a conservative estimate. Worker exposure to these solvents will be minimized through a combination of engineering and administrative controls. Control options under consideration include the use of fume hoods, glove boxes, substitution with less toxic solvents, process changes, and elimination of unnecessary solvent cleaning steps. These controls ensure that no worker is exposed beyond the PELs as established by OSHA.

A series of engineering and administrative controls will be implemented at SNL to ensure that worker exposures to these chemicals are kept As-Low-As-Reasonably-Achievable. No worker will be exposed above the PELs established by OSHA. Releases of radioactive materials from SNL result in a total maximum individual annual dose on the public of 0.002 mrem effective dose equivalent (SNL, 1991). The resulting risk of potential fatal cancers associated with 1 year of operations would be 8.9×10^{-10} to that individual. The dose increment associated with the increase in tritium emissions would be 0.022 mrem effective dose equivalent and would result in an increased risk of 9.8×10^{-9} potential fatal cancers from 1 year of operation. Risks less than 10^{-6} are considered acceptable by EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population.

The average doses to workers at SNL associated with tritium-handling activities would be less than those at SRS since the tritium inventories and level of tritium-handling activities at SNL would be much less than those at SRS. Based on worker dose experience at SRS (see section 4.1.2.9), the average dose to workers at SNL is expected to result in incremental and cumulative doses of less than 0.011 and 0.281 mrem, respectively. This would result in an incremental and cumulative cancer risk of less than 4.9×10^{-9} and 1.3×10^{-7}, respectively.

In summary, these analyses show that a small excess cancer risk to workers is possible from the normal release of hazardous chemicals/chemical pollutants at SNL as a result of the Proposed Action. These impacts would be mitigated using a combination of engineering and administrative controls.

Accidents associated with the neutron generators and activities similar to the cap assemblies, thermal batteries, and special products functions at SNL have been analyzed previously and are documented in an EA (SN DOE, 1992a). The accidents analyzed included the release of tritium. Both natural and man-made external initiating events were considered (e.g., human errors, fires, explosions, and airplane crashes). Safety procedures and requirements have been developed and implemented for these activities at SNL. These procedures and requirements establish the safety conditions under which operations must be performed. Additionally, due to the projected reduction in workloads, operations and inventories of neutron generators, cap assemblies, thermal batteries, and special products functions currently at SNL would be reduced. Therefore, even including the operations and inventories that would be moved from other DOE sites to SNL, operations and inventories would be below those that currently exist at SNL.

Currently, SNL operations consume 1,152,000 ft^3 of hydrogen per year. SNL's current storage capacity for hydrogen is 76,000 ft^3. Therefore, storage is recharged approximately 15 times per year to meet the current demand for hydrogen.

The functions proposed to be relocated to SNL would result in the consumption of an additional 2,118,000 ft^3 of hydrogen per year. No new storage capacity for hydrogen would be constructed as part of the Proposed Action. While the increased demand for hydrogen would result in a higher recharge rate, the storage and distribution systems and practices would not change as a result of the Proposed Action.

As discussed in section 3.3.5, the neutron generators, cap assemblies, thermal batteries, and special products functions involve operations and use of chemicals that are the same as or similar to those currently being performed and used at SNL. Even if there were no projected reduction in workloads, the annual usage of chemicals that are of concern because of their hazardous nature, methylene chloride and TCE, would increase by only 9 and 10 percent, respectively. Therefore, the current accident profile at SNL would not change as a result of relocating these functions to SNL.

4.1.6 Closeout Complex Missions at Mound

A detailed discussion of Mound's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.2. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at Mound and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on the closeout of Complex missions at Mound, is also provided in the chapter 4 introduction and in section 4.1.

4.1.6.1 Land Resources

Affected Environment. Mound is located in Miamisburg, OH, approximately 10 miles south-southwest of Dayton (figure 3.2.2-1). Generalized land uses at Mound and in the vicinity are shown in figure 4.1.6.1-1. Residential distribution of Mound employees is discussed in section 4.1.6.7.

Mound is subdivided into a 183-acre northern half and a 123-acre southern half. The northern half consists of a heavily industrialized area with a high density of 120 buildings, an internal road network and parking lots, a government-owned railroad spur, a spoils area, and a small testing ground and surrounding buffer zone. The Main Hill Area, SM/PP Hill Area, and the Valley Area are located in the northern half (figure 3.4.1-2). The southern half, called the "New Property Area," is a former farm, which currently consists of wooded areas, old fields, and a parking lot.

Mound is located within the center of the urban service area defined by the Comprehensive Development Plan for Montgomery County (Montgomery County, 1988). County policies encourage development inside the urban service area boundaries, but discourage development outside them; the intent is to preserve prime farmland . There are no prime farmlands on Mound. Mound, which is zoned industrial, is located on the southwest corner of developed Miamisburg (Miamisburg, 1991).

Residential use adjacent to the Mound site is generally low density. The closest residence is 46 feet east of the Mound boundary. Much of the adjacent land use consists of the Mound Golf Course and Mound Park (both municipal facilities). Mound does not contain any public recreation facilities.

Construction and operations of the DOE facilities have heavily disturbed the landscape character of the site. Development on the site has mainly occurred on the northern portion. Most of the buildings are one to two stories; the tallest is approximately five stories. The most visually dominant features on the site include six stacks and two water tanks. The facilities, including the stacks and water tanks, are brightly lit at night and are highly visible. The majority of the development at Mound is on one of the highest points (940+ feet elevation) along this reach of the Great Miami River. Substantial portions of Mound are visible from 3 to 4 miles away, especially from the north and east. Views from the south are much more limited. Views from the west are limited by the high ridgeline that forms the west side of the river valley, generally 1 to 1.5 miles from the plant. Viewpoints impacted by DOE facilities include portions of downtown Miamisburg, Central Avenue, Miamisburg Road, Lower Miamisburg Road, Riverview Avenue, Miamisburg Mound State Memorial (immediately adjacent to the east boundary), Mound Golf Course, Hill Grove Cemetery, and various residential areas. The developed portion of the site is consistent with a Class 5 VRM designation.

Environmental Consequences. Land use at Mound would not change during the closeout period; therefore, no onsite land use impacts are expected. Future use of Mound surplus facilities would be evaluated in the transition process.

Closeout of Complex missions at Mound would not adversely impact the comprehensive planning and zoning of the city of Miamisburg, Montgomery County, and surrounding jurisdictions. A review of socioeconomic data in section 4.1.6.7 indicates no adverse impacts to regional recreational resources due to changes in employment at the plant. There are no construction or demolition activities planned as part of the closeout; therefore, the physical appearance of Mound would remain essentially unchanged and the VRM classification of the existing landscape would not be affected.

4.1.6.2 Air Quality and Acoustics

Affected Environment. The climate at Mound and in the surrounding region is characterized as being humid, continental, with warm summers, moderately cold winters, and moderate annual precipitation evenly distributed throughout the year (Trewartha, 1954). The annual average temperature in the area, as measured at the Dayton NWS station, is 51.9 "F; temperatures vary from an average daily minimum of 18.8 "F in January to an average daily maximum of 84.9 "F in July (NOAA, 1991a). Annual average precipitation is 34 inches. About 20 inches of snowfall are typically recorded per year. Maximum monthly precipitation measured at the Dayton NWS station ranged from 5.69 inches in September to 10.89 inches in June.

Ambient Air Quality . Mound is located within the Metropolitan Dayton Intrastate AQCR. The region is under the authority of the Regional Air Pollution Control Agency (RAPCA), which conducts a program to monitor ambient levels of criteria pollutants. This AQCR is designated as attainment by the EPA with respect to SO_2 , NO_2 , and CO (40 CFR 81.336). However, several counties within the AQCR, have been classified as nonattainment for TSP and O_3 . The NAAQS and Ohio state ambient air quality standards for criteria pollutants, which are the same, are listed in table D2.1.1-1.

The Ohio EPA has standards for existing pollutants regulated by NESHAP. As of July 1991, the Ohio EPA has not promulgated standards for the additional 189 HAPs specified in the CAA. However, the Ohio EPA uses the American Conference of Governmental Industrial Hygienists list of pollutant TLV. The HAPs/toxics described in this section are those currently used at Mound or those anticipated to be used under the Mound consolidation alternative.

Ambient air quality near Mound is monitored by the RAPCA monitoring program and that of the Southwestern Ohio Air Pollution Control Agency (MD RAPCA, 1987-1991). The data for 1987 through 1991 are presented in table D2.1.2-1.

The principal sources of criteria air pollutants at Mound are the two boilers associated with the steam plant and the Keystone heat exchanger. Other sources include fugitive particulates from process emissions, emissions from laboratory operations, and vehicular emissions. Predominant HAP/toxic emissions from Mound include acetone and TCA. The emission inventories for Mound are presented in tables D2.1.2-2 and D2.1.2-3.

Normal operations in 1990 resulted in the emission of radioactive materials at Mound. These emissions included 1,823 curies of tritium (MD DOE, 1991a). The health effects of these emissions are discussed in section 4.1.6.9.

The air quality under ambient and No Action conditions at Mound is shown in table 4.1.6.2-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. Baseline air quality concentrations from Mound do not exceed, and are not expected to exceed, any applicable guidelines or regulations.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions . The major noise sources at Mound include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, vehicles, and explosive detonation). No sound-level measurements have been made around Mound. At the site boundary, away from most of these industrial facilities, noise from these sources would be barely distinguishable from background noise levels. The acoustic environment along the Mound site boundary is assumed to be that of a suburban or urban location with typical DNL in the range of 53 to 62 dBA (EPA, 1974). Sound levels in the more rural areas south of the plant may be more typical of a rural area with typical DNL in the range of 35 to 50 dBA. Some noise from explosives detonation can occasionally be heard at the western site boundary. The primary source of noise at the site boundary and in nearby residential areas is traffic. During peak traffic periods, vehicles traveling to and from Mound are a major contributor to traffic noise in the residential areas near the plant.

The State of Ohio has not established specific numerical environmental noise standards applicable to Mound. The city of Miamisburg has set maximum sound-level limits for residential, commercial, and industrial property boundaries as described in appendix D, section D2.2.2. Maximum sound levels at a residential property boundary are limited to 60 dBA during the hours of 7 a.m. to 9 p.m. and 50 dBA during the hours of 9 p.m. to 7 a.m.

Although sound levels at nearby residences may exceed the city of Miamisburg noise limits and the EPA guideline level for residential areas, they result primarily from traffic noise and not noise from Mound facilities.

Environmental Consequences.

Air Quality . Mission closeout of Complex missions at Mound would reduce emissions of criteria, hazardous and toxic air pollutants. The air quality in the vicinity of Mound would likely improve with the reduction of pollutant sources (table 4.1.6.2-1). Closeout of Complex missions would also reduce emissions of tritium.

Acoustic Conditions . Mission closeout would reduce staff levels and, therefore, traffic volumes on nearby streets in Miamisburg. Some minor reduction in traffic noise levels would also be expected. A minor reduction in sound levels in the community is expected to result from elimination of noise sources on the site.

4.1.6.3 Water Resources

Affected Environment. This section describes the surface water and groundwater resources at Mound.

Surface Water . The Great Miami River borders Mound to the west and is the predominant hydrological feature in the region (figure 3.2.2-1 and 3.2.2-2). The river is classified for recreation, agriculture, and water supply uses. There are no natural surface water bodies onsite (MD DOE, 1979), although there is a drainage basin in a valley between the two highest areas of the facility. The basin is small with relatively steep slopes, so runoff is rapid and poses no threat to structures. The Great Miami River has an average flow of 2,436 ft^3/s for the 45 years of record (MD DOE, 1987a). In 1990, the flow in the Great Miami River averaged 3,369 ft^3/s, with a minimum of 489 ft^3/s and a maximum of 23,385 ft^3/s (MD DOE, 1991a).

As part of the flood mitigation program, a flood control system was constructed along the Great Miami River and its tributaries. This system, managed by the Miami Conservancy District, includes five dams (four are located above Miamisburg). All existing facilities are located 710 feet above mean sea level (MSL) and the 500-year floodplain is estimated at 703.1 feet above MSL. Levees constructed along the banks of the Great Miami River near the Mound facility have crest elevations ranging from 705 to 706.5 feet above MSL (DOE, 1988).

The site has three principal wastewater collection systems: sanitary wastewater, stormwater (which receives significant amounts of noncontact cooling water), and radioactive wastewater. Each system leads to a treatment unit before ultimately discharging to the Great Miami River. The units are the sanitary wastewater treatment plant, the stormwater retention pond, and the radioactive waste treatment plant. Existing sanitary wastewater generation is estimated at approximately 47 MGY (table 3.2.2-2). Effluent streams are monitored to ensure no undetected discharges occur (MD DOE, 1987a).

The effluents from the sanitary wastewater treatment plant and the radioactive waste treatment plant are combined into one pipeline just outside Mound and discharged to the Great Miami River (MD DOE, 1987a). Stormwater discharges through a culvert into the abandoned Miami-Erie Canal. It then empties into a drainage ditch and enters the river 1 mile south of where the wastewater pipeline discharges. No municipal system in the Great Miami River basin uses surface water for a public water supply below the Mound discharges, although surface waters are used by manufacturing and power companies along the basin for processing and heat exchange (MD DOE, 1979).

Surface Water Quality . Routine surface water monitoring, in accordance with EPA guidelines and the requirements of the NPDES permit, consists of sample collection at various discharge points (outfalls) within the facility and along the Great Miami River. The effluent locations have been sampled for total toxic organics, NPDES-required nonradiological parameters, and radionuclides. The surface waters have been analyzed for radiological parameters only (MD DOE, 1991a).

In 1990, 813 effluent samples were collected for analysis. Four occasions of noncompliance with permit limits were detected, all involving the biochemical oxygen demand of the wastewater treatment plant effluent. The exceedances occurred in January and February 1990, and had no measurable impact on the water quality of the Great Miami River (MD DOE, 1991a). There were no parameters that exceeded water quality criteria.

In 1990, river water sampling locations for radionuclides were selected to be representative of water after mixing with the Mound effluents. Water samples were analyzed regularly for tritium, plutonium-238, uranium-233/234, and uranium-238. The 1990 surface water monitoring results for downstream locations on the Great Miami River are presented in table 4.1.6.3-1 (MD DOE, 1991a). There were no parameters that exceeded water quality criteria.

Groundwater . There are three aquifer units in the area, including outwash, glacial till, and limestone. The most important is the outwash aquifer unit, which lies at a depth of 5 to 15 feet below the ground. It consists of 200 feet of fine sand, coarse sand, gravel, and cobbles that were deposited by streams. The glacial till aquifer unit lies at a depth of 20 to 40 feet below the ground surface. It consists of 30 feet of poorly sorted silt, sand, and gravel in a clay matrix. The number of till zones and their lateral extents vary, and the thickness of the zones range from 10 to 50 feet. The bedrock aquifer unit lies at a depth greater than 50 feet below the ground surface. It consists of 50 feet of interbedded limestone and shale. These rocks are exposed east of Mound.

The aquifers that lie beneath the plant are considered Class II, current and potential sources of drinking water and waters having other beneficial uses.

Groundwater flow is toward the central valley area from both the east and west, then southwest down the valley. The general hydraulic gradient in the outwash aquifer under the valley floor is southwest at 5 to 10 feet per mile. The groundwater level varies seasonally and yearly, and ranges from 681 to 696 feet. The groundwater table has declined under conditions of heavy use and drought but recovers when conditions reverse. Mound's water supply is taken from three onsite wells (MD DOE, 1987b).

Groundwater Quality . The water quality of the aquifers near Mound and in the region as a whole is good. Scattered areas may contain objectionable concentrations of iron and manganese.

Water samples are periodically collected from community supplies in the surrounding area, private wells, and Mound's onsite wells. The wells onsite at Mound are analyzed for plutonium-238, uranium-233/234,-238, and tritium (table 4.1.6.3-2). Analyses show that plutonium concentration levels in all cases are well below DOE and EPA limits. Samples from some locations have been analyzed for uranium; concentrations and isotopic ratios are typical of naturally occurring background levels in the shales and other rocks of the area. Tritium levels are within EPA maximum contaminant levels. Nonradioactive pollutant levels are also within water quality criteria.

Groundwater Use . The lower Great Miami River Valley is an important user of groundwater. The many supply wells in the region furnish approximately 97 percent of the regional water supply. The wells range in yield from a few to 3,000 gallons per minute (gpm). The most important production is from the thicker, cleaner portions of the outwash aquifer; nearly all municipal supplies are from this source. The upland till areas supply water to small domestic and farm units.

The major regional use of groundwater is municipal; other uses include industrial and noncommunity domestic; there is no agricultural use. Mound has three production wells onsite that supply mainly drinking and process water from the glacial till aquifer. Current groundwater use is approximately 0.5 MGD (table 3.2.2-3).

Groundwater Rights . Groundwater rights in Ohio are held by the landowner. Mound has the right to develop its own wells and withdraw water in quantities sufficient to meet its needs.

Environmental Consequences. Closeout activities for Mound would require no new construction and all current DP operations would cease.

Surface Water . Because existing facilities are not located in the 500-year floodplain, closeout would not affect floodplain areas.

Because no surface water is used at Mound and wastewater discharges would be reduced, no adverse impacts would be anticipated to water flow rates in the Great Miami River.

Surface Water Quality . Because surface water discharges would be reduced, there would be no adverse impacts on water quality from closeout activities.

Groundwater . By closing out Complex missions at Mound, a reduction of demand for local water supply would occur.

Groundwater Quality . Spill protection systems and plans exist to contain and minimize effects of releases of hazardous substances during closeout activities. Given normal safeguards and precautions, no adverse impacts to groundwater quality are expected to result from transition activities associated with closeout of Mound Complex missions.

4.1.6.4 Geology and Soils

Affected Environment. Mound is located in the central stable interior. There are no capable faults at or in the vicinity of Mound. The closest capable fault is over 50 miles away and has not been active for over 60 years. The Mound area is in Seismic Zone 1 (ICBO, 1991). Historic earthquakes, including the New Madrid shocks of the 19th century, have resulted in a MMI of V or less in the Miamisburg area (Nuttli, 1990). There are no geologic concerns that would affect operations at Mound. Slopes are stable and seismic hazards pose little or no threat to Mound.

Soils that underlie Mound belong to the Milton-Ritchey-Millsdale association and are typically silt and clay loams formed on glacial till over limestone (MD USDA, 1976). Many of these soils rest on slopes of 2 to 6 percent, and some soils lie on slopes exceeding 25 percent. Miamian silt loams (2 to 6 percent slopes) and Milton silt loams (2 to 6 percent slopes) are designated prime farmland.

Most soils at Mound are moderately to severely eroded and are unsuitable for cultivation or have severe limitations because of the risk of erosion.

Environmental Consequences. The proposed closeout of Complex missions at Mound would not result in adverse impacts on the geologic features of the area, nor would the geology have any impacts on mission closeout activities at the plant.

However, the proposed mission closeout could result in minor beneficial impacts on the soils of the area. Hazardous, radioactive, and mixed waste sources would be eliminated from the plant, thus decreasing future soil contamination potential.

4.1.6.5 Biotic Resources

Affected Environment. Terrestrial habitats at Mound are generally limited to the southwestern portion of the plant and to several slopes separating developed areas. The western half of the site supports a matrix of mowed grass, deciduous forest, and scrub-shrub communities in various stages of succession. Land surrounding the site is urbanized or under cultivation (section 4.1.6.1).

Wetland boundaries have not been delineated at the plant site. Wetlands at the Mound site are likely limited to a small area of seeps, narrow intermittent stream channels, some drainage ditches, and man-made ponds (MD DOE, 1991a).

No perennial streams occur on the site. Aquatic species found in the Great Miami River, located approximately one-half mile from the site, are listed in an EIS prepared earlier by the DOE (MD DOE, 1979). Recreational fishing is common in the river. Wastewater and stormwater are treated prior to discharge to the Great Miami River. Aquatic habitats in the vicinity of Mound are not significantly affected by Mound operations (MD DOE, 1987a).

The only FederallyÄlisted threatened or endangered species potentially occurring in the vicinity of Mound is the Indiana Bat (Myotis sodalis) (a Federally- and state-listed endangered species). Although no bats have been officially recorded on the site, the Indiana Bat is known to occur in the surrounding area (MD FWS, 1991).   Suitable habitat is thought to include riparian areas and nearby woodlots, especially those with dead trees or trees with peeling bark, such as the shagbark hickory (Carya illinoisensis) (MD DOE, 1991b).

Environmental Consequences. Closeout of Complex missions at Mound under the Proposed Action would not adversely affect biotic resources. Closeout of these missions would result in a reduction of existing operations impacts to natural habitats on and surrounding the site.

4.1.6.6 Cultural Resources

Affected Environment. The prehistoric chronology in western Ohio consists of five time periods: Paleoindian (10,000-8000 B.C.), Archaic (8000-1000 B.C.), Woodland (1000 B.C.-A.D. 700), Mississippian (A.D. 700-1600), and Protohistoric (A.D. 1600-1795) (MD Riordan, 1987; MD Willey, 1966). Site types identified in the area of Mound include burial mounds, villages, campsites, and limited activity sites. The Miamisburg Mound, an Adena burial mound, is located 400 feet east-southeast of Mound in the Miamisburg Mound State Memorial Park. This mound, a symmetrical conical earthwork, is one of the two largest Adena mounds recorded and is listed on the NRHP. About 62 percent of the Mound area has been developed or disturbed. In 1987, all undeveloped sections in the plant area were surveyed for cultural resources or assessed for the probability of containing sites (MD Riordan, 1987). Only one isolated artifact was recorded during the study.

The history of the region has been previously documented (MD Anson, 1970; MD Riordan, 1987; MD Kneeper, 1989). Archaeological remains of an 1865-1914 homestead were recorded on Mound property during the 1987 cultural resources survey (MD Riordan, 1987). The site lacked physical integrity and was recommended as not eligible for the NRHP; the Ohio SHPO concurred.

Prior to World War II, the Mound area was primarily used for agriculture. In 1943, the Manhattan Project developed the Dayton Project at three locations in Dayton, OH. Expansion of this project soon required the construction of facilities at Mound in 1946; the plant became operational in 1949 (History Associates, 1987). The buildings and facilities at Mound are not regarded as exhibiting architectural integrity, nor are they representative of a particular style. It is unlikely that their documentation would contribute to the broad historical context of nuclear production. Therefore, the existing facilities are not likely to be considered eligible for the NRHP.

Native American groups who occupied or traversed the area include the Mosopelea, Shawnee, Miami, and Huron or Wyandot (MD Anson, 1970; MD Howard, 1981; MD Riordan, 1987). Site types which may be of concern to Native American groups include villages, burials, and cemeteries.

Environmental Consequences. The closeout of Complex missions at Mound does not include ground disturbance or building modifications and, therefore, would not affect cultural resources.

4.1.6.7 Socioeconomics and

Affected Environment. The discussion of socioeconomics and community services at Mound is based on an ROI where 88 percent of Mound employees lived in 1991. The ROI includes Butler (9 percent), Montgomery (65 percent), and Warren (14 percent) counties in Ohio. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Carlisle (2 percent), Centerville (10 percent), Dayton (18 percent), Germantown (2 percent), Miamisburg (15 percent), and Middletown (6 percent) (see figure 3.2.2-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.6-1 through E3.6-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy.   The civilian labor force in the ROI grew 27 percent, increasing from 380,253 in 1970 to 481,700 in 1990. Total employment increased from 360,836 to 456,100 between 1970 and 1990, an annual growth rate of about 1 percent. The unemployment rates for 1970 and 1990 were 5.1 percent and 5.3 percent, respectively. For the same years, personal income increased from approximately $3.8 billion to $16.6 billion (an annual average of 8 percent), and per capita income increased from $4,132 to $16,947.

Mound is located within the limits of the city of Miamisburg, which imposes a local income tax on all employees who work in Miamisburg, regardless of their place of residence. In 1992, the city's income tax collections totaled $7.5 million, of which almost $1.6 million (about 21 percent of the total) was contributed by 2,230 Mound employees. The city's total receipts in 1992 were $32.5 million, which includes beginning year balances and internal transfers. Without these transfers, total actual revenue in 1992 would be about $21.1 million. The total income tax collections represent 35 percent of these total actual revenues, and the Mound employees' contribution accounted for about 7 percent.

The importance of the local income tax for Miamisburg is largely due to the city's reliance on these revenues for the General Fund (almost $8.7 million), which accounts for approximately half of the total budget. Almost $4.8 million (66 percent) of the total income tax revenue accounts for 55 percent of the General Fund. Eighty-five percent of the Mound employee total income tax receipts is dedicated to the General Fund. The Mound employees' portion of the income tax revenue represents almost 16 percent of the General Fund (Miamisburg, 1993). General property taxes are the second major source of revenue, accounting for about 10 to 15 percent of the General Fund, while the balance comes from a variety of taxes, fines and forfeitures, and licenses and permits.

Between 1970 and 1990, employment at Mound increased from 1,875 to 2,138, representing less than 1 percent of the ROI employment in 1990 (MD EG&G, 1991b). Changes in mission requirements have historically led to fluctuations in employment levels over the period. For example, employment rose to 2,398 by 1985. As of September 30, 1992, employment at Mound had decreased to 1,719. The proposed Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in workforce associated with the budget reductions is only estimated at this time. Under the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to decrease to 1,600 by the year 2000 (DOE, 1993c). In 1992, the total Mound payroll was estimated to be more than $48.4 million (MD EG&G, 1991b). Under the No Action baseline, the total payroll would be projected to be approximately $46 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 521,680 by 2000 and 523,780 by 2020. The unemployment rates for 2000 and 2020 are both projected to be 5.6 percent. For the same years, personal income is projected to increase from approximately $22.3 billion to $27.9 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $22,000 in 2000 to $26,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 7 percent to 979,197. During the same period, the Ohio population increased 2 percent. The population in the three-county ROI is projected to increase from an estimated 1,009,000 in 2000 to 1,084,000 by 2020, at an annual rate of less than 1 percent.

The largest county population increase (34 percent) occurred in Warren County between 1970 and 1990, while during the same years, population in Montgomery County declined 5 percent. Population in Warren County is estimated to increase 2 percent between 1990 and 2000 and 8 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Montgomery County population is projected to increase approximately 4 percent between 1990 and 2000 and an additional 7 percent between 2000 and 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, Centerville had the greatest increase in city population (104 percent) in the ROI. For the same years, the Carlisle, Miamisburg, and Germantown populations increased 28 percent, 21 percent, and 20 percent, respectively, while the Dayton and Middletown populations decreased 25 percent and 6 percent, respectively.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 35 percent from 290,740 to 391,809. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 3 percent by the year 2000 and an additional 7 percent by 2020, an annual increase of less than 1 percent.

Between 1970 and 1990, the largest increase in housing units (69 percent) occurred in Warren County, while the smallest increase (22 percent) occurred in Montgomery County. The number of housing units in Warren County is expected to increase approximately 14 percent by 2000 and an additional 8 percent by 2020, an annual increase of less than 1 percent. The demand for housing units in Montgomery County is expected to decrease by 1 percent by 2000 and increase about 7 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 1 percent in the ROI and ranged from approximately 1 percent in Warren County to 2 percent in Butler County. The vacancy rates for rental units averaged 8 percent and ranged from 6 percent in Warren County to 8 percent in Butler and Montgomery counties.

Community Infrastructure and Services. The water supply systems operated by Dayton, Miamisburg, West Carrollton, Germantown, Hamilton, Middletown, Franklin, and Warren County maintain about 96 percent of the total capacity of the 10 systems identified in the ROI. All of these systems draw their raw water supplies from groundwater.

Dayton (192 MGD capacity), Miamisburg (4.3 MGD capacity), West Carrollton (3.6 MGD capacity), and Germantown (1.3 MGD capacity) all operate systems in Montgomery County and had 1991 average daily demands of 45 percent, 49 percent, 38 percent, and 32 percent of capacity, respectively. The Franklin (4.7 MGD capacity) and Warren County (4.5 MGD capacity) systems in Warren County had 1991 average daily demands of 11 percent and 62 percent of capacity, respectively. Hamilton (25 MGD capacity) and Middletown (20 MGD capacity) operate systems in Butler County and had 1991 average daily demands of 70 percent and 55 percent of capacity, respectively.

Hamilton plans to increase its system capacity to 42 MGD by 1997, and the average daily demands on this system are projected to be about 72 percent of capacity in 1995 and 44 percent of capacity in 2000. Warren County's system is projected to have average daily demands of about 64 percent of capacity in 1995 and 65 percent of capacity in 2000. The other systems are all projected to have average daily demands of less than 56 percent of capacity in 1995 and less than 57 percent of capacity in 2000.

Dayton, Montgomery County, the Miami Conservancy District North Regional, the Miami Conservancy District Franklin Regional, Miamisburg, West Carrollton, Warren County, Hamilton, Middletown, Butler County, and Fairfield operate wastewater treatment systems in the ROI. In Montgomery County, Dayton (72 MGD capacity), Montgomery County (33 MGD capacity), the Miami Conservancy District North Regional (about 11 MGD capacity), West Carrollton (about 4.3 MGD capacity), and Miamisburg (3 MGD capacity) had 1991 average daily demands of 76 percent, 61 percent, 58 percent, 35 percent, and 67 percent of capacity, respectively. In Warren County, the Miami Conservancy District Franklin Regional (4.5 MGD capacity) and the Warren County system (about 3.6 MGD capacity) had 1991 average daily demands of 67 percent and 66 percent of capacity, respectively. Hamilton (32 MGD capacity), Middletown (26 MGD capacity), Butler County (10 MGD capacity), and Fairfield (10 MGD capacity), all in Butler County, had 1991 average daily demands of 69 percent, 81 percent, 81 percent, and 49 percent of capacity, respectively.

Butler County plans to increase its system capacity to 14 MGD by 1995 and is projected to have average daily demands of about 63 percent of capacity in 1995 and 2000. The other systems are projected to have average daily demands of less than 82 percent of capacity in both 1995 and 2000. Thirty-three school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 1,073 students each in the New Miami and Wayne school districts to 27,662 students in the Dayton School District. The school districts operated between 62 percent and 103 percent of capacity. Those school districts operating over 100 percent of capacity were Mason (103 percent), Edgewood City (101 percent), and Huber Heights (101 percent). Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 18:1, and expenditures averaged $3,956 per pupil. The statewide average pupil-to-teacher ratio was 17:1, and expenditures averaged $4,349 per pupil (OH DEd, 1990a, b, and c).

Fourteen hospitals serve the three-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 1,841 physicians served the ROI. The physician-to-population ratio for the ROI was 1.9:1,000, and ranged from 0.7:1,000 in Warren County to 2.5:1,000, in Montgomery County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990).

Thirteen city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the three-county ROI was in the city of Dayton, with 594 sworn officers or 3.3 sworn officers per 1,000 persons. Other large agencies are in Montgomery County with 183 sworn officers or 0.3 sworn officers per 1,000 personsand Butler County, with 89 sworn officers or 0.3 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.1 per 1,000 persons (FBI, 1991).

Forty fire departments and 2,286 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Montgomery County (912 firefighters; 1.6 firefighters per 1,000 persons) and in the city of Dayton (424 firefighters; 2.3 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.3 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to Mound is provided by Mound and Benner roads. All onsite roads, except for Mound Avenue, are DOE-owned and -controlled, with access restricted to employees and official visitors.

Estimated traffic along segments providing access to Mound is projected to contribute to differing service level conditions in accordance with population growth. Benner and Mound roads, as well as 6th Street, would generally support congestion-free traffic flow. Main Street, however, would typically experience some congestion. Along this roadway, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in some congestion. In addition, estimated truck traffic into Mound for delivery of supplies and removal of wastes would typically average 170 trips per day. However, the additional traffic volumes associated with continued operation of Mound are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to Mound (OH DOT, 1992).

Other modes of transportation within the ROI include public transportation systems, railways, and waterways. Public transport to Mound is provided by the Dayton Regional Transit Authority. A plant bus system provides transportation between facilities on the site. Major railroads in the ROI include Consolidated Rail Corporation (Conrail), CSX Transportation, and the Norfolk Southern Corporation. A Conrail spur line accesses the site from the west via Miamisburg. The Great Miami River is located on the west side of Mound but is not considered a navigable waterway.

Dayton International Airport (29 miles north of the site) and the Greater Cincinnati International Airport (69 miles south of the site) serve the ROI. Both provide passenger and cargo service via national and international carriers. Numerous smaller airports are located in the ROI (DOT, 1991).

Environmental Consequences. The employment figures for the Proposed Action are shown in table 3.3-1 in section 3.3. As a result of ongoing planning and the proposed Fiscal Year 1994 budget figures, DOE has revised the estimate of post consolidation work force figures which reflect a loss of 1,020 jobs instead of 1,070 jobs (DOE, 1993c and d). The analysis presented in table 4.1.6.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 1,070 lost jobs. The estimate of 1,020 lost jobs is 5 percent lower than the 1,070 job loss used in the following analysis, and the lower job loss estimate would result in slightly lower negative economic consequences. The Proposed Action would result in minor decreases in economic activity and employment in the ROI. Based on the employment requirements for the transferred functions from Mound, employment would decrease in the ROI by an estimated 2,846 jobs (1,070 direct and 1,776 indirect). This reduction in jobs would not increase the unemployment rate in the year 2000 beyond the projected baseline level of 5.6 percent. Earnings in the ROI would be reduced by about $93.1 million, with a related decrease in the total personal income of $119.3 million.

It is estimated that the city of Miamisburg would lose $760,000 in income tax revenue in the year 2000 as a result of the loss of direct employment at Mound. This represents a 10-percent loss in total income tax revenue, a 9-percent loss in General Fund revenue, and a loss of almost 4 percent in total actual revenues. There will also be a small loss due to indirect employment losses in Miamisburg.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.6.7-1. This project-related change would represent a slight population decrease of less than 1 percent from the projected ROI baseline of 1,009,000. The cities of Germantown, Miamisburg, and Carlisle would be the most affected. Germantown and Miamisburg would each lose about 1 percent of their projected populations, and Carlisle would lose about 2 percent of its projected population.

The less than 1-percent change in population after phasing out the nonnuclear functions would create an estimated 568 additional vacant housing units, which is a less than 1-percent increase. The smaller cities of Miamisburg, Germantown, and Carlisle would be the most affected, but with no more than a 2-percent increase in the number of vacant housing units.

The less than 1 percent estimated population loss would not adversely affect any community infrastructure and services in the ROI but would, instead, reduce the burden on the capacity of the existing systems. Existing public education and health care capacity burdens would also improve by reducing utilization. Current staffing levels for police and fire services in the ROI counties and cities would not be affected, and local traffic conditions would improve slightly.

4.1.6.8 Waste Management/Pollution Prevention

Affected Environment. Discussion of the Mound waste management baseline is provided in section 3.2.2.3 and appendix A, section A.2. Because there are no TRU wastes associated with any of the Complex activities at Mound that would be closed out due to the Proposed Action, no further discussion of TRU waste management or generation is presented. However, disposal of existing TRU waste and waste generated as a result of transition activities would be addressed in the EM transition plan.

Generation of all waste types at Mound is expected to decrease with time, as production operations are expected to be reduced. Additionally, Mound's Pollution Prevention Program would systematically reduce waste generation through specific waste minimization projects and the use of process waste assessments.

All radioactive and mixed waste management activities conducted at Mound, including requirements for handling, storage, and shipping of LLW and mixed waste, are covered by many DOE orders, Federal and state statutes, and regulations such as RCRA (see chapter 5). All solid LLW is stored onsite in LLW management facilities, and transported by commercial carriers in closed vans to NTS for burial. Mixed waste is containerized and stored in Building 23 at Mound, pending completion of waste characterization and identification of an acceptable waste treatment/disposal option by DOE. It is anticipated that Mound's Glass Melter thermal treatment unit would be available for treatment of much of this waste in 1994. The addition of a new facility, which incorporates 7,800 ft^2 of storage space, when combined with the existing 2,400 ft^2 of Building 72, would result in 10,200 ft^2 of available hazardous waste storage area. The storage area would meet RCRA and TSCA facility standards. All waste stream residue generated at Mound that is not reclaimed or recycled onsite is manifested and shipped under contract with DOT-registered transporters to RCRA or TSCA-permitted offsite treatment and disposal facilities.

Mound has implemented a waste minimization and pollution prevention program using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. Process solvent substitution has been evaluated for a number of production processes and the paint shop has converted to using water-based paints as practical. Additionally, onsite and offsite recycling is being employed for wastes such as spent circuit etch solution, lead acid batteries, and discard chemicals.

Environmental Consequences. Closeout of Complex missions at Mound would reduce annual onsite hazardous waste management by approximately 50,900 lb for DP operations. Over 99 percent of the reduction would be due to decreased generation and landfilling of industrial wastewater pretreatment sludge. The remaining less than 1 percent of the hazardous waste reduction is due to generation and disposal by incineration of bulk acid liquids.

Closeout of Complex missions would also initiate closure of existing onsite RCRA hazardous waste storage facilities. Closure would comply with a detailed closure plan and schedule approved by the Ohio EPA. Hazardous wastes in storage would be manifested and shipped under contract with DOT-registered transporters to RCRA-permitted treatment and disposal facilities. Equipment, structures, and soils (if contaminated) must also be decontaminated and disposed of in accordance with all applicable environmental regulatory requirements.

Existing inventories of TRU waste, LLW, mixed waste, and classified waste would be shipped offsite to DOE disposal facilities certified to accept such wastes.

Even with the closeout of Complex functions, Mound will need to continue to treat alpha wastewater from plutonium D&D activities and discharge pretreated process wastewater and sanitary wastewater effluents into the Great Miami River.

The Burn Area at Mound would no longer treat explosive/reactive wastes. Nonhazardous solid waste streams, such as paper, cardboard, glass, wood, scrap, and metal containers would no longer be generated. Trash that would have been disposed of in the local sanitary landfill by a commercial contractor would cease, extending the operating life of the landfill.

4.1.6.9 Human Health: Facility Operations and Accidents

Affected Environment. As discussed in the Air and Water Resources sections for Mound (4.1.6.2 and 4.1.6.3, respectively), the chemical pollutant levels from Mound operations to which the public is exposed meet all applicable permit, regulatory, and DOE operational requirements. Exposures to members of the public from radiological releases are also well below applicable permit, regulatory, and DOE operational requirements (MD DOE, 1991a).

A review of the recent Mound annual environmental reports and accident reports indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serves as potable water. Process water that may contain hazardous chemicals is treated before discharge to remove toxicants. Furthermore, all releases of the pollutants are below NPDES limits and water quality is not adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

All possible HAPs from Mound were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, ammonia, trichlorotrifluoroethane, isopropyl alcohol, and TCA. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified as carcinogens. The existing Hazard Indexes for Mound (see table F-15a) were 0.0011 onsite (worker effects) and 0 at the site boundary (effect on the public) on an annual basis. No chemicals posing a potential cancer risk were identified.

Releases of radioactive materials from Mound result in a total maximum individual annual dose of 0.16 mrem effective dose equivalent (MD DOE, 1991a). The resulting risk of potential fatal cancers associated with 1 year of operations would be 7.1×10^{-8}. Risks less than 10^{-6} are considered acceptable by the EPA because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general population.

Environmental Consequences. Closeout of Mound Complex missions would result in no additions of hazardous material to, but rather the transfer of DP operations from, Mound to other DOE sites. Consequently, closeout would result in a decrease in adverse effects at Mound. The impacts at the DOE facilities that would receive the relocated DP missions from Mound are discussed in their respective sections.

4.1.7 Closeout Complex Missions at Pinellas

A detailed discussion of the current missions at Pinellas, facility/process description, and waste treatment and management activities is provided in section 3.2.3. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at Pinellas and the environmental assessment methodologies for each resource area discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on the closeout of Complex missions at Pinellas, is also provided in the chapter 4 introduction and section 4.1.

4.1.7.1 Land Resources

Affected Environment. Pinellas is located in the unincorporated Greater Seminole Area of Pinellas County, adjacent to the northwestern city limits of Pinellas Park. The city limits bound portions of the plant on the north, east, and south (Pinellas County, 1989). Pinellas County is the most highly urbanized county in the State of Florida. Urban land use surrounding the plant is shown in figure 4.1.7.1-1. The residential distribution of Pinellas employees is discussed in section 4.1.7.7. There are no prime farmlands on Pinellas.

Pinellas is a heavily industrialized facility. There is one principal building (Building 100) surrounded by other accessory structures and parking lots which occupy approximately 55 acres, while another 42 acres are essentially open space. The remaining 3 acres are occupied by the Pinellas Childcare Development Center/Partnership School with a maximum enrollment of 240 children and a staff of 25 to 30. The school is located approximately 150 feet east of Building 100 (PI DOE, 1990a).

The comprehensive plans of Pinellas County and the city of Pinellas Park have policies encouraging industrial development inside the boundaries of their defined industrial areas. Pinellas County has zoned the Pinellas site as "Light Manufacturing and Industrial District (M-1)." Approximately 57 acres of additional M-1 zoned land abuts the site on the north; of the 57 acres, 43 are vacant. The city portion of the industrial area is zoned both M-1 and "Industrial Planned Use Development." An additional 39 acres of an inactive landfill zoned "Public" (owned by the Pinellas County School Board) is also located north of the plant. The school board has also acquired 40 acres of a former industrial plant, zoned M-1, east of the plant.

The closest residences to the plant site perimeter are two caretaker facilities located approximately 550 feet and 610 feet north. A 270-unit apartmentcomplex is located approximately 910 feet north. The nearest single-family residential subdivisions are located approximately 1,015 feet northeast and northwest of the plant perimeter. Other than the playground of the school, there are no recreation areas at Pinellas.

The natural landscape of the plant and vicinity has been altered to that of a highly developed area. Viewpoints of the plant site are limited to roads and adjoining property that present clear, unobstructed views of the plant facility. The Lake Allen area, an expanding residential area north of the plant, has views of the facilities. The facilities, however, are mostly screened by a strip of woodland, with only higher structures, such as outdoor security lighting, antennas, towers, and some tanks and roofs, visible from the residential subdivisions. The Pinellas landscape is consistent with a Class 5 VRM designation.

Environmental Consequences. Land use within the Pinellas site would not change during the Complex mission closeout; therefore, no onsite land use impacts are expected. Future use of Pinellas surplus facilities would be evaluated in the transition process.

Closeout of Complex missions at Pinellas would not adversely impact the comprehensive planning and zoning of Pinellas County, the city of Pinellas Park, and surrounding jurisdictions. A review of socioeconomic data in section 4.1.7.7 indicates no adverse impacts to regional recreation resources due to changes in employment at the plant. No construction or demolition activities are planned as part of the missions closeout; therefore, no affect to visual resources or VRM classifications is expected.

4.1.7.2 Air Quality and Acoustics

Affected Environment. The climate at Pinellas and in the surrounding region is subtropical marine, characterized by long, humid summers and mild winters (Trewartha, 1954). The annual average temperature in the area as measured at the Tampa NWS station is 72 "F; temperatures vary from an average daily minimum of 49.5 "F in January to an average daily maximum of 90.3 "F in August (NOAA, 1991b). Annual average precipitation is 47 inches, with most occurring between June and September.

Ambient Air Quality . Pinellas is located within the West Central Florida Intrastate AQCR. This AQCR is designated as attainment by EPA for all criteria pollutants with the exception of O_3 (40 CFR 81.310). The NAAQS and Florida State Ambient Air Quality Standards (which are the same as the NAAQS) are listed in table D2.1.1-1. Pinellas does not conduct any onsite or offsite ambient monitoring for criteria pollutants or HAPs (PI DOE, 1989).

The Florida Department of Environmental Regulation has standards for the existing HAPs regulated by the NESHAPs. In addition, the Florida Department of Environmental Regulation maintains a working list of toxics that is used as a tool in regulatory and air permitting analyses. This list, published in January 1992, is Revision 3 of the Draft Florida Air Toxics Permitting Strategy Guidelines (FL DER, 1992) and covers 751 compounds including all 189 HAPs listed under Title III of the CAA. The HAPs/toxics described in this section are those currently used at Pinellas or those anticipated to be used under Pinellas consolidation alternative.

Ambient air quality within and near Pinellas is monitored by the state for each of the criteria pollutants. The ambient air quality data for SO_2, O_3, and CO collected at these stations during 1990 are presented in table D2.1.3-1. The O_3 standard is exceeded primarily due to vehicular emissions, which is typical of most urban areas.

The principal sources of criteria air pollutants at Pinellas are the boilers and diesel generators in Building 500. Buildings 100, 700, and 1040 are sources of particulate and solvent emissions (PI DOE, 1992d). Other sources include vehicular emissions (PI DOE, 1989). The emission inventories for criteria pollutants at Pinellas are included in table D2.1.3-2.

HAPs/toxics emitted to the atmosphere from the plant include methylene chloride, diethanolamine, and TCE, as well as cadmium, Pb, and mercury (PI DOE, 1992d). HAP/toxic sources include laboratories, coating and plating operations, production and test facilities, and various manufacturing operations. The Pinellas emissions inventory for these HAPs/toxics is listed in table D2.1.3-3.

Normal operations result in the emission of radioactive materials at Pinellas. These emissions include approximately 100 curies of tritium annually. The health effects of these emissions are discussed in section 4.1.7.9. EPA has granted Pinellas minor source status because of these low annual emissions (PI DOE, 1992d). Tritium is the only radionuclide that may be affected by the activities that are the subject of this EA.

The air quality under ambient and No Action conditions at Pinellas is shown in table 4.1.7.2-1. The concentrations listed in the table are based on information received from DOE, Pinellas (PI DOE, 1991d). Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of the O_3 standard, baseline air quality concentrations from Pinellas do not exceed, and would not be expected to exceed, any applicable guideline or regulation.

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions . The major noise sources within Pinellas include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, paging systems, construction and materials-handling equipment, and vehicles). No sound-level measurements have been made around Pinellas. At the site boundary, away from most of these industrial facilities, noise from these sources would be barely distinguishable from background noise levels. Thus, the acoustic environment along the Pinellas boundary and in the nearby residential areas away from traffic noise was assumed to be that of a suburban or urban location with typical DNL in the 53 to 62 dBA range (EPA, 1974). The primary source of noise at the site boundary and in nearby residential areas is traffic. The contribution of plant traffic to traffic noise levels in the area is minor.

The State of Florida has not established specific numerical environmental noise standards applicable to Pinellas. Pinellas County has specified limits on environmental noise at the property line of an industrial source as described in appendix D (section D2.2.3). Although the maximum noise levels specified by the ordinance and the EPA guideline level for residential areas may be exceeded at the Pinellas site boundary, these noise levels are attributable to traffic noise and not to sources at the plant.

Environmental Consequences.

Air Quality . Closeout of Complex missions at Pinellas would reduce emissions of criteria, hazardous, and toxic air pollutants. The air quality in the vicinity of the plant may improve marginally with the elimination of the minor pollutant sources (table 4.1.7.2-1). Closeout of Complex missions at Pinellas would eliminate the nominal emissions of tritium.

Acoustic Conditions . Closeout of Pinellas Complex missions would result in reduced staff levels. The reduction in traffic volumes on nearby streets, primarily during the peak hours, would result in only a minor reduction in noise levels along these routes. Community noise levels are expected to experience only a minor reduction due to elimination of noise sources on the site.

4.1.7.3 Water Resources

Affected Environment. This section describes the surface water and groundwater resources at Pinellas.

Surface Water . Pinellas lies on the divide between the Cross Bayou and Starkey Road drainage basins. The dividing line between the basins crosses the site in a northeast/southwest direction. All wastewater discharges from the plant, with the exception of stormwater, are sent to the Pinellas County Sewer System (PI DOE, 1991b). There are two stormwater retention and one stormwater detention ponds and no natural surface water bodies at Pinellas (figure 3.2.3-2) (PI GE, 1991).

Pinellas is located above the 100-year tidal floodplain. The land elevation at the plant is approximatley 18 feet above MSL, which is higher than the 100-year floodplain mark of 11 feet above MSL (PI DOE, 1991b).

Pinellas is located approximately 4.4. miles west of Tampa Bay, and 6.3 miles east of the Gulf of Mexico. The nearest significant water body to Pinellas is Lake Seminole (1 mile to the west), which does not have open access to the Gulf or to Tampa Bay and would therefore not provide a conduit for storm surge to reach the plant site. Minimum plant floor elevation is approximately 18 feet MSL, or 4.4 feet above the highest recorded storm surge in Pinellas County which occurred during a hurricane in 1984. The probability of experiencing a storm surge that exceeds the Pinellas 18 feet MSL is very low. Even the storm surge from hurricane Andrew, estimated at approximately 15.5 feet, would not have flooded the plant site (PI DOE, 1992d). Given this information, it is not likely that Pinellas would be affected by the storm surge from even the most significant storm event.

Extraordinary wave action could potentially flood the plant site during a storm event (DOE, 1988). However, due to the distance and number of naturally occurring and man-made barriers that exist between Pinellas and the open waters of the Gulf of Mexico and Tampa Bay, there appears to be no credible scenario in which storm-generated wave activity could inundate the plant (PI DOE, 1992d).

Pinellas discharges approximately 66 MGY in liquid effluents to the Pinellas County sewer system. The Pinellas County wastewater treatment plant receives approximately 7.3 to 8.8 BGY (20 to 24 MGD of waste water and has a capacity of 10.4 BGY (28.5 MGD) (PI DOE, 1987). The discharge consists of sanitary sewage and pH-neutralized industrial process waters from the plant's 110 MGY-capacity Industrial Wastewater Neutralization Facility. Non-radioactive discharges to the Pinellas County sewer system are regulated under Pinellas County Sewer Use Ordinance #88-4 and the U.S. Department of Energy Pinellas Plant Industrial Wastewater Discharge Permit #018-IE, issued August 28, 1989. Pinellas is also subject to the National Categorical Pretreatment Standards of 40 CFR Part 433 developed by the EPA. Radioactive discharges are regulated by state and Federal standards. Where differing standards apply to a pollutant, the plant complies with the more stringent (PI, DOE, 1992a).

Non-radiological parameters are monitored at the point where the combined industrial wastewater and sanitary effluent first enter the Pinellas County sewer system, according to the following schedule: pHÄcontinuously monitored; metalsÄweekly; cyanide, mercury, total suspended solids, and biological oxygen demandÄmonthly; and total toxic organicsÄbiannually. Tritium is the only radiological parameter encountered in Pinellas discharges and it is monitored each day from the sanitary, industrial, and combined waste streams (PI DOE, 1992a).

In 1991, one noncompliance with pH permit limits and one noncompliance with zinc permit limits were noted. The zinc noncompliance was only slightly above limits and was determined to be an unusual excursion. The pH noncompliance resulted from acidic cleaning solutions discharged to sanitary drain systems that bypassed pH-neutralization at the Industrial Wastewater Neutralization Facility. Efforts to prevent reoccurrence of pH violations included notifying all plant personnel of the discharge permit requirements and prohibiting discharge of high or low pH cleaning solutions into sanitary sewage drains. Table 4.1.7.3Ä1 presents a summary of the parameters monitored and a comparison of the average concentrations discharged in 1991 with regulatory standards (PI DOE, 1992).

The East and South retention ponds receive all surface runoff from paved and unpaved areas of the plant. The East retention pond is included in the Northeast Site solid waste management unit, currently under investigation for corrective measures as part of the Hazardous and Solid Waste Amendments Permit issued by EPA Region IV (FL 6890090008) (PI DOE, 1991b). Sediments from the East retention pond contain no pollutants above regulatory action levels. Stormwater from the South retention pond would flow to the Cross Bayou Canal; however, no discharge from the pond has occurred since its construction. An NPDES industrial stormwater permit application for the South and East retention ponds has been submitted to EPA for processing (PI DOE, 1992d).

The West detention pond received treated industrial effluent from 1972 to 1982 and has been identified as a solid waste management unit to be investigated for possible corrective measures. Currently, the West pond is not receiving effluent or waste but does receive limited stormwater runoff during heavy rainfall events (PI DOE, 1991b). The West pond does not discharge to offsite surface waters (PI DOE, 1992a).

Surface Water Quality . Water quality in the two stormwater retention ponds and the West detention pond is monitored weekly for tritium and periodically for nonradiological constituents (PI DOE, 1991b). Results from 1991 indicate the highest tritium levels were 800 pCi/L, well below Federal drinking water standards of 20,000 pCi/L (PI DOE, 1992d). Monitoring results for nonradiological parameters in the East and South retention ponds are presented in table 4.1.7.3-2. Monitoring from 1992 indicates that copper, iron, and phosphorous exceeded Florida state water quality criteria. Because the South retention pond has not discharged since its construction, no impacts to offsite surface waters have resulted. Quarterly offsite surface water monitoring indicates tritium concentrations are well below DOE and EPA water quality criteria (PI DOE, 1992a).

Groundwater . Aquifers associated with Pinellas include a near-surface unit (5 to 35 feet below ground) and the deeper Floridan Aquifer (100 feet below ground), separated by a shale of low hydraulic conductivity. These aquifers are classified as Class IIa, current sources of drinking water and waters having other beneficial uses.

The water table of the near-surface aquifer is found a few feet below the ground surface. The water table fluctuates 1 to 5 feet seasonally (PI DOE, 1992d). A groundwater divide crosses the site northeast to southwest. Groundwater flow in the surficial aquifer is from the divide toward discharge points along three surface water channels.

The Floridan Aquifer is an extensive water-bearing carbonate unit found throughout west-central Florida. It contains upper and lower units, which are separated by an evaporite bed. The lower unit generally contains saltwater, while the upper unit serves as the primary potable and agricultural water supply for the area. In Pinellas and Hillsborough counties, the thickness of the Upper Floridan Aquifer is approximately 1,200 feet.

In much of west-central Florida, the Upper Floridan Aquifer is separated from the Surficial Aquifer by the Hawthorn Formation. This unit, because of its flow-restricting properties, acts as a confining layer for the Upper Floridan Aquifer. As a result, the potentiometric surface associated with the Upper Floridan is generally only 5 to 10 feet below that of the groundwater table associated with the Surficial Aquifer.

Groundwater Quality . Groundwater quality in the uncontaminated portions of the Surficial Aquifer beneath the plant is generally good, except for a pH level which is less than limits set for than water quality criteria, and a naturally occurring iron content that is higher than the criteria (table 4.1.7.3-3). The results of water quality analyses from wells in the monitoring network indicate that concentrations of major constituents are within the reported range for background water quality. Concentrations of trace metals in the groundwater are less than detection limits or are within criteria limits of the EPA. Concentrations of herbicides, insecticides, organic priority pollutants, and total organic carbon in groundwater are also less than detection limits.

Contamination of groundwater in the Surficial Aquifer has been identified within and adjacent to the Pinellas boundary (figure 4.1.7.3-1). The areas of greatest concern are 4 of the 15 solid waste management units within the plant boundary and the 4.5- acre site, which is adjacent to the plant boundary but has been attributed to previous Pinellas activities. The four solid waste management units, Northeast Site, Old Drum Storage Pad, Building 100, and Incinerator Ditch, have been recommended for corrective measures studies (PI DOE, 1992a). Remediation activities for the 4.5-acre site have successfully recovered and treated approximately 4.1 million gallons of VOC-contaminated groundwater (PI GE, 1991).

The water quality of the Floridan Aquifer directly beneath Pinellas has been measured and has not been adversely impacted by Pinellas operations (PI DOE, 1992d).

Groundwater Supply . The Floridan Aquifer is the primary source of water supply in the Pinellas County area. Well fields are located in Pasco and Hillsborough counties that supply the various communities with domestic and industrial water. Only limited agricultural use of water occurs in the vicinity of Pinellas. The plant has no production wells, and the water supply is obtained from the Pinellas County Water System (PI DOE, 1991a).

Pinellas uses approximately 0.14 MGD of potable water (table 3.2.3-3). Periodic restrictions on water use at the plant have occurred due to a dramatic rise in regional water demand (PI GE, 1991). Although there have been failures in some of the supply piping of the Pinellas County water supply system, faulty sections of the system are scheduled for replacement and backup supplies from the St. Petersburg water supply system are available to ensure that there is no interruption in service. All current water restrictions are due to drought conditions. There is no permit or contract agreement with Pinellas County for water supply.

Environmental Consequences. Complex mission closeout activities at Pinellas would involve no new construction and all current DP operations would cease.

Surface Water . Because existing facilities are not located in the 100-year floodplain and do not appear to be within an area affected by a credible longer term event, mission closeout would not affect floodplain areas.

Because there would be no surface water withdrawals, and no routine releases to offsite surface waters, no adverse impacts would be anticipated to flow rates in local surface water bodies.

Surface Water Quality . Because there would be no routine releases to offsite surface waters, there would be no adverse impacts to water quality.

Groundwater . By closing out Complex missions at Pinellas, a reduction in the demand for groundwater from local water suppliers would occur.

Groundwater Quality . Spill protection systems and plans exist to contain and minimize effects of releases of hazardous substances during mission closeout activities. Given normal safeguards and precautions, no adverse impacts to groundwater quality are expected to result from transition activities associated with Complex mission closeout at Pinellas.

4.1.7.4 Geology and Soils

Affected Environment. Pinellas lies on the Floridan Plateau of the Florida Peninsula. The site lies on a low relief surface north of St. Petersburg.

There are no capable faults in Pinellas County. This region of Florida lies in Seismic Zone 0 (ICBO, 1991). Earthquakes are not common in Florida. The most severe earthquake within a 200-mile radius occurred near St. Augustine in 1879, 160 miles northeast of the plant, and had a magnitude of 4. There is no reason to expect damaging earthquakes at Pinellas (PI DOE, 1991b).

Sinkholes are not uncommon in Florida in areas where limestone layers are near the surface. Circular depressions have been observed at Pinellas from aerial photographs, but no historic active sinkhole development has taken place in the plant area. Because of the depth of the limestone layers below the water table, sinkhole collapse is unlikely at Pinellas (PI DOE, 1983).

Pinellas is underlain by Made land and soils of the Myakka and Wabasso soil series (PI USDA, 1972). Made land consists of mixed sand, clay, hard rock, shells, and shell fragments that have been transported, reworked, leveled by earth-moving equipment, and used as foundation material. The Myakka and Wabasso consist of nearly level, poorly drained, fine sandy soils formed, respectively, in thick beds of acid marine sands and beds of sandy and loamy sediments. Because of the low relief and relatively high water saturation of these soils, they are not subject to water or wind erosion.

No prime or unique farmland soils are located within the Pinellas site. All the soils within the site boundary are characterized as unsuitable for cultivation (PI USDA, 1972).

The Pinellas radiological monitoring program analyzes soil from two onsite and four offsite locations for plutonium. Results of the analyses for 1990 were below detectable levels (PI DOE, 1991b).

Environmental Consequences. The proposed closeout of Complex missions at Pinellas would not result in impacts on the geologic features of the area, nor would the geology have any impact on mission closeout activities at the plant.

Hazardous, radioactive, and potential mixed waste sources would be eliminated from the plant, thus decreasing future soil contamination potential.

4.1.7.5 Biotic Resources

Affected Environment. Habitat in the southern part of Pinellas generally consists of lawns, ponds, and ornamental vegetation surrounding buildings and parking lots. Because of the lack of natural vegetation to provide cover, few animals are likely to use these areas to breed. Much of the northern part of the site is a grassy field with clusters of scattered trees. Lands surrounding the site have experienced extensive urban development, although areas to the immediate northwest are bounded by remnant pine forests and other natural plant communities typical of Pinellas County. These plant communities and the wildlife typically found in them are described in an EA prepared for the site by DOE (PI DOE, 1983).

Two man-made ponds, the East Pond near the northeastern corner of the site and the West Pond near the northwestern corner of the site (figure 3.2.3-2), are designated as wetlands on NWI maps (PI FWS, 1982; PI DOE, 1983). These wetlands are classified on the maps as Palustrine Open Water. These ponds were once used to store wastewater generated by Pinellas (PI DOE, 1983) but now serve only as stormwater retention ponds. To function for stormwater retention, the ponds require periodic cleaning and maintenance involving the disruption of any vegetation that establishes within them. A third stormwater retention pond, the South Pond, was constructed since development of the NWI maps. The sides of this pond are lined with steel pilings; it contains no vegetative growth.

Although there is no natural surface water on the site, some aquatic flora and fauna, including frogs and insects, may have become established in the East and West Ponds, and could be providing a source of food for migrating birds. However, habitats within both ponds are less than choice for migrating birds.

A threatened and endangered species survey of Pinellas was conducted in March 1992 (PI DOE, 1992a). No threatened or endangered species were seen on or near the site during the survey.

Environmental Consequences. Closeout of Complex missions at Pinellas under the Proposed Action would not adversely affect biotic resources. Mission closeout would result in a reduction of existing operational impacts to natural habitats on and surrounding the site.

4.1.7.6 Cultural Resources

Affected Environment. The prehistoric chronology of the Pinellas area consists of five broad time periods: Paleoindian (12,000-6500 B.C.), Archaic (6500-1000 B.C.), Transitional (1000-500 B.C.), Manasota (500 B.C.-A.D. 800), and Mississippian (A.D. 800-1625) (PI Milanich, 1980; PI Austin , 1991). Prehistoric site types in the vicinity include temple and burial mounds, shell and dirt middens, artifact scatters, villages, and cemeteries (PI Austin , 1991). About 65 percent of the facility has been developed, and the remaining area has been disturbed by plowing and clearing activities. No cultural resource inventories have been conducted for Pinellas, and no sites have been recorded. As a result of the previous development and disturbance, the Florida SHPO has concurred with the finding that NRHP-eligible cultural resources are not likely to occur at the plant (FL SHPO, 1991).

The history of the region has been previously documented (PI Tebeau, 1971; PI Austin , 1991). Pinellas was constructed in 1955 on land that was originally pasture for dairy cattle (History Associates, 1987). As a result of the previous development and disturbance at the plant, no historic resources have been identified and no surveys have been conducted. The Florida SHPO has concurred with the finding that NRHP-eligible cultural resources are not likely to occur at Pinellas (FL SHPO, 1991). The Pinellas facilities are constructed of cinder block and have been modified numerous times. The facilities are not considered to exhibit architectural integrity nor are they representative of a particular style. They are not considered contributing features to the broad historical theme of the Manhattan Project and initial nuclear production. The facilities are not likely to be considered eligible for the NRHP.

The Safety Harbor archaeological manifestation (late Mississippian period) is assumed to represent the Tocobaga Indian group who occupied the area at the time of Spanish contact. They were decimated in the early 1700's by European diseases, and the area was relatively unoccupied (PI Austin, 1991; PI Bullen, 1978). Northern Creek groups moved into the Tampa Bay area after the Creek War and were labeled Seminoles by the British (PI Tebeau, 1971). An Upper Creek or Red Stick settlement may have been located on the lower Pinellas peninsula, but an exact location has not been documented (PI Austin , 1991). Site types that may be of concern to Native American groups include villages, temple mounds, charnel house locations, burial sites, and cemeteries.

Environmental Consequences. The closeout of Complex missions at Pinellas does not include ground disturbance or building modifications and therefore would not affect cultural resources.

4.1.7.7 Socioeconomics and Community Services

Affected Environment. The discussion of socioeconomics and community services at Pinellas is based on an ROI where 99 percent of the plant employees lived in 1991. The ROI includes Hillsborough (4 percent), Pasco (4 percent), and Pinellas (91 percent) counties in Florida. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Clearwater (23 percent), Largo (18 percent), Pinellas Park (10 percent), Seminole (11 percent), and St. Petersburg (30 percent) (see figure 3.2.3-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.7-1 through E3.7-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 159 percent, increasing from 378,426 in 1970 to 979,201 in 1990. Total employment increased from 364,562 to 929,724 between 1970 and 1990, an annual growth rate of 5 percent. The unemployment rates for 1970 and 1990 were 3.7 percent and 5.1 percent, respectively. For the same years, personal income increased from approximately $4.1 billion to $35.5 billion (an annual average of 11 percent), and per capita income increased from $3,749 to $18,051.

Between 1970 and 1990, employment at Pinellas increased from 1,274 to 1,667, representing less than 1 percent of the ROI employment in 1990 (PI DOE, 1991e). Changes in mission requirements have historically led to fluctuations in employment levels over this period. For example, employment rose to 1,946 by 1985. As of September 30, 1992, employment at Pinellas had decreased to 1,575. The proposed Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in workforce associated with the budget reductions is only estimated at this time. Under the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to decrease to 1,070 by the year 2000 (DOE, 1993c). In 1992, the total Pinellas payroll was estimated to be about $74 million (PI DOE, 1991e). Under the No Action baseline, the total payroll would be projected to be approximately

$50 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 1,188,000 by 2000 and 1,300,000 by 2020. The unemployment rates for the years 2000 and 2020 are both projected to be 5.4 percent. For the same years, personal income is projected to increase from approximately $51.5 billion to $70.4 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $23,000 in 2000 to $26,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 81 percent to 1,966,844. During the same period, the Florida population increased 91 percent. The population in the three-county ROI is projected to increase from an estimated 2,255,000 in 2000 to 2,689,000 by 2020, an annual rate of 1 percent.

The largest county population increase (270 percent) occurred in Pasco County between 1970 and 1990, while during the same years, population in Pinellas County increased 63 percent. Population in Pasco County is estimated to increase 12 percent between 1990 and 2000 and 19 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Pinellas County population is projected to increase approximately 14 percent between 1990 and 2000 and an additional 19 percent between 2000 and 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, Seminole had the greatest increase in city population (825 percent) in the ROI. For the same years, the Clearwater, Largo, and Pinellas Park populations increased 90 percent, 198 percent, and 95 percent, respectively, while St. Petersburg had the smallest population growth (10 percent).

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 126 percent from 432,142 to 975,046. Concurrent with population growth in the ROI, housing units are expected to increase approximately 15 percent by the year 2000 and an additional 19 percent by 2020, an annual increase of about 1 percent.

Between 1970 and 1990, the largest increase in housing units (328 percent) occurred in Pasco County, while the smallest increase (100 percent) occurred in Pinellas County. The number of housing units in Pasco County is expected to increase approximately 12 percent by 2000 and an additional 19 percent by 2020, an annual increase of less than 1 percent. The number of housing units in Pinellas County is expected to increase about 14 percent by 2000 and an additional 19 percent by 2020, an annual increase ofabout 1 percent.

In 1990, the homeowner vacancy rates averaged about 4 percent in the ROI, with averages of approximately 4 percent for both Hillsborough and Pasco counties. The vacancy rate for rental units averaged 14 percent and ranged from about 14 percent in Hillsborough County to 15 percent in Pasco County.

Community Infrastructure and Services. The water supply systems operated by Pinellas, Hillsborough, and Pasco counties and the cities of St. Petersburg and Tampa maintain about 95 percent of the capacity of the nine systems identified in the ROI. All of these systems draw their raw water supplies from groundwater, except Tampa, which draws about 60 percent of its supplies from surface water.

The systems operated by Pinellas County (about 102 MGD capacity) and St. Petersburg (68 MGD capacity) had 1988 average daily demands of 75 percent and 63 percent of capacity, respectively. The water supply systems of Tampa (130 MGD capacity), Hillsborough County Northwest Service Area (about 9 MGD capacity), and Hillsborough County South-Central Service Area (about 24 MGD capacity) all operate in Hillsborough County. In 1988, the average daily demands on Tampa's system were of percent of capacity. Hillsborough County's South-Central and Northwest Service Area systems operated near or at capacity, with average daily demands of 91 percent and 100 percent of capacity, but both are supplemented by Tampa and other regional systems. Pasco County Utilities (35 MGD capacity) had 1991 average daily demands of 32 percent of capacity.

The average daily demands on the Pinellas County and St. Petersburg systems are projected to be of percent and 68 percent of capacity in 1995 and 92 percent and 73 percent of capacity in 2000, respectively. The average daily demands on Tampa's system are projected to be 64 percent of capacity in 1995 and 75 percent in 2000. Pasco County Utilities is projected to have average daily demands of about 35 percent of capacity in 1995 and 38 percent of capacity in 2000.

Pinellas, Hillsborough, and Pasco counties and the cities of St. Petersburg, Clearwater, Largo, and Tampa operate wastewater treatment systems that maintain about 96 percent of the capacity of the 12 systems identified in the ROI. Pinellas County (about 45 MGD capacity), St. Petersburg (about 68 MGD capacity), Clearwater (about 23 MGD capacity), and Largo (15 MGD capacity) all operate systems in Pinellas County. The Pinellas County system had 1990 average daily demands of 64 percent of capacity, while the St. Petersburg, Clearwater, and Largo systems had 1988 average daily demands of 74 percent, 65 percent, and 68 percent of capacity, respectively. Hillsborough County (about 25 MGD capacity) and Tampa (about 212 MGD capacity) had 1988 average daily demands of 67 percent and 29 percent of capacity, respectively. Pasco County's system (15 MGD capacity) experienced 1991 average daily demands of 80 percent of capacity.

All of the systems discussed for Pinellas and Hillsborough counties are projected to have average daily demands of less than 78 percent of capacity in 1995 and less than 80 percent of capacity in 2000. The average daily demands on Pasco County's system are projected to be about 83 percent of capacity in 1995 and 87 percent of capacity in 2000.

Three school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 32,626 students in the Pasco School District to 120,364 students in the Hillsborough County School District. The school districts operated between 79 percent and 94 percent of capacity. Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 22:1, and expenditures averaged $4,261 per pupil. The statewide average pupil-to-teacher ratio was 23:1, and expenditures averaged $4,638 per pupil (FL DEd, 1990).

Forty-six hospitals serve the three-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 4,483 physicians served the ROI. The physician-to-population ratio for the ROI was 2.3:1,000, and ranged from 1.2:1,000 in Pasco County to 2.5:1,000 in Hillsborough County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990).

Nine city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agency in the three-county ROI was in Hillsborough County, with 845 sworn officers or 1.0 sworn officers per 1,000 persons. Other large agencies are in Pinellas County, with 680 sworn officers or 0.8 sworn officers per 1,000 persons and in the city of St. Petersburg, with 483 sworn officers or 2.0 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.4 per 1,000 persons (FBI, 1991).

Seventeen fire departments and 2,064 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Hillsborough County (507 firefighters; 0.6 firefighters per 1,000 persons) and in Pinellas County (384 firefighters; 0.5 firefighters per 1,000 persons). The average number of firefighters in the ROI was 1.0 per

1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to Pinellas is via Belcher Road (Pinellas County Road 501) to the east and Bryan Dairy Road (Pinellas County Road 296) to the south.

Estimated traffic along segments providing access to Pinellas is projected to contribute to differing service level conditions in accordance with population growth. All roadways that access the site would typically experience traffic congestion, with volumes exceeding the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be greatly restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in considerable congestion. In addition, estimated truck traffic into Pinellas for delivery of supplies and removal of wastes would typically average 30 trips per day. However, the additional traffic volumes associated with continued operation of Pinellas are relatively minor and would not substantially affect local transportation conditions.

Three major road improvements are scheduled for completion (1994Ä1997) that will provide improved access to Pinellas. Bryan Dairy Road (Pinellas County Road 296) will be extended west to Seminole Road (US 19A) near 102nd Avenue. A new bridge will be constructed for this road over Lake Seminole. McMullen Booth Road will be widened from two to six lanes between Curlew Road (Florida State Route 586) and Sunset Point Road. A four-lane bridge will be constructed over Old Tampa Bay just west of Saint Petersburg-Clearwater International Airport. This will connect 49th Street in South Pinellas County with McMullen Booth Road in North Pinellas County. Other modes of transportation in the ROI include public transportation systems, railways, and waterways. Public transportation in Pinellas County is provided by the Pinellas Sun Coast Transit Authority. Railroad service in the ROI is provided by CSX Transportation. A single-track CSX Transportation line parallels the western border of Pinellas but does not access the site. Waterborne transport in the ROI is from the Gulf of Mexico through Tampa Bay. Two port facilities are located at St. Petersburg Harbor and Tampa Harbor (COE, 1991).

Tampa International and St. Petersburg-Clearwater International airports receive jet air passenger and cargo service from both national and local carriers. Numerous smaller private airports are located in the study area (DOT, 1991).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning and the proposed Fiscal Year 1994 budget figures, DOE has revised the estimate of post consolidation work force figures which reflect a loss of 800 jobs instead of 1,050 jobs (DOE, 1993 c and d). The analysis presented in table 4.1.7.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 1,050 lost jobs. The estimate of 800 lost jobs is 24 percent lower than the 1,050 job loss used in the following analysis, and this lower job loss estimate would result in slightly fewer negative economic consequences. The Proposed Action would result in minor decreases in economic activity and employment in the ROI. Based on the employment requirements for the transferred functions from Pinellas, employment would decrease in the ROI by an estimated 3,038 jobs (1,050 direct and 1,988 indirect). This reduction in jobs would not increase the unemployment rate in the year 2000 beyond a projected baseline level of 5.4 percent. Earnings in the ROI would be reduced by about $103.1 million, with a related decrease in total personal income of $148.2 million.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.7.7-1. This project-related change would represent a slight population decrease of less than 1 percent from the projected ROI baseline of 2,255,000. The city of Seminole would be the most affected, with an estimated 1-percent loss in its projected population.

The less than 1-percent change in population after closeout of Complex missions would create an estimated 685 additional vacant housing units, which is less than a 1-percent increase. The city of Seminole would be the most affected, but with a less than 2-percent increase in the number of vacant housing units.

The less than 1-percent estimated population loss would not adversely affect any community infrastructure and services in the ROI but would, instead, reduce the burden on the capacity of the existing systems. Existing public education and health care capacity burdens would also improve by reducing utilization. Current staffing levels for police and fire services in the ROI counties and cities would not be affected, and local traffic conditions would improve slightly.

4.1.7.8 Waste Management/Pollution Prevention

Affected Environment. Discussion of the Pinellas waste management baseline is provided in section 3.2.3.3 and appendix A, section A.3. Because there are no TRU wastes associated with any of the Complex missions at Pinellas that would be closed out due to the Proposed Action, no further discussion of TRU waste generation or management is presented.

Generation of LLW, hazardous/toxic waste, and nonhazardous wastes at Pinellas is expected to decrease with time, as production operations are expected to be reduced. Additionally, Pinellas' Pollution Prevention Program would systematically reduce waste generation through specific waste projects and the use of process waste assessments.

Solid LLW generated in small quantities at Pinellas is temporarily stored onsite and shipped to the SRS burial site for final disposal.

Waste operations at Pinellas consist of the storage and treatment of hazardous wastes subject to the requirements of RCRA and the management of wastes subject to the requirements of TSCA. All facilities are in compliance with the applicable requirements of both TSCA and RCRA, as appropriate. All waste stream residue generated at Pinellas that is not reclaimed or recycled onsite is manifested and shipped under contract with DOT-registered transporters to RCRA-permitted offsite treatment and disposal facilities. There are no RCRA-permitted commercial facilities available to treat Pinellas' explosive wastes; therefore, open burn thermal treatment activities occur onsite for reactive and Class C explosive materials. Pinellas is currently evaluating alternative treatment options for explosive wastes currently treated onsite.

Nonhazardous wastes are segregated and recycled whenever possible. Trash is taken to the local sanitary landfill. Pretreated industrial process wastewater and sanitary wastewater are discharged to the Pinellas County wastewater treatment facility in compliance with industrial wastewater permit discharge limits.

Pinellas has implemented a waste minimization and pollution prevention program using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. Ongoing hazardous waste pollution prevention and waste minimization activities at Pinellas include offsite solvent reclamation, use of aqueous degreasers instead of chlorinated solvents, and onsite treatment of machine cutting fluid.

Environmental Consequences. Closeout of the Complex missions at Pinellas would ultimately reduce annual onsite hazardous annual waste management by 2,400 lb for DP operations. Over 50 percent of the reduction would be due to decreased generation, treatment, and disposal of wastewater sludge.

Closeout of Complex missions at Pinellas would initiate closure of existing onsite RCRA hazardous waste storage facilities. Closure would comply with a detailed closure plan and schedule approved by the Florida Department of Environmental Regulations. Hazardous wastes in storage would be manifested and shipped under contract with DOT-registered transporters to RCRA-permitted treatment and disposal facilities. Equipment, structures, and soils (if contaminated) would also be decontaminated and disposed of in accordance with all applicable environmental regulatory requirements.

Existing inventories of LLW, mixed waste, and classified waste would be shipped offsite to DOE disposal facilities certified to accept such wastes.

Due to the closeout of Complex missions, Pinellas would no longer discharge pretreated industrial process wastewater effluents and sanitary wastewaters to the Pinellas County Sewer System.

Nonhazardous solid waste streams, such as paper, cardboard, glass, wood, plastics, scrap, and metal containers, would no longer be generated. Trash that would have been disposed of in the local sanitary landfill by a commercial contractor would cease, extending the operating life of the local landfill.

4.1.7.9 Human Health: Facility Operations and Accidents

Affected Environment. Releases of chemical pollutants as a result of Pinellas operations are discussed in the Air and Water Resources sections (§4.1.7.2 and 4.1.7.3, respectively). Exposures to members of the public associated with radiological releases are well below applicable permit, regulatory, and DOE operational requirements (PI DOE, 1991c).

A review of the recent annual environmental and accident reports for Pinellas indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future.

Water from processes containing hazardous chemicals is not discharged directly into surface or groundwater that serve as potable water. High or low pH process water is neutralized before discharge. Furthermore, all releases of the pollutants are below Pinellas County Sewer System permit limits and water quality is not adversely affected. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For Pinellas, all possible hazardous air pollutants were examined and the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: acetone, ammonia, methylene chloride, nickel chloride, TCA, toluene, TCE, methyl ethyl ketone, nitric acid, and isopropyl alcohol. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index valueof 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified as carcinogens. The existing Hazard Indexes for Pinellas (see table F-19a) were 0.272 onsite (worker effects) and 0.02 at the site boundary (effect on the public) on an annual basis.

Two of the chemicals identified, methylene chloride and TCE, are considered to be carcinogens and the cancer risk for each was calculated. The combined risk to individuals for the carcinogens was calculated as 4.1×10^{-5} onsite and 1.5×10^{-6} at the site boundary (public) (see table F-19b).

Releases of radioactive materials from Pinellas result in a total maximum individual annual dose of 0.098 mrem effective dose equivalent, which is well below the NESHAP 10 mrem effective dose equivalent standard (PI DOE, 1991b). The resulting risk of potential fatal cancers associated with 1 year of operations would be 4.4×10^{-8}.

Risks less than 10^{-6} are considered acceptable by EPA and the State of Florida because this incidence of cancers cannot be distinguished from the normal cancer risk to an individual member of the general public. When risks are greater than 10^{-6} for regulated priority pollutants/hazardous chemicals, appropriate measures are required to reduce these risks to less than 10^{-6}.

In summary, these analyses show that excess cancer risks to workers and members of the public can be expected from the normal releases of hazardous chemicals/chemical pollutants at Pinellas as a result of continued operations (No Action). Mitigative actions, such as substituting less toxic solvents or modifying production processes, are being implemented as appropriate to minimize the impacts.

Environmental Consequences. Closeout of Pinellas Complex missions would result in no additions of hazardous material to, but rather the transfer of operations from, Pinellas to other DOE sites. Consequently, mission closeout would result in a decrease in adverse effects at Pinellas. The impacts at the DOE facilities that would receive the relocated functions from Pinellas are discussed in their respective sections. Closeout of Complex missions at Pinellas would reduce or eliminate the mitigated cancer risks, which are expected to be below 10^{-6}.

4.1.8 Closeout Complex Nonnuclear Missions at Rocky Flats Plant

A detailed discussion of RFP's current missions, facility/process description, and waste treatment and management activities is provided in section 3.2.4. Discussions of the assumptions used in the EA for determining the affected environment and environmental consequences at RFP and the environmental assessment methodologies for each resource or issue discussed below are presented in the introduction to this chapter. Additional information on baseline conditions and environmental consequences of the Proposed Action, which supports the following discussion on the closeout of Complex nonnuclear missions of RFP, is also provided in the chapter 4 introduction and section 4.1.

4.1.8.1 Land Resources

Affected Environment. RFP is located approximately 16 miles northwest of downtown Denver, Colorado (figure 3.2.4-1). Generalized land uses within RFP and in the immediate vicinity are shown in figure 4.1.8.1-1. Residential distribution of RFP employees is discussed in section 4.1.8.7. RFP contains two main types of land use: industrial and undeveloped. Production facilities, which occupy only 384 acres (about 6 percent of the site), are centrally located on the site in a fenced security area (RF EG&G, 1991a). The primary function of the remaining 6,166 acres is that of a security buffer zone. Most of this area is open space; however, there are several other uses including 20 acres of production support facilities, 111 acres (55 acres developed, 56 acres future) of sanitary waste disposal, and 523 acres of aggregate and clay mining. Twenty-nine acres are presently being mined, 194 acres are expected to be mined over the next 20 years, and the remainder is on a 50-year lease. In addition to RFP facilities, the National Renewable Energy Laboratory has facilities located in the extreme northwest corner of the site. There is no prime farmland within the RFP boundary. RFP does not contain any public recreation facilities. Construction and operation of the DOE facilities has heavily disturbed the character of the landscape. The most dominant features on the site include two large stacks and a water tank. The facilities are brightly lit at night and highly visible from many areas within a 3- to 5-mile radius of the site. The area within the central developed area is consistent with a Class 5 VRM designation. The remainder of RFP ranges from a Class 3 to Class 4.

Environmental Consequences. With im-plementation of the Proposed Action, RFP facilities would change from a DP mission to an environmental cleanup (see section 4.4). Land use within the RFP site would not change during the closeout of Complex nonnuclear missions; therefore, no onsite land use impacts are expected. Future use of RFP surplus facilities would be determined as part of transition activities.

Closeout of Complex nonnuclear missions at RFP would not adversely impact the comprehensive planning and zoning of Boulder and Jefferson counties. A review of socioeconomic data in section 4.1.8.7 indicates no adverse impacts to regional recreational resources due to changes in employment at the plant. No construction or demolition activities are planned as part of closeout; therefore, no affect on visual resources or VRM classifications is expected.

4.1.8.2 Air Quality and Acoustics

Affected Environment. The climate at RFP and in the surrounding region is characterized as a dry climate, middle-latitude steppe (Trewartha, 1954), with mild, sunny, semiarid conditions and few temperature extremes. The annual average temperature at RFP is 50.3 "F; temperatures vary from an average daily minimum of 15.9 "F in January to an average daily maximum of 88.0 "F in July. The average annual precipitation at the RFP is approximately 15 inches (NOAA, 1991c).

Ambient Air Quality . RFP is located within the Metropolitan Denver Intrastate AQCR. This AQCR is designated nonattainment with respect to the NAAQS for PM_{10}, O_3, and CO, and listed as attainment for SO_2 and NO_2 (40 CFR 81.306). The PM_{10} standard is exceeded primarily due to fugitive dust. The O_3 and CO standards are exceeded primarily due to vehicular traffic, which is typical of an urban area. The NAAQS and Colorado state ambient air quality standards are listed in table D2.1.1-1.

The Colorado Department of Health has standards for seven hazardous/toxic air pollutants. Five of these (asbestos, beryllium, mercury, benzene, and vinyl chloride) are regulated by NESHAP. The other two (pb and hydrogen sulfide) are not regulated under NESHAP. The Colorado Department of Health has not promulgated HAPs regulations for new sources. The HAPs/toxics described in this section are those currently used at RFP or those anticipated to be used under the RFP consolidation alternative.

RFP operates an ambient air quality monitoring station located near the east entrance of the plant (RF Rockwell, 1989). The data from this monitoring station are presented in table D2.1.4-1. To achieve a conservative estimate, the maximum background concentrations as measured from this station were used in the analysis. Note that the Colorado ozone standard was exceeded.

The principal sources of criteria pollutants at RFP are the steam plant boilers. Minor combustion sources include various small boilers and diesel generators. Other sources of criteria pollutants include coating operations and particulate matter from various manufacturing operations. The emission inventories for RFP are included in table D2.1.4-2.

HAPs/toxics from various laboratories and manufacturing facilities include CCl_4, TCA, trichlorotrifluoroethane, ammonia, and trace quantities of other chemicals. Table D2.1.4-3 lists the RFP emissions inventory of HAPs/toxics.

Normal operations result in the emission of radioactive materials at RFP. These emissions would not be affected by the activities that are the subject of this EA.

The air quality under ambient and No Action conditions at RFP is shown in table 4.1.8.2-1. Ambient air quality monitoring data are listed as "maximum background concentration" and the air dispersion modeling results for existing operations are listed as "No Action concentration." The sum of the maximum background concentration and the No Action concentration for a given pollutant and averaging time is the baseline concentration. The baseline concentration was compared to applicable Federal and state pollutant limits to provide a conservative estimate of effects of the No Action alternative on air quality. With the exception of predicted concentrations of ozone, baseline concentrations from RFP do not exceed, and would not be expected to exceed, any applicable guidelines or regulations. (See section 4.1.8.9 for a discussion of the human health effects of CCl_4.)

The EPA-recommended ISCST model was used to perform the air dispersion modeling analysis (EPA, 1987). A description of the modeling methodology is included in appendix D.

Acoustic Conditions . The major noise sources within RFP include various facilities, equipment, and machines (e.g., cooling towers, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). No sound-level measurements have been made around RFP. At the site boundary, away from most of the industrial facilities, noise from these sources would be barely distinguishable from background noise levels. Thus, the acoustic environment along the RFP boundary and in the nearby residential areas away from traffic noise is assumed to be that of a rural location with typical DNL in the 35 to 50 dBA range (EPA, 1974). The primary source of noise at the site boundary and at nearby residences is traffic. Except for the prohibition of nuisance noise, neither the State of Colorado nor its local governments have established environmental noise standards applicable to RFP.

Noise levels at some residences along roads near RFP may exceed the EPA guidelines level for residential areas. The contribution to noise levels at nearby residences from sources at RFP is minor and not expected to contribute to any exceedance of the guideline levels.

Environmental Consequences.

Air Quality . Closeout of Complex nonnuclear missions at RFP would reduce emissions of criteria, hazardous, and toxic air pollutants. The air quality in the vicinity of RFP would likely improve with the elimination of pollutant sources.

Closeout of Complex nonnuclear missions at RFP would not reduce or eliminate emissions of radioactive materials. These emissions would not be affected by the activities that are the subject of this EA.

Acoustic Conditions . Closeout would reduce staff levels and traffic volumes on nearby roads. A minor reduction in traffic noise levels would also result. However, some of this reduction is expected to be offset by traffic resulting from increases due to other transition activities at RFP.

4.1.8.3 Water Resources

Affected Environment. This section describes the surface water and groundwater resources at RFP.

Surface Water . The primary streams in the plant area are Walnut Creek, North Walnut Creek, South Walnut Creek, and Woman Creek. The major hydrological features at RFP are shown in figure 4.1.8.3-1. The streams at RFP are considered part of the Big Dry Creek drainage basin, although Big Dry Creek is not directly affected by RFP activities. Rock Creek flows through the northwestern portion of the site and is physically separate from the operational plant complex; as such, Rock Creek is unaffected by site activities. Rock Creek has been maintained in an undisturbed condition since 1952 (RF EG&G, 1991e).

RFP lies on the divide between Walnut Creek and Woman Creek drainage basins. North Walnut Creek and South Walnut Creek drain the central and northern areas of RFP, and Woman Creek drains the southern areas. The confluence of South and North Walnut Creeks forms Walnut Creek. Walnut Creek flows downstream from RFP and empties into the Broomfield Diversion Ditch. The Broomfield Diversion Ditch routes water around the Great Western Reservoir, which is a public water supply, then into Big Dry Creek, and eventually into the South Platte River.

Woman Creek flows east across the southern portion of RFP into Standley Lake, which provides irrigation storage and municipal water for surrounding communities (RF EG&G, 1990a). The Woman Creek drainage basin traverses and drains the southern portion of the site. The South Interceptor Ditch collects runoff from the southern portions of the plant before it reaches Woman Creek, and diverts the flow to the off-channel unlined detention Pond C-2. Woman Creek flows into Standley Lake, which provides irrigation, storage, and municipal water for surrounding communities. Woman Creek may also be diverted into Mower Reservoir which also flows into Standley Lake. Then Standley Lake flows into Big Dry Creek, which flows into the South Platte River.

All natural surface water flow on RFP occurs in ephemeral channels that flow only as a result of precipitation, discharge of site effluents, surface seeps, or release of water from storage areas west of the site to supplement water supplies in the Great Western Reservoir or Standley Lake (RF DOE, 1987). On North Walnut Creek, South Walnut Creek, and Woman Creek, a series of unlined ponds serve to impound waters from the site. Along North Walnut Creek, the ponds are numbered A-1 through A-4; on South Walnut Creek, the ponds are numbered B-1 through B-5; and on Woman Creek, the ponds are numbered C-1 and C-2.

Wastewater from industrial processes is treated at a treatment plant that is isolated from other sources and does not discharge. Existing sanitary wastewater generation is estimated at approximately 55.2 MGY (table 3.2.4-2). Sanitary wastewater is treated and discharged to Pond B-3. Stormwater runoff from the plant is conveyed in storm sewers that discharge to creeks on the undeveloped portion of the site (RF WWE, 1992). Discharges from Ponds A-3, A-4, B-3, B-5, and C-2 are monitored under the NPDES permit program.

Terminal Ponds (A-4, B-5, and C-2) are designed to capture the flow from a 100-year storm if maintained at less than 10 percent of capacity. However, RFP has been unable to maintain the 10 percent capacity limit due to the treatment of large quantities of water and delays in receiving approval for certain discharges (RF ASI, 1991).

The primary source of flood potential at RFP is from flash flooding in seasonal streams. Of these, Woman Creek and North and South Walnut Creek drain the part of the site occupied by plant facilities (DOE, 1988). A recent study evaluating flooding potential at RFP indicated that even in the most extreme circumstances it is unlikely that flows on Woman Creek could pose a hazard to facilities. The stream is at least 80 feet below the elevation of structures in proximity to the stream (DOE, 1988 page 3-1). Because evidence suggested that Walnut Creek may be subject to excessive flows during periods of high rainfall and runoff, a probabilistic flood analysis was performed. The 500-year floodplain of Walnut Creek corresponds to an elevation of approximately 5,925 feet. The majority of RFP facilities are located between elevations of 5,950 and 6,050 feet MSL. Therefore, these facilities lie outside the 500-year floodplain.

RFP does not withdraw any water from streams on or near the site. All water for the plant is obtained from surface waters from the city of Denver via the South Boulder Diversion Canal from the South Boulder Creek and Ralston Reservoir. The water supply contract with the city and county of Denver through the Denver Water Board is for an unguaranteed supply of up to 1.5 MGD (RF DOE, 1991c). The current average water consumption is approximately 0.3 MGD (table 3.2.4-3). Raw water is stored in a 1.5 million gallon storage pond west of the plant (RF DOE, 1987).

Surface Water Quality . Revised surface water classifications and standards for RFP streams were adopted by the Colorado Water Quality Control Commission in January 1990 (RF DOE, 1991c). These standards were enacted in response to concerns raised after the 1989 FBI/EPA investigation of environmental violations and a chromic acid spill. The new water quality stream standards are not yet reflected in the RFP NPDES permit (RF EG&G, 1991e).

The water from Woman Creek, North Walnut Creek, and South Walnut Creek flows into ponds that restrict offsite discharges and allow water testing and, if necessary, treatment to meet water quality standards (RF EG&G, 1991e). A treatment facility is located at Pond A-4. Water from Pond B-5 is transferred to Pond A-4. Treatment consists of filtration and carbon absorption to reduce potential radionuclides and organic chemical contaminants. With concurrence from the Colorado Department of Health, water is released from Pond A-4 to Walnut Creek, and from Pond C-2 to the Broomfield Diversion Ditch, or in an emergency, to Ponds A-4 or B-5.

Discharges from Ponds A-4 and B-5 enter Walnut Creek and are diverted around the Great Western Reservoir by the Broomfield Diversion Ditch. Water is discharged untreated from Pond C-2 through an 8,000-foot pipeline into the Broomfield Diversion Ditch and around the Great Western Reservoir (RF EG&G, 1990a). The release of untreated discharge from Pond C-2 has been approved by EPA because sampling indicates that the discharge meets all Woman Creek standards, except for gross beta. The gross beta standards for Walnut Creek, the eventual destination of the piped discharge, are higher, and no standard is violated (RF EG&G, 1991e).

An unlined surface water control pond exists immediately downstream and downgradient of the landfill and current waste disposal operations at the eastern end of the landfill. The landfill is considered a hazardous waste management landfill due to past disposal of some materials that may now qualify as regulated hazardous wastes (RF EG&G, 1991e). The landfill pond routinely exceeds the RFP standard for strontium and has exceeded standards for copper, iron, lithium, manganese, mercury, nickel, plutonium, and zinc (RF ASI, 1991). The landfill pond does not discharge to natural surface waters.

RFP did not comply with NPDES permit limits for biochemical oxygen demand in May, June, and September 1990 and for fecal coliform in August 1990. All noncompliances were communicated to DOE as soon as the data became available. DOE notified EPA by telephone and followed up with written details. No Notices of Violation were issued by EPA in 1990 for these noncompliances (RF EG&G, 1991e). Also, the 1989 Environmental Audit states that the leach fields are inadequate and sewage emerges on the surface and has flowed to nearby streams (RF DOE, 1989).

Water quality monitoring results for Walnut Creek and Woman Creek are presented in table 4.1.8.3-1. These results indicate that concentrations were less than the water quality criteria listed, except in the case of beryllium, which exceeds Federal drinking water regulations.

Groundwater . Two hydraulically connected groundwater systems are present at RFP. The upper unit exists as an unconfined aquifer and the lower unit as a confined aquifer.

The unconfined aquifer at RFP is primarily unconsolidated alluvial material. Depth to the water table becomes shallower from 50 to 70 feet toward the east as the alluvial material thins. Seeps are common along stream drainages. Groundwater flow direction is generally toward the east (RF EG&G, 1991f).

Recharge to the unconfined aquifer occurs from infiltration of precipitation and as seepage from ditches, creeks, and ponds. In addition, retention ponds along South Walnut and Woman Creeks probably recharge this unit.

In the confined aquifer, groundwater is in the sandstone lenses below most of the plant. Flow within the sandstones is assumed to be from west to east (RF Hydro-Search, 1985). In some places, the sandstones are in contact with the alluvium so that the unit is part of the unconfined system at those places. Recharge to the sandstones occurs where they are in direct contact with the alluvium and valley fill of the upper aquifer or by leakage through claystones in contact with alluvium. The sandstone units discharge along the South Platte River, about 18 miles east of RFP.

Groundwater Quality . Groundwater monitoring has been conducted at RFP since 1960. Currently, 371 wells characterize the hydrogeology and groundwater quality at RFP. Groundwater quality in uncontaminated portions in surficial materials (alluvium, colluvium, valley fill, and weathered bedrock) is relatively good and can be classified as calcium bicarbonate water. The unweathered bedrock groundwater system can be distinguished from the surficial system by relatively higher sodium and sulfate content (DOE, 1989). Groundwater quality of the aquifer beneath RFP in the proposed area is summarized in table 4.1.8.3-2.

The unconfined aquifer contains both radiological and nonradiological contaminants. To date, no contaminants have been found in the confined aquifer.

There are five known contaminant plumes at RFP (figure 4.1.8.3-2). The first plume is associated with the solar evaporation ponds, which were used to store radioactive/hazardous waste. The main contamination from this plume lies beneath Buildings 207A and 207B. Groundwater quality data from 1991 indicate that the solar ponds contributed nitrate/nitrite, sodium, total dissolved solids, sulfate, radionuclides, and VOCs to the groundwater in surficial material and weathered bedrock immediately north, east, and southeast of the ponds. The radionuclides include tritium, radium, strontium-89 and -90, and uranium-233, -234, -235, and -238.

The second plume, the 903 Pad, Mound, and Trench plume, is located in the southeastern central portion of RFP. The 903 Pad and Mound areas were historically used for storage and burial, respectively, of radioactively contaminated wastes. The plume does not lie beneath buildings that house DOE DP nonnuclear activities.

The third plume is associated with the present landfill and is located at the western end of North Walnut Creek. The plume does not lie beneath buildings that house DOE DP nonnuclear activities. However, the contaminants in this area have reached the North Walnut Creek drainage. The plume contains inorganic analytes, dissolved metals, dissolved radionuclides, VOCs, and nitrate/nitrite above standard levels.

The fourth plume is the 881 Hillside plume, located in the south-central portion of the RFP in the shallow groundwater system. This plume does not lie beneath any buildings housing DOE DP nonnuclear activities.

The fifth plume is associated with the West Spray Area with primary contamination occurring in the western portion of the RFP buffer zone. This plume is not shown on figure 4.1.8.3Ä2 and does not lie beneath buildings that house DOE DP nonnuclear activities. Remediation of all plumes is being addressed as part of the RFP environmental restoration program.

Groundwater Use . Currently, no groundwater is used by the facility. However, the plant is attempting to have one water supply well permitted for research use.

Groundwater Rights and Permits . In general, the rights to groundwater resources in Colorado are unrelated to ownership of the land under which those groundwater resources are located. However, for the Denver Basin Aquifers, which include the lower aquifers at the RFP, the right to groundwater resources derives from land ownership as long as the water is not tributary to any surface water supplies.

Environmental Consequences. Closeout of Complex nonnuclear missions at RFP would not involve any new construction; instead, all current nonnuclear operations would cease.

Surface Water . Because existing facilities are not located in the 500-year floodplain, closeout would not affect the floodplain area.

The closeout would result in an incremental decrease in the total wastewater volume handled by the plant. With reduced wastewater discharges, the RFP Terminal Ponds may be able to operate at design capacity to capture the flow from a 100-year storm. No impact to flow and water quality of Walnut and Woman Creeks would result.

Surface Water Quality . Because surface water discharges would be reduced there would be no adverse impact to water quality from closeout activities.

Groundwater . Because RFP does not withdraw groundwater, there would be no impact on the availability of this resource.

Groundwater Quality . A minor beneficial impact on groundwater resources would occur due to less potential for degradation of water quality from Complex nonnuclear mission activities. However, all other nuclear functions would continue as presently planned.

Spill protection systems and plans exist to contain and minimize effects of releases of hazardous substances during closeout activities. Given normal safeguards and procedures, no adverse impact to groundwater quality is expected to result from transition activities associated with the closeout of RFP Complex nonnuclear functions.

4.1.8.4 Geology and Soils

Affected Environment. RFP lies on the west flank of the Denver Basin. The plant is located on the gently eastward-sloping plain east of the foothills of the Front Range of the Rocky Mountains. The site is on rock layers that slope east at a low angle to the east. A short distance to the west, the stratigraphic sequence turns sharply upward, forming a series of rock outcrops along the mountain front (RF EG&G, 1991b).

RFP is in an area of low seismicity and lies in Seismic Zone 1 (ICBO, 1991). No capable faults are present in the immediate vicinity of the plant. The main faulting in the area is along the Front Range. Occasional earthquakes with maximum intensities of V to VI occur in Colorado, with the larger ones restricted to the west end of the state. Seismic activity poses little or no threat.

Small landslides and other mass movements are present where slopes exist; however, slopes are not steep and mass movements are limited in scale.

RFP is underlain by soils of the Denver-Kutch and Flatirons-Veldcamp soil associations. Erosion potential of the Denver-Kutch soils is low to moderate and the shrink-swell potential is moderate to high. The Flatirons-Veldcamp soils do not pose an erosion hazard, and their shrink-swell potential is low to moderate. Some soils in the Denver-Kutch association located on RFP could be considered prime farmland if irrigated (RF USDA, 1980). However, they are not irrigated and, therefore, are not designated as prime farmland.

Air-distributed plutonium-239 has settled over the land surface at RFP due to past operation activities, contaminating the surface layer of soils to depths of up to about 12 inches. Soil sampling is conducted to detect and monitor contamination with radioactive material on and from RFP, and permanent soil-sampling sites have been set up around the perimeter of the plant. Because radiation levels above those naturally occurring have been found to the east and southeast of the main RFP complex, DOE has carried out and currently supports remediation actions to remove or decrease soil contamination (RF DOE, 1992b).

Environmental Consequences. The proposed closeout of Complex nonnuclear missions at RFP would result in no impact on geologic features of the area, nor would the geology have any impact on closeout activities at the plant.

Hazardous, radioactive, and mixed waste sources would be eliminated from portions of the plant, thus decreasing future soil contamination potential. The proposed closeout of Complex nonnuclear functions at RFP would result in no impact on the soils of the area.

4.1.8.5 Biotic Resources

Affected Environment. Other than the central developed area of approximately 400 acres, most of RFP is managed as an undeveloped security buffer zone (section 4.1.8.1) that is excluded from human activity. This area supports natural vegetation that is representative of tall grass prairie, short grass plains, lower montane, and foothill ravine regions (RF DOE, 1980 and 1991a). The undeveloped buffer areas are closed to the grazing that is prevalent on grasslands in the vicinity of the RFP site. Many areas that formerly supported annual weed communities (due to grazing prior to DOE acquisition) now support perennial grassland. Wildlife in the undeveloped buffer areas is typical of similar grassland habitats in the surrounding region (RF DOE, 1991a).

Wetlands within the RFP site have been mapped and verified by the Corps of Engineers. Wetlands include an open lake, ponds, intermittent stream channels, ditches, and hillside seeps (RF EG&G, 1990b; RF FWS, 1975). These wetlands are classified in the lacustrine, riverine, and palustrine systems by the FWS.

Four intermittent streams that provide habitat for aquatic biota occur within the boundaries of RFP: Rock Creek, Woman Creek, and North and South Walnut Creeks (figure 4.1.8.3-1) (RF DOE, 1980; RF Rockwell, 1986a). Woman Creek supports an aquatic biota typical of small, high-prairie streams receiving minimal agricultural runoff and domestic and industrial wastes.

A comprehensive survey for threatened and endangered species has been recently completed for RFP (RF EG&G, 1991c). Suitable habitat for the Ute's ladies-tresses orchid (S piranthes diluvialis) (a Federally-listed threatened species) occurs on RFP; however, no specimens were found during a recent survey (RF ESCO, 1992). The bald eagle (Haliaeetus leucocephalus) (a Federally- and state-listed endangered species) is known to winter on large water bodies in the vicinity of RFP, and the peregrine falcon (Falco peregrinus) (a Federally- and state-listed endangered species) has been sighted on RFP. The ferruginous hawk (Buteo regalis) and the Preble's meadow jumping mouse (Zapus hudsonius preble) (both Federal candidate category-2 species) have also been observed on RFP and may breed there. Portions of a prairie dog colony extend across RFP's northern boundary and could provide suitable habitat for the black-footed ferret (Mustele nigripes) (a Federally- and state-listed endangered species). However, the occurrence of the black-footed ferret is not likely (RF EG&G, 1991c).

Environmental Consequences. Closeout of Complex nonnuclear missions at RFP under the Proposed Action would not adversely affect biotic resources. Closeout of these missions would result in a reduction of existing operational impacts to natural habitats on and around the site.

4.1.8.6 Cultural Resources

Affected Environment. The prehistoric chronology of the Rocky Flats area consists of four broad time periods: Paleoindian (10,000-5500 B.C.), Archaic (5500 B.C.-A.D. 1), Ceramic (A.D. 1-1550), and Protohistoric (A.D. 1550-1800) (RF Cassells, 1983; RF D&M, 1991). Prehistoric site types that occur in the area include teepee ring sites, camps, quarries, hunting stations, plant processing sites, and buffalo kill and butchering sites. Three surveys have been conducted at RFP covering all of the undisturbed portions of the facility (RF Burney, 1989; RF Cassells, 1983; RF D&M, 1991). No prehistoric sites were identified; however, two sites with rock alignments and four isolated cairns were recorded and are most likely prehistoric (RF Burney, 1989; RF EG&G, 1991a). The two sites have not been evaluated to determine their NRHP eligibility; therefore, these sites are considered potentially NRHP-eligible pending additional work. The four isolated cairns are not considered NRHP-eligible (RF Burney, 1989; RF D&M, 1991). The history of the region has been previously documented. Most of the historic resources in the area are archaeological sites or standing structures associated with ranching or transportation routes. Historic site types in the vicinity include trails, railroad grades, homesteads, cattle camps, line shacks, ranch complexes, irrigation ditches, stock ponds, and windmills. All undisturbed portions of RFP have been intensively surveyed; 35 historic sites and 4 isolated rock features have been recorded. The historic sites include a railroad grade, stock ponds and tanks, irrigation ditches, corrals, a fence, a dump, a spring house, and homesteads. None of the historic sites or features have been recommended as eligible for the NRHP (RF Burney, 1989; RF D&M, 1991).

In 1951, the Santa Fe Office of the AEC selected the Denver area for a new fabrication facility, and operations at Rocky Flats were initiated in 1953 (RF D&M, 1991). Most of the RFP facilities were constructed in the early 1950's and have since been modified and refurbished. The existing facilities are not likely to be considered NRHP-eligible because they lack architectural integrity, are not representative of a particular style, and are not contributing features to the broad theme of the Manhattan Project and initial nuclear production.

Several Native American groups, including Plains Apache, Comanche, Ute, Arapaho, and Cheyenne, historically occupied or traversed the foothills area around RFP. Important sites, such as burials or vision quest locations, may be of concern to Native American groups. Several unidentified rock features and alignments have been recorded on RFP and may also be of concern to Native American groups.

Environmental Consequences. The closeout of Complex nonnuclear missions at RFP does not include ground disturbance or building modifications and, therefore, would not affect cultural resources.

4.1.8.7 Socioeconomics and Community Services

Affected Environment. The discussion of socioeconomics and community services at RFP is based on an ROI where 93 percent of the RFP employees lived in 1991. The ROI includes Adams (18 percent), Arapahoe (5 percent), Boulder (24 percent), Denver (8 percent), and Jefferson (38 percent) counties in Colorado. Within these counties, the following key cities have been included in the Affected Environment and Environmental Consequences discussions: Arvada (16 percent), Boulder (6 percent), Broomfield (8 percent), Golden (5 percent), and Westminster (8 percent) (see figure 3.2.4-1).

Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. Tables E3.8-1 through E3.8-5 provide ROI resource information on: residential distribution of plant employees, regional economic and population growth indicators, housing characteristics, primary municipal water and wastewater systems, education characteristics, and local transportation.

Employment and Local Economy. The civilian labor force in the ROI grew 97 percent, increasing from 511,935 in 1970 to 1,009,650 in 1990. Total employment increased from 492,961 to 964,447 between 1970 and 1990, an annual growth rate of 3 percent. The unemployment rates for 1970 and 1990 were 3.7 percent and 4.5 percent, respectively. For the same years, personal income increased from approximately $5.6 billion to $35.8 billion (an annual average of 10 percent), and per capita income increased from $4,503 to $20,006.

Between 1970 and 1990, employment at RFP increased from 3,805 to 6,780, representing less than 1 percent of the ROI employment in 1990 (RF EG&G, 1991d). Changes in mission requirements have historically led to fluctuations in employment levels over this period. For example, employment increased to 6,000 by 1985. As of September 30, 1992, employment at RFP had increased to 7,299. The proposed Fiscal Year 1994 budget projects a reduction in expenditures at the site resulting in reduced employment. The reduction in workforce associated with the budget reductions is only estimated at this time. Under the proposed Fiscal Year 1994 budget, the No Action alternative future site employment would be expected to increase to approximately 6,500 persons by the year 2000 (DOE, 1993c). In 1992, the total RFP payroll was estimated to be about $294 million (RF DOE, 1992a). Under the No Action baseline, the total payroll would be projected to be approximately $262 million by the year 2000.

The civilian labor force is projected to grow at less than 1 percent annually, reaching an estimated 1,205,000 by 2000 and 1,283,000 by 2020. The unemployment rates for 2000 and 2020 are both projected to be 5.6 percent. For the same years, personal income is projected to increase from approximately $51.8 billion to $67.7 billion, an annual average of 1 percent. Per capita income is projected to increase from an estimated $25,000 in 2000 to $28,000 in 2020.

Population. Between 1970 and 1990, the population in the ROI increased 45 percent to 1,787,928. During the same period, the Colorado population increased 49 percent. The population in the 5-county ROI is projected to increase from an estimated 2,100,000 in 2000 to 2,390,000 by 2020, an annual rate of 1 percent.

The largest county population increase (137 percent) occurred in Arapahoe County between 1970 and 1990, while the population in Denver County declined 9 percent. During the same period, population in Jefferson County increased 88 percent. Population in Arapahoe County is estimated to increase 16 percent between 1990 and 2000 and 14 percent between 2000 and 2020, an annual growth rate of less than 1 percent. The Denver County population is projected to increase approximately 22 percent between 1990 and 2000 and 14 percent between 2000 and 2020, an annual growth rate of 1 percent. The population in Jefferson County is expected to increase approximately 14 percent by 2000 and an additional 14 percent by 2020, an annual growth rate of less than 1 percent.

Between 1970 and 1990, Westminster had the greatest increase in city population (284 percent) in the ROI. For the same years, the populations in Arvada, Boulder, Broomfield, and Golden increased 86 percent, 25 percent, 239 percent, and 34 percent, respectively.

Housing. Between 1970 and 1990, the number of housing units in the ROI increased 92 percent from 410,529 to 788,480. Concurrent with population growth in the ROI, the number of housing units is expected to increase approximately 18 percent by the year 2000 and an additional 14 percent by 2020, an annual increase of about 1 percent.

Between 1970 and 1990, the largest increase in housing units (245 percent) occurred in Arapahoe County, while the smallest increase (24 percent) occurred in Denver County. The number of housing units in Arapahoe County is expected to increase approximately 19 percent by 2000 and an additional 14 percent by 2020, an annual increase of 1 percent. The number of housing units in Denver County is expected to increase about 5 percent by 2000 and an additional 14 percent by 2020, an annual increase of less than 1 percent.

In 1990, the homeowner vacancy rates averaged 3 percent in the ROI and ranged from approximately 2 percent in Boulder County to 4 percent in Denver County. The vacancy rates for rental units averaged 11 percent and ranged from about 5 percent in Boulder County to 14 percent in Adams County.

Community Infrastructure and Services. Thornton, Westminster, Northglenn, Brighton, South Adams County Water and Sewer District, Aurora, Englewood, Boulder, Longmont, Broomfield, Lafayette, Denver, Arvada, and Golden all operate water supply systems in the ROI. All of these systems draw their raw water supplies from surface water, except Brighton and the South Adams County Water and Sewer District, which utilize groundwater supplies.

In Adams County, the systems operated by Thornton (50 MGD capacity), Northglenn (15 MGD capacity), Brighton (12 MGD capacity), and South Adams County Water and Sewer District (15.5 MGD capacity) had 1989 average daily demands of less than 29 percent of capacity. Westminster's system (36 MGD capacity), also in Adams County, had 1989 average daily demands of 64 percent of capacity. The Aurora (130 MGD capacity) and Englewood (34 MGD capacity) systems in Arapahoe County experienced 1989 average daily demands of 31 percent and 24 percent of capacity, respectively. Water supply systems in the cities of Boulder (55 MGD capacity), Longmont (50 MGD capacity), Broomfield (8 MGD capacity), and Lafayette (8 MGD capacity) in Boulder County all had 1989 average daily demands of less than 38 percent of capacity. The Denver Water Board system (715 MGD capacity) had 1989 average daily demands of 30 percent of capacity. The systems operated by Arvada (52 MGD capacity) and Golden (15 MGD capacity) in Jefferson County had 1989 average daily demands of 30 percent and 23 percent of capacity, respectively.

Westminster's system is projected to have average daily demands of 67 percent of capacity in 1995 and 70 percent of capacity in the year 2000. All other systems are projected to have average daily demands of less than 41 percent of capacity in 1995 and less than 46 percent of capacity in 2000.

Westminster, Northglenn, Brighton, South Adams County Water and Sewer District, Aurora, Englewood, Boulder, Broomfield, Lafayette, Longmont, and Denver operate wastewater treatment systems in the ROI. Westminster (5.5 MGD capacity), Northglenn (6.5 MGD capacity), Brighton (about 2.6 MGD capacity), and South Adams County Water and Sewer District (4 MGD capacity) in Adams County experienced 1989 average daily demands of 76 percent, 48 percent, 67 percent, and 65 percent of capacity, respectively. Englewood's system (35 MGD capacity) in Arapahoe County experienced 1989 average daily demands of 66 percent of capacity. Aurora (2.5 MGD capacity), also in Arapahoe County, operates its system near capacity (92 percent in 1989) but utilizes Denver's system to treat approximately 90 percent of its wastewater. The cities of Boulder (16 MGD capacity), Longmont (about 11.6 MGD capacity), Broomfield (5.4 MGD capacity), and Lafayette (1.8 MGD capacity) all operate systems in Boulder County. Longmont, Broomfield, and Lafayette had 1989 average daily demands of 61 percent, 47 percent, and 67 percent of capacity, respectively, while Boulder's system experienced average daily demands of 100 percent of capacity. The Denver Metro Wastewater Reclamation District (185 MGD capacity), the largest system in the region, serves both Denver County and Arvada and Lakewood in Jefferson County and had 1989 average daily demands of 76 percent of capacity.

The system operated by Westminster is projected to have average daily demands of 85 percent of capacity in 1995 and 95 percent of capacity in 2000. Boulder's system, currently operating at capacity, is projected to have average daily demands of 103 percent and 106 percent of capacity in 1995 and 2000, respectively. All other systems are projected to have average daily demands of less than 80 percent of capacity in 1995 and less than 84 percent of capacity in 2000.

Eighteen school districts provide public education services and facilities in the ROI. In 1990, these school districts ranged in enrollment size from 181 students in the Deer Trail School District to 75,164 students in the Jefferson County School District. School districts with enrollments over 1,000 were operating between 46 percent and 135 percent of capacity. Those school districts operating over 100 percent of capacity were Strasburg (135 percent) and Westminster (104 percent). Any plans to expand permanent facilities in the near future are unknown at this time. The average pupil-to-teacher ratio for the ROI was 19:1, and expenditures averaged $5,253 per pupil. The statewide average pupil-to-teacher ratio was 18:1, and expenditures averaged $5,374 per pupil (CO DEd, 1990).

Thirty-one hospitals serve the five-county ROI, with the majority operating well below capacity (AHA, 1990). In 1990, a total of 5,199 physicians served the ROI. The physician-to-population ratio for the ROI was 2.9:1,000 and ranged from 1.3:1,000 in Jefferson County to 6.6:1,000 in Denver County. The national physician-to-population ratio for urban areas was 2.6:1,000 (AMA, 1990).

Fourteen city, county, and state law enforcement agencies provide police protection in the ROI. In 1990, the largest law enforcement agencies in the five-county ROI were in Denver, with 1,362 sworn officers or 2.9 sworn officers per 1,000 persons; and in Jefferson County, with 360 sworn officers or 0.8 sworn officers per 1,000 persons. The average number of sworn officers in the ROI was 1.8 per 1,000 persons (FBI, 1991).

Thirty-three fire departments and 3,694 regular and volunteer firefighters provided fire protection services in 1990. The principal municipal departments include both professional and volunteer staff. In 1990, the greatest staffing strengths were found in the fire departments in Denver County (877 firefighters; 1.9 firefighters per 1,000 persons) and in Boulder County (754 firefighters; 3.3 firefighters per 1,000 persons). The average number of firefighters in the ROI was 2.1 per 1,000 persons (Kapalczynski, 1988).

Local Transportation. Vehicular access to RFP is provided by Colorado State Route 93 to the west and Jefferson County Road 17 (Indiana Street) to the east.

Estimated traffic along segments providing access to RFP is projected to contribute to differing service level conditions in accordance with population growth. Colorado State Routes 93 and 128, as well as Indiana Street, would typically experience traffic congestion, with volumes approaching or exceeding the design capacity of each roadway. Along these roadways, a motorist's speed and ability to maneuver would be restricted, and potential disruptions to the traffic flow could be caused by accidents or maintenance activities, resulting in some congestion. In addition, estimated truck traffic into RFP for delivery of supplies and removal of wastes would typically average 24 trips per day. However, the additional traffic volumes associated with continued operation of RFP are relatively minor and would not substantially affect local transportation conditions.

No major improvements are scheduled for those segments providing immediate access to RFP (CO DHwy, 1991a).

Major railroads in the ROI include the Denver and Rio Grande Western Railroad; the Burlington Northern Railroad; the Atchison, Topeka, and Santa Fe Railroad; and the Union Pacific Railroad. A single-track spur from the Denver and Rio Grande Western Railroad mainline accesses RFP from the west (RF DOE, 1980). No navigable waterways within the ROI are capable of accommodating waterborne transportation of material shipments to RFP.

Stapleton International Airport provides passenger and cargo service in the ROI on national and international carriers (DOT, 1991). A new Denver Airport is scheduled for completion in October 1993, at which time Stapleton International Airport is scheduled to close (Adams County, 1990).

Environmental Consequences. The employment figures for construction and operations for the Proposed Action are given in table 3.3-1 in section 3.3. As a result of ongoing planning and the proposed Fiscal Year 1994 budget figures, DOE has revised the estimate of post consolidation work force figures which reflect a loss of 715 jobs instead of 750 jobs (DOE, 1993c and d). The analysis presented in table 4.1.8-7 and discussed here uses the methodology presented in appendix E and the original estimate of 750 lost jobs. The estimate of 715 lost jobs is 5 percent lower than the 750 job loss used in the following analysis, and this lower job loss would result in slightly fewer negative economic consequences. The Proposed Action would result in minor decreases in economic activity and employment in the ROI. Based on the employment requirements for the transferred functions from RFP, employment would decrease in the ROI by an estimated 2,917 jobs (750 direct and 1,167 indirect). This reduction would not increase the unemployment rate in the year 2000 beyond the projected baseline level of 5.6 percent. Earnings in the ROI would be reduced by about $68.5 million, with a related decrease in the total personal income of $82.2 million.

The ROI would be further affected by employment losses after the closure of the Technical Training Center at Lowry Air Force Base located in Denver. The 1001st Space Systems Squadron, Defense Finance and Accounting Service, and the Air Force Reserve Personnel Center would remain open, but all technical training would by redistributed to other locations (RF DBCRC, 1991). It is estimated that this closure will result in the loss of approximately 6,500 persons, of whom between 3,500 and 4,000 are students at the Technical Training Center.

The projected economic and population changes that would result from the Proposed Action are summarized in table 4.1.8.7-1. This project-related change would represent a slight population decrease of less than 1 percent from the projected ROI baseline of 2,100,000. The cities of Broomfield and Golden would be the most affected; however, their populations would not decrease more then 1 percent.

The less than 1-percent change in population after closeout of Complex nonnuclear missions would create an estimated 435 additional vacant housing units, which is less than a 1-percent increase. The city of Golden would be the most affected, but with a less than 1-percent increase in the number of vacant housing units.

The less than 1-percent estimated population loss would not adversely affect any community infrastructure and services in the ROI but would, instead, reduce the burden on the capacity of the existing systems. Existing public education and health care capacity burdens would also improve by reducing utilization. Current staffing levels for police and fire services in the ROI counties and cities would not be affected, and local traffic conditions would improve slightly.

4.1.8.8 Waste Management/Pollution Prevention

Affected Environment. Discussion of the RFP waste management baseline is provided in section 3.2.4.3 and appendix A, section A.4. Because there are no TRU wastes associated with any of the Complex nonnuclear missions at RFP that would be closed out due to the Proposed Action, no further discussion of TRU waste generation or management is presented.

Generation of LLW, mixed, hazardous/toxic waste, and nonhazardous wastes at RFP is expected to decrease with time, as production operations are expected to be reduced.

LLW is packaged and stored onsite pending approval for offsite disposal at NTS. RFP's RCRA permit specifies storage locations and volume limits for LLW storage onsite. A new 25,000-ft^2 centralized waste storage facility, which would consolidate LLW, low-level mixed, and hazardous wastes, is scheduled to be completed in April 1994, allowing RFP to extend permitted capacity well beyond 1994.

Waste operations at RFP consist of the storage and treatment of hazardous wastes subject to the requirements of RCRA and the management of wastes subject to the requirements of TSCA. All facilities are in compliance with the applicable requirements of both TSCA and RCRA, as appropriate. All waste stream residue generated at RFP that is not reclaimed or recycled onsite is manifested and shipped under contract with DOT-registered transporters to RCRA- or TSCA-permitted offsite treatment and disposal facilities.

Nonhazardous wastes are segregated and recycled whenever possible. Trash is disposed of at RFP in a landfill approved by Jefferson County with concurrence from the State of Colorado. Wastewater effluents from RFP processing activities are treated and used for process make-up water and do not discharge offsite.

RFP has implemented a waste minimization and pollution prevention program using programmatic controls such as source reduction, inventory control, product substitution, and waste exchange programs. Ongoing hazardous waste pollution prevention and waste minimization activities at RFP include replacement of carbon tetrachloride and trichloroethane used in cleaning with aqueous detergents or nonchlorinated solvents, and recycling of chlorofluorocarbons used in refrigeration units throughout the plant.

Environmental Consequences. Closeout of Complex nonnuclear missions at RFP would ultimately reduce onsite, hazardous annual waste management by approximately 378,600 lb for DP operations. Over 65 percent of the reduction would be due to decreased generation and incineration of bulk oil; 32 percent to decreased generation and landfilling of industrial wastewater pretreatment sludge; and less than 2 percent to decreased generation and incineration of bulk acid liquid. Nonhazardous waste would also be reduced as a result of the closeout.

Closeout of Complex nonnuclear missions at RFP would initiate closure of some existing onsite RCRA hazardous waste storage facilities. Closure would comply with a detailed closure plan and schedule approved by the Colorado Department of Health. Hazardous wastes in storage would be manifested and shipped under contract with DOT-registered transporters to RCRA- or TSCA-permitted treatment and disposal facilities. Equipment, structures, and soils (if contaminated) would also be decontaminated and disposed of in accordance with all applicable environmental regulatory requirements.

Existing inventories of LLW, mixed waste, and classified waste would be shipped offsite to DOE disposal facilities certified to accept such wastes.

Due to the closeout of Complex nonnuclear missions, RFP would reduce discharges of treated sanitary wastewater to Walnut Creek.

Nonhazardous solid waste streams, such as paper, cardboard, glass, wood, plastics, scrap, and metal containers, would be reduced as a result of this action. Trash that would have been disposed of in the onsite sanitary landfill would diminish, extending the operating life of the landfill.

4.1.8.9 Human Health: Facility Operations and Accidents

Affected Environment. As discussed in the Air and Water Resources sections for RFP (§4.1.8.2 and 4.1.8.3, respectively), the chemical pollutant levels from RFP operations to which the public is exposed meet applicable permit, regulatory, and DOE operational requirements. Exposures to members of the public from radiological releases from RFP are well below applicable permit, regulatory, and DOE operational requirements (RF EG&G, 1991e).

A review of the recent RFP annual environmental and accident reports indicates that there have been no releases that resulted in adverse impacts to workers, members of the public, or the environment. This review was performed to provide a baseline for estimating impacts from recent site operations. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than expected in the future.

Water from processes containing hazardous chemicals is treated in a closed loop system. Thus, the primary pathway considered for possible worker or public exposure is the air pathway.

For RFP, HAPs were examined and from this assessment, the following chemicals were identified for further analysis based on their toxicity, concentration, and frequency of use: ammonia, CCl_4, methylene chloride, and TCA. The Hazard Index, a summation of the Hazard Quotients for all chemicals, was calculated for the No Action alternative and the chemicals proposed to be added (increment) at the site to yield cumulative levels for the site. A Hazard Index value of 1.0 or less means that no adverse human health effects (non-cancer) are expected to occur. The Hazard Quotient is the value used as an assessment of non-cancer associated toxic effects of chemicals, e.g., kidney or liver dysfunction (see target organs in table F-1). It is independent of a cancer risk, which is calculated only for those chemicals identified as carcinogens. The existing Hazard Indexes for RFP (see table F-14a) were 14.1 onsite (worker effects) and 0.322 at the site boundary (effect on the public) on an annual basis.

The exceedance of the Hazard Index onsite is due primarily to CCl_4 emissions (Hazard Quotient of 14.0), the majority of which is due to nuclear facilities operations; elimination of this chemical would bring the Hazard Index to a level below

1.0, where no adverse health effects would be expected. In the future, CCl_4 use would be reduced. Replacement non-carcinogenic solvents like TCA would be used as a substitute for CCl_4. Furthermore, RFP operations that use CCl_4 are not activities that are proposed to be transferred as part of the action of this EA. The activities currently involving beryllium at RFP have been the subject of epidemiologic studies which show correlation with chronic beryllium diseases. However, improved safety procedures and modifications in the crystal structure of beryllium result in lower toxicity than that of beryllium used between 1940 and 1950 (Rossman, 1991).

Two of the chemicals identified, CCl_4 and methylene chloride, are considered to be carcinogens and the cancer risk to individuals was calculated. The risk for the carcinogen was calculated as $5.3x10^{-4}$ onsite (worker) and $1.2x10^{-5}$ at the site boundary (public) (see table F-14b). The cancer risk for the methylene chloride will be mitigated by substitution of a less toxic noncarcinogenic solvent.

Releases of radioactive materials from RFP resulted in a total maximum individual annual dose of 0.23 mrem effective dose equivalent (RF EG&G, 1990a). The resulting risk of potential fatal cancers associated with 1 year of operations would be $1.0x10^{-7}$. Cancer risks of 10^{-6} or less are considered acceptable because this incidence of cancers cannot be distinguished from the normal risk to an individual member of the public. When risks are greater than 10^{-6}, appropriate measures are required to reduce the risks to less than 10^{-6}.

In summary, these analyses show that excess cancer risks to workers and members of the public can be expected from normal releases of hazardous chemicals/chemical pollutants associated with nuclear activities at RFP as a result of continued operations. Administrative and engineering mitigative actions are being implemented to minimize the impact. The risk attributed to nonnuclear functions can be reduced by replacing the currently used solvents with less toxic ones.

Environmental Consequences. Closeout of Complex nonnuclear missions would result in no additions of hazardous materials to RFP. Consequently, closeout would result in a decrease in adverse affects. The impacts at the DOE facilities that would receive the relocated Complex nonnuclear missions from RFP are discussed in their respective sections.

4.2 Other Consolidation Alternatives

This section discusses the environmental consequences of the Mound, Pinellas, and RFP alternatives to the Proposed Action (KCP consolidation). Because many of the elements of the alternatives are also common to the Proposed Action and No Action, the discussion of impacts for each is presented and discussed in a comparative manner to the Proposed Action (section 4.1) and, as appropriate, No Action (section 4.1.1 to 4.1.8).

4.2.1 Mound Plant

Impacts of this alternative are similar to the Proposed Action because the neutron generator, cap assemblies, and thermal battery functions from Pinellas would be relocated to SNL (sections 4.1.5). However, the impacts of this alternative would be less than the impacts of the Proposed Action at SNL because the milliwatt heat source surveillance function would remain at Mound and not be relocated to SNL. The impacts of this alternative would also be less than the Proposed Action at LANL (section 4.1.3), which would receive only the neutron tube target loading function from Pinellas and the beryllium technology and pit support functions from RFP, but not the explosives or calorimeter functions from Mound. There would be no impacts at SRS under this alternative because the tritium-handling functions currently at Mound would remain at Mound and not be relocated to SRS. The explosives, tritium-handling, and electrical/mechanical functions currently performed at Mound would remain in place but at the same reduced workload as the Proposed Action.

4.2.1.1 Land Resources

Consolidation of electrical/mechanical functions at Mound would require modification of existing building space located at the Main Hill Area, SM/PP Hill Area, and Valley Area of the plant (figure 3.4.1-2). New construction would occur at the SM/PP Hill Area (heavily developed) and New Property Area (undeveloped). New construction at the SM/PP Hill Area and the New Property Area would disturb about 62 acres for new buildings, temporary construction laydown, and a parking area (table 3.4.1-1).

During construction, the offsite land requirements for residential land uses from project-related in-migration (section 4.1.6.7) would be approximately 37 acres, distributed throughout the local jurisdictions of Butler, Montgomery, and Warren counties. The project-related offsite land requirements for residential land uses associated with operations would be approximately 267 acres. Land available for residential development in the tri-county area would easily meet these needs.

There are extensive public and private recreational facilities in the region that could easily absorb the increased demand resulting from the population increase. Impacts to recreational resources would be negligible.

Facilities of the Mound alternative would be located adjacent to existing industrial development and would be screened from viewpoints with high sensitivity levels by terrain and vegetation. The buildings would be similar in appearance to the existing structures and in keeping with the existing Class 5 VRM designation.

4.2.1.2 Air Quality and Acoustics

Air Quality . During construction, minor air quality impacts would occur, including the generation of particulate matter such as dust and dirt. These impacts would be controlled through standard construction practices such as watering of construction sites. During operations, air emissions could increase at Mound for the criteria pollutants and for HAPs/toxics (FDI, 1993). The emissions inventory for the Mound alternative is presented in table D3.1.2-1. The predicted air quality impacts at Mound from the Mound consolidation alternative are presented in table 4.2.1.2-1. These are all within applicable standards and guidelines (See appendix D for a description of the input parameters, assumptions, and methodology used to estimate impacts of this alternative on air quality at Mound).

Normal operations result in the emission of radioactive materials at Mound (MD DOE, 1991a). The Mound alternative would not result in an increase in the emission of radioactive materials.

Acoustic Conditions . Changes in noise levels during construction and operations have been estimated for the major traffic routes around Mound. The estimates are based on existing traffic volumes and projected changes in volumes as a result of proposed changes in employment at Mound. These changes in traffic volumes are predicted to result in an increase of 5 dB in peak-hour sound levels along Mound Road during operations. Changes in sound levels along other routes are estimated to be small. The increased noise levels along the major access routes would be expected to cause no increase in annoyance level to communities or individuals, except along Mound Road during operations when some increased reaction to traffic noise may be expected.

Noise emissions from onsite construction activities have not been analyzed but may be expected to result in a short-term increase in noise from heavy equipment operation and other construction noise sources. Construction activities include erection of major new buildings and parking areas on the southern part of the site and renovation of existing buildings. Noise emissions from onsite operation activities should be similar to those from existing sources. The facilities would be designed to minimize noise levels at the site boundary and to ensure compliance with the city of Miamisburg's Noise Ordinance (appendix D, section D.2.2.2).

Construction workers and personnel working at any of the reconfigured facilities at Mound would be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at Mound.

Although no increase in annoyance is expected offsite from construction and operations onsite, measures would be necessary to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments during construction and operations with appropriate hearing protection devices meeting OSHA standards. Noise levels would be measured in worker areas and an effective hearing protection program conducted. Traffic noise may be mitigated by providing access to the new facilities from Benner Road.

4.2.1.3 Water Resources

This section describes potential surface and groundwater impact due to the Mound consolidation alternative.

Surface Water . Building modifications and new building construction would take place in areas above the 500-year floodplain. Therefore, the requirements of Executive Order 11788 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Because the water supply for Mound is from three onsite wells, the only potential impacts from site activities on the Great Miami River result from the planned water treatment processing facility and the existing wastewater treatment plant.

The additional sanitary wastewater generated by the transferred processes would be approximately 132 MGY (table 3.4.1-3). This additional wastewater would represent an approximate 280 percent increase over the current wastewater generation rate of approximately 47 MGY (table 3.2.2-2). The additional process/sanitary wastewater would require additional treatment capacity.

The total wastewater throughput of the relocated facilities would be approximately 132 MGY (0.6 ft^3/s). This represents less than 1 percent of the average 1990 flow of the Great Miami River of 3,369 ft^3/s. Influent to, and effluent from, the treatment facility would be required to meet all Federal and state discharge limits.

Surface Water Quality . During construction, erosion and transport of disturbed soils could create adverse impacts to the site drainage facilities and surface water quality. New construction in the Valley Area and the SM/PP Hill area could result in the disposition of eroded materials into the site's stormwater control system, thereby reducing its effectiveness. The New Property Area drains in the direction of the Great Miami River via the Miami-Erie Canal. The erosion and transport of disturbed materials could degrade receiving water quality; therefore, the use of control measures, such as berms and silt fences, would be implemented to minimize any adverse impacts during construction.

The proposed new parking areas would increase the impervious surface area and increase the flow of nonpoint source drainage toward the Miami-Erie Canal. Areas of surficial contamination exist in proximity to the proposed parking areas (MD DOE, 1987b). During periods of high runoff, the transport of contaminants in the direction of the Miami-Erie Canal could occur. The level of potential impact would be controlled or eliminated through the collection of runoff. Mitigation of impacts could involve the treatment of stormwater runoff before release to offsite surface waters, or the remediation of the areas of surficial contamination.

Groundwater . Water requirements for renovation of existing buildings and construction of new buildings would be approximately 8,000 GPD or 6.6 MGY for the 4-year construction period (table 3.4.1-2). During operations, approximately 0.91 MGD or 330 MGY of additional water would be required for domestic and industrial uses (table 3.4.1-4). The renovation and operations water use estimates are within the 1.2 BGY capacity of the production wells and represent a less than 4 percent and approximately a 180 percent increase, respectively, in the approximately 0.5 MGD (table 3.2.2-3) currently withdrawn by Mound from its wells.

Groundwater Quality . Because no discharge of waste materials to groundwater is planned, no adverse impact to groundwater quality is expected.

4.2.1.4 Geology and Soils

Mass movement, subsidence, seismic activity, and volcanism are unlikely to occur at a level that would impact construction or operations activities. There are no landslides, sinkholes, or other nontectonic movements at Mound. No impact would result to local geologic features from this action.

Transferring the electrical/mechanical functions to Mound would require a total of 62 acres for a new building, parking lot, and construction laydown area (table 3.4.1-1). Disturbance during construction could temporarily lead to an increase in soil erosion from wind and water. Water erosion is likely to occur only sporadically during storm periods. Wind erosion is likely to occur intermittently depending on wind velocities. The maximum total soil loss rate associated with construction is not expected to exceed the maximum acceptable soil loss of 5 tons per acre per year. Wind erosion control measures would include sprinkling, use of mulch, and other dust control methods on a daily basis. Water erosion control measures would include proper drainage and grading. Exposing only small areas for limited periods would reduce the effects of erosion and ensure that soil losses are within acceptable levels.

Soil disturbance during operations would be reduced from that of the construction period as areas temporarily given over to laydown and haul-road use are restored. Environmental consequences to soils during operations would include permanent alteration of soil cover as a result of emplacement of structures, parking lots, and other features. Control measures during construction would include regrading and reseeding. Paving, grading of slopes, establishment of ground cover, windbreaks, construction of engineered berms, and drainage ways would also reduce both wind and water erosion impacts.

4.2.1.5 Biotic Resources

The construction, modification, and operation of facilities for nonnuclear consolidation at Mound would require the loss of some natural vegetation and terrestrial wildlife habitat. Most of this loss would include forested and old field habitats within the largely undeveloped New Property Area. Remaining natural habitats within the western part of Mound would be fragmented by construction and exposed to increased human presence for the operating life of the consolidated facilities. A limited area of natural habitat would also be lost from the more heavily developed SM/PP Hill Area. Areas cleared of existing vegetation would be permanently occupied by structures, pavement, or new vegetation. About 30 acres of the total 62 acres to be disturbed would be used for construction laydown and parking (table 3.4.1-1). Where possible, these areas would be revegetated with native species following construction. Additionally, new wastewater treatment and hazardous waste storage capacity would be required.

These impacts would represent a large reduction in the quantity and quality of terrestrial habitat within Mound but only a minor regional impact to terrestrial habitat. Old field and forested habitats are a common feature in the landscape surrounding Miamisburg. Potential mitigation measures include habitat disturbance minimization and revegetation with native species.

Wetlands may potentially be disturbed by construction of new facilities associated with the Mound consolidation alternative. A wetland delineation and discussions with the Corps of Engineers would be necessary to determine the extent of potential disturbance. If disturbance to wetlands could not be avoided during construction, mitigation would involve constructing or purchasing compensatory replacement wetlands within Mound or in the surrounding area at a ratio designated by the Corps of Engineers.

Increased water demands of the consolidated facilities would be met by onsite wells. Wastewater discharges would be required to meet all Federal and state discharge limits, thereby avoiding impacts to aquatic biota in the Great Miami River. Stormwater management structures associated with the new facilities would be constructed to prevent significant quantities of runoff from reaching the Miami-Erie Canal or other aquatic habitats near Mound.

DOE has contacted the FWS and Ohio Division of Natural Areas and Preservation to determine whether the proposed consolidation would potentially affect threatened or endangered species. In keeping with current environmental practice on Mound, all trees with peeling bark within the proposed construction footprint would be inspected for the presence of the Indiana Bat (Myotis sodolis) before any disturbance is initiated.

4.2.1.6 Cultural Resources

The construction, modification, and operation of facilities and equipment for the consolidation of electrical/mechanical functions at Mound may have impacts if important Native American resources are present and no impacts if such resources do not occur. No NRHP-eligible prehistoric or historic resources are expected to occur. Construction activities may physically disturb Native American resources. Operations may create audio or visual intrusions to sacred locations. If selected as the consolidation site, consultation would be initiated for this project to identify important Native American resources.

The environmental consequences of locating functions at SNL and LANL as part of this alternative are discussed in sections 4.1.5.6 and 4.1.3.6, respectively.

4.2.1.7 Socioeconomics

The following section discusses the potential environmental impacts of the Mound alternative. To provide a context for potential socioeconomic impacts to the ROI, a discussion of the local employment, population, housing, community services, and transportation is included for this alternative, which has not been previously discussed under the No Action or the Proposed Action (section 4.1). Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. The economic and population characteristics for this alternative are summarized in table 4.2.1.7-1.

As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 3,120 to 2,700 new jobs (DOE, 1993d). The analysis presented in table 4.2.1.7 and discussed here uses the methodology presented in appendix E and the original estimate of 3,120 new jobs. The estimate of 2,700 new jobs is 13 percent lower than the 3,120 new jobs used in the following analysis, and this lower estimate would result in fewer economic benefits than the 3,120 new jobs.

The construction, modification, and installation of facilities and equipment for the consolidation of electrical/mechanical and special products functions at Mound would require 775 employees during peak construction (FDI, 1993). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 3,120 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions will be filled through donor transfers, new hires, and internal reassignments. In addition to those jobs created directly by the project, other employment, indirectly created, would lead to further in-migration to the ROI.

The city of Miamisburg could experience a growth in income tax receipts up to $2,200,000 in the year 2000 as a result of additional direct employment, and there could be a small additional gain as a result of new indirect jobs. This estimated growth in income tax receipts would represent a 29-percent increase in total income tax revenue, a 22-percent increase in General Fund revenue, and a 10-percent increase in total revenues.

Locating electrical/mechanical and special products functions at Mound would increase population in the ROI by approximately 570 during 1995, the peak construction year, and by an estimated 4,143 during 2000, the peak operations period. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force. In 2000, this project-related population would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 1,009,000. None of the cities or counties would experience population growth beyond 1 percent over the baseline during peak construction. However, several small cities would experience population changes that range from 2 percent (West Carrollton) to 5 percent (Carlisle) over the baseline during peak operations. Other cities in the range include Germantown (4 percent), Miamisburg (4 percent), and Centerville (2 percent).

The less than 1-percent change in population during construction required for consolidating the electrical/mechanical and special products functions would create the need for approximately 200 housing units, which is less than a 1-percent addition to this large urban area. For operations in the year 2000, the less than 1-percent change in population would not create the need for additional housing units beyond a 1-percent increase. In past years, housing units in the ROI have been built at an annual rate of 2 percent. In the smaller cities, housing units have been built at annual average rates ranging between 2 and 6 percent. Therefore, additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

The estimated additional population during peak construction and peak operations would not affect any water or wastewater systems in the ROI because the existing capacities more than exceed the projected demand.

In the 1989-1990 school year, school districts in Butler, Montgomery, and Warren counties were operating, on average, between 83 percent and 87 percent of capacity. Under the No Action future baseline, these capacities will not be exceeded in either 1995 or 2000. Currently, one school district in each county exceeds capacity, but these capacities would not be affected beyond what would naturally occur under the No Action baseline growth because the Mound alternative would not add more than 1 percent to enrollments during construction or operations.

Existing health care facilities are more than adequate to accommodate the population increases, although approximately 10 new doctors (less than 1-percent increase over the projected baseline) would be needed during operations to maintain the current level of service.

Current staffing levels for police and fire services in the ROI counties and cities would be maintained relative to population increases during peak construction. To maintain current standards during operations, approximately 8 additional police officers and 12 firefighters would be needed in the ROI. Cities projected to have the greatest needs are Dayton (three officers; less than 1 percent over the projected baseline), Miamisburg (one officer and two firefighters; each at 4 percent over the projected baseline), and Centerville (two firefighters; 2 percent over the projected baseline).

Relative to baseline traffic projections, consolidation activities would have minimal impacts on the local transportation network serving Mound. Average truck traffic associated with construction activities would increase by seven trips daily relative to historic levels (FDI, 1993). Annual vehicle accidents would increase by approximately 19 and associated fatalities would increase by less than 1.

Conditions on most route segments inthe local transportation network during typical operations are projected to remain consistent with projections. However, projected conditions along the segment of Mound Road between Main Street and Benner Road would deteriorate from baseline free flow conditions, with no delays from disruptions, to a stable flow with minor deterioration of service conditions associated with disruptions due to consolidation activities. Average commercial truck traffic would increase to 228 trips daily (FDI, 1993). An estimated 156 additional vehicle accidents and 1 associated fatality are projected to occur annually within the ROI due to consolidation activities.

Under the Mound alternative, 90 additional employees during peak construction and 385 additional employees during peak operations would be required at SNL. At LANL, 10 additional employees during peak construction and 50 during operations would be required (DOE 1993b; FDI, 1993). The effect of this alternative on SNL and LANL would be less than with the Proposed Action. As a result of ongoing planning, DOE has revised work force estimates. Recently revised estimates of 390 additional operations employees at SNL and 46 additional operations employees at LANL would not affect this conclusion. Effects on RFP and Pinellas would be the same as with the Proposed Action. These changes in employment numbers would create no adverse effects on the related ROIs. Some negative effects would occur at KCP as discussed in section 4.2.4.7.

4.2.1.8 Waste Management/Pollution Prevention

Solid waste generated during construction of new buildings would include discarded packaging and construction materials (e.g., plasterboard, brick, wood, and scrap steel). All construction waste would be disposed of offsite. Sanitation sewage would be handled by an outside contractor. Because this contractor would also be responsible for disposing of this sewage, existing site wastewater treatment facilities would not be affected.

Hazardous waste generated during construction would consist of such materials as waste adhesives, oils, cleaning fluids, solvents, and coatings. All hazardous waste would be appropriately packaged, manifested, and shipped under contract with DOT-registered transporters to RCRA-permitted offsite disposal facilities or recyclers.

The consolidation of current nonnuclear manufacturing activities at Mound would generate additional hazardous and nonhazardous wastes. The additional hazardous wastes generated would consist of: halogenated and nonhalogenated solvents, both ignitable and toxic; spent plating bath solutions; corrosives; combustibles; TCLP materials; off-specification materials; sludge; oils/solvents; PCBs (expected to be phased out); and caustic and acid solutions. A summary of the wastes, effluents, and emissions, and discussions related to their management, can be found in appendix C, section C.1.

Mound would have to manage a hazardous waste volume increase of more than three times existing volumes. The additional liquid hazardous waste volume of approximately 47,600 GPY and 12,300 ft 3 /yr of solid hazardous waste would require additional waste management considerations.

The additional sanitary/industrial wastewater effluent discharge of approximately 132 MGY due to the consolidation at Mound could not be handled by the existing wastewater treatment system, which has a capacity of 47.4 MGY. A major upgrade/modification to the existing treatment plant would be necessary.

The estimated 359,000 ft 3 /yr of additional solid nonhazardous wastes would shorten the life expectancy of the offsite sanitary landfill. The landfill would have to be expanded or another landfill utilized. Amounts of paper and scrap metals available for recycling would increase.

Relocating only the tritium-handling functions at Pinellas to LANL would mean the addition of approximately 4,715 lb/yr of hazardous waste at LANL. The additional hazardous wastes include crushed containers, alkaline and acid liquids, and cyanide solution. These wastes could be stored onsite at LANL in existing RCRA-permitted storage facilities. Because LANL has a contract with offsite vendors to ship hazardous waste offsite for treatment and disposal, there would be no need to add more storage facilities.

Each of the functions transferring to Mound or LANL due to consolidation of nonnuclear manufacturing at Mound have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities. This environmental benefit would be transferred with the functions. Once the transfer of the functions occurs, Mound and LANL would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

4.2.1.9 Human Health: Facility Operations and Accidents

Discussions of impacts to members of the public and the environment, worker exposures, and accidents for the No Action (Affected Environment) and the Proposed Action are presented in section 4.1 and sections □4.1.1 to 4.1.8. Information specific to the Mound alternative (i.e., different from the Proposed Action) is discussed below; actions that are the same as those for the proposed consolidation at KCP were discussed earlier and are not repeated here.

As discussed in the Air and Water Resources sections for Mound (□4.2.1.2 and 4.2.1.3, respectively), even after consolidation at Mound, exposures to members of the public associated with the release of chemical pollutants as a result of Mound operations, even after consolidation at Mound, meet all applicable permit, regulatory, and DOE operational requirements. Exposures to members of the public associated with radiological releases from current Mound operations are also well below applicable permit, regulatory, and DOE operational requirements (MD DOE, 1991a). Consolidating functions at Mound would not result in any increases of radiological releases.

A review of the recent Mound annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future. Because the functions that would be consolidated at Mound are the same as or similar to those currently being performed, and would be conducted in facilities designed for these activities, the current accident profile would not change as a result of consolidating these functions at Mound.

This alternative involves relocation of the electrical/mechanical and special products functions to Mound as an alternative to consolidation at KCP. Differences in site characteristics between Mound and KCP would cause small differences of pollutant concentrations at Mound from those calculated for the KCP site. However, the conclusion remains that releases associated with relocating these functions would be below applicable permit, regulatory, and DOE operational requirements. The concentrations of potentially hazardous chemicals associated with the functions to be relocated would result in a cancer risk of $2.45x10^{-6}$ onsite and at the site boundary, a risk to the public of $3.65x10^{-8}$. These risks are mainly attributable to TCE, for which solvents posing much reduced risks will be substituted (see table F-15b).

4.2.2 Pinellas Plant

Impacts of the Pinellas alternative are similar to the Proposed Action because the tritium-handlingfunctions from Mound would be relocated to SRS (section 4.1.2). However, the impacts of this alternative would be less than the impacts of the Proposed Action at LANL (section 4.1.3), which would only receive the detonator and calorimeter functions from Mound and the beryllium technology and pit support functions from RFP but not the neutron tube target loading function from Pinellas. The impacts of this alternative would also be less than those for the Proposed Action at SNL (section 4.1.5), which would receive only the milliwatt heat source surveillance function from Mound and not the neutron generator, cap assemblies, and thermal batteries functions from Pinellas. The neutron generator, cap assemblies, thermal batteries, electrical/mechanical, and neutron tube target loading functions currently performed at Pinellas would remain in place but at the same reduced workload as the Proposed Action.

4.2.2.1 Land Resources

Consolidation of electrical/mechanical functions at Pinellas would require the demolition of the existing parking lot at Building 1200, the parking lot north of Building 100, and a gas storage tank; and relocation of a contractor modular building complex. New facilities would include a five-story parking structure, a large three-story office/manufacturing building, and a one-story mechanical technology building (see figure 3.4.2-2). Land disturbance for the above facilities, construction parking, and a 35-acre construction support area would total approximately 63 acres (table 3.4.2-1). Pinellas does not have sufficient onsite land area to meet this requirement. Specific mitigation measures would be identified in the final design phase if this alternative were implemented.

During construction, the land requirements for residential land use from project-related in-migration (section 4.1.7.7) would be approximately 50 acres distributed throughout the local jurisdictions of Pinellas County. The project-related land requirements associated with operations would be approximately 258 acres. The offsite residential land use demand would easily be accommodated within the county.

Extensive public and private recreational facilities in the region could easily absorb the resulting increased demand. Impacts to recreational resources would be negligible.

Project-related impacts to visual resources would occur from the construction of a new three-story, 36-foot-high, approximately 500-foot-long office/manufacturing building and a new five-story, 60-foot-high, 425-foot-long parking structure. The plant site, which is already heavily developed, is designated VRM Class 5. The viewpoints from the adjacent roads would have clear views of the new high-rise structures.

The viewpoints from the Lake Allen area, an expanding residential area with waterfront-oriented homes and a park with water frontage, are slightly more sensitive. The viewpoints from Lake Allen already contain limited views of industrial structures, which rise above the vegetation screening in the foreground. The new buildings would also be partially visible above the vegetation screen. The visual change could be termed moderate as these views already consist of a highly altered industrial landscape. As a result, the VRM Class would not change.

4.2.2.2 Air Quality and Acoustics

Air Quality. During construction, minor air quality impacts would occur, including the generation of particulate matter such as dust and dirt. These impacts would be controlled through standard practices such as watering of construction sites. During operations, air emissions could increase at Pinellas for the criteria pollutants (totaling approximately 40 tons per year) and for HAPs/toxics (totaling approximately 20 tons per year) (FDI, 1993). The emissions inventory for the Pinellas alternative is presented in table D3.1.2-2. Table 4.2.2.2-1 presents the contribution to air quality at Pinellas from the Pinellas consolidation alternative and total concentrations with comparison to applicable regulations and guidelines. The 1-hour standard for ozone and the 24-hour standard for glycol ethers would be exceeded at the site boundary. All other pollutants are within applicable regulation or guidelines. The exceedance for ozone is associated with baseline conditions at the site (section 4.1.7.2). Potential mitigation measures for glycol ethers includes substitution with other compounds. (See appendix D for a description of the input parameters, assumptions, and methodology used to estimate impacts of this alternative on air quality at Pinellas.)

Normal operations result in the emission of radioactive materials at Pinellas (PI DOE, 1991b). The Pinellas alternative to the Proposed Action would not result in an increase in the emission of radioactive materials.

Acoustic Conditions. Changes in noise levels during construction and operations have been estimated for the major traffic routes around Pinellas. The estimates are based on existing traffic volumes and projected changes in traffic volumes as a result of changes in employment at Pinellas. These changes in traffic volumes are predicted to result in an increase of less than 1 dB in peak-hour sound levels along Belcher Road and no increase in peak-hour sound levels along Bryan Dairy Road. Changes in sound levels along other routes are estimated to be small. The increased noise levels along the major access routes would not be expected to cause an increase in annoyance level to communities or individuals.

Noise emissions from onsite construction activities have not been analyzed but may be expected to result in a short-term increase in noise from heavy equipment operation and other construction noise sources at residential areas to the north. Construction activities include erecting a major new building and parking garage on the northern part of the site. Noise emissions from onsite operation activities should be similar to those from existing sources. The facilities would be designed to minimize noise levels at the site boundary and to assure compliance with the Pinellas County Noise Ordinance (see section D.2.2.3).

Construction workers and personnel working at any of the reconfigured facilities at Pinellas would be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at Pinellas.

Although no increase in annoyance is expected offsite from construction and operations onsite, measures would be necessary to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments with appropriate hearing protection devices meeting OSHA standards. Noise levels would be measured in worker areas and an effective hearing protection program conducted.

4.2.2.3 Water Resources

This section describes potential surface and groundwater impacts due to the Pinellas consolidation alternative.

Surface Water . Building modification and new building construction would take place in areas above the 100-year floodplain and in areas that do not appear to be affected by a credible longer-term event. Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Because all water is supplied from the county system and all wastewater is returned to the county wastewater collection system, there would be no impact on local surface water levels.

The addition of new buildings for office/manufacturing, mechanical technology, and onsite storage of hazardous waste would increase the amount of impervious area at Pinellas (FDI, 1993). This would increase the volume of stormwater runoff to the South and East retention ponds and potentially to the Cross Bayou Canal, into which they discharge. The increase in runoff would be controlled by the retention ponds so that offsite impacts would be minimized.

Surface Water Quality . The proposed location for the mechanical technology and office/manufacturing buildings lies within the Northeast Site solid waste management unit and Spray Irrigation Site, respectively, which contain contaminated groundwater in the near-surface aquifer (PI DOE, 1991a). The discharge of contaminated groundwater or soils to surface water during construction would be avoided.

The additional sanitary wastewater generated by the transferred processes is approximately 153 MGY (see table 3.4.2-3). The additional wastewater would represent an approximately 230 percent increase over the current rate of approximately 66 MGY (table 3.2.3-2). The additional discharge from transferred functions represents approximately 140 percent of the 110 million gallon annual capacity onsite pretreatment facility. This is also 2 percent of the 7.3 BGY current treatment rate of the county system and approximately 1 percent of the 10.4 BGY capacity (PI DOE, 1987). The effluent to the Pinellas County system would be required to meet all Federal, state, and local discharge requirements. There would be no impacts to surface water quality.

Groundwater . Currently, no groundwater is withdrawn beneath Pinellas. The Pinellas County Water System supplies the plant with water from the Floridan Aquifer.

The Pinellas alternative would require approximately 27,000 GPD of additional water during construction and approximately 0.98 MGD for operations (table 3.4.2-2 and 3.4.2-4, respectively). The construction use would be an approximate 19 percent increase in the approximately 0.14 MGD (table 3.2.3-3) current usage, with the operational use an approximately 700 percent increase. With current water demands and restrictions, the increase in operational use could pose an adverse impact on water supply (PI GE, 1991). Conservation measures at the plant, such as domestic water use restrictions and industrial process water recycling, could reduce the amount of water required.

Groundwater Quality . Groundwater in the surficial aquifer beneath the proposed locations is contaminated with VOCs. The groundwater quality near these locations is summarized in table 4.1.7.3-2. No intentional discharge of waste materials to groundwater would occur, and no adverse impacts would result to groundwater quality. Likewise, cleanup of the aquifer would not be impacted by activities of the Proposed Action.

4.2.2.4 Geology and Soils

Mass movement, subsidence, seismic activity, and volcanism are unlikely to occur at levels that would impact construction or operations activities. There are no landslides, active sinkholes, or other nontectonic movements at Pinellas. No impact would result to regional or local geologic features from this action.

Transferring the electrical/mechanical functions to Pinellas would require new building space. The total disturbance of approximately 63 acres (table 3.4.2-1) during construction could temporarily lead to an increase in soil erosion from wind and water. Water erosion is likely to occur only sporadically during storm periods. Wind erosion is likely to occur intermittently depending on wind velocities. The maximum total soil loss rate associated with construction is not expected to exceed the maximum acceptable soil loss of 5 tons per acre per year. Wind erosion control measures would include sprinkling, use of mulch, and other dust control methods. Water erosion control measures would include proper drainage, grading, and reseeding. Exposing only small areas for limited periods would reduce erosional effects and ensure that soil losses are within acceptable levels.

Soil disturbance during operations would be reduced from that of construction as areas temporarily given over to laydown and haul-road use are restored. Environmental consequences to soils during the periods of operations would include permanent alteration of soil cover as the result of emplacement of structures, parking lots, and other features.

4.2.2.5 Biotic Resources

The construction, modification, and operation of facilities and equipment for the consolidation of electrical/mechanical functions at Pinellas would disturb most of the remaining terrestrial habitat on the site. However, where possible, disturbed land would be revegetated using native species. Loss of a mowed field with scattered clusters of trees in the north-central part of the site would be necessary to accommodate new buildings. A new parking structure proposed for the east-central part of the site would only displace paved areas and landscaped vegetation. Additionally, new hazardous waste storage capacity would be required. Areas cleared of existing vegetation would be permanently occupied by structures, pavements, or new vegetation.

These impacts would not represent a large reduction in the quantity or quality of terrestrial habitat surrounding Pinellas. Although implementation of this alternative would result in the loss of most terrestrial habitat at Pinellas, all of this habitat is currently in a highly disturbed condition and none of it is unusual to the surrounding area. Potential mitigation measures include habitat disturbance minimization and revegetation with native species.

Although it is unlikely, due to the lack of natural surface water on the site, wetlands may potentially be disturbed by construction activities associated with the Pinellas consolidation alternative. A wetland delineation and discussions with the Corps of Engineers and Florida Department of Environmental Regulation would be necessary to determine whether any jurisdictional wetlands occur in the areas to be disturbed. Known wetlands within the stormwater retention ponds would not be disturbed (PI FWS, 1982; PI DOE, 1983).

Development of the consolidated facilities would increase the volume of runoff to the stormwater retention ponds. The increased volume of water within the ponds would potentially result in the alteration of the wetlands. Potential mitigation includes additional stormwater management and soil erosion control measures.

The increased water demands during operations of the consolidated facilities would be met by, and wastewater returned to, the local municipal systems, thereby avoiding impacts to aquatic habitats in the vicinity of the site. Increased stormwater runoff to the detention ponds could potentially affect any aquatic biota established within them, but likely impacts would be negligible.

A threatened and endangered species survey of Pinellas was conducted in March 1992, and no threatened or endangered species were observed on or near the site (PI DOE, 1992a). Consequently, the proposed construction would not impact any threatened or endangered species.

4.2.2.6 Cultural Resources

The construction, modification, and operation of facilities and equipment for the consolidation of electrical/mechanical functions at Pinellas may have impacts if important Native American resources are present and no impacts if such resources do not occur. No NRHP-eligible prehistoric or historic resources are expected to occur. If selected as the consolidation site, consultation would be initiated for this project; however, impacts to Native American resources are not anticipated as a result of the proposed construction. There are no indications that physical activities will disturb Native American resources or intrude on sacred locations.

The environmental consequences of locating functions at SNL, SRS, and LANL as part of this alternative are discussed in sections 4.1.5.6, 4.1.2.6, and 4.1.3.6, respectively.

4.2.2.7 Socioeconomics

The following section discusses the potential environmental impacts of the Pinellas alternative. To provide a context for potential socioeconomic impacts to the ROI, a discussion of the local employment, population, housing, community services, and transportation is included for this alternative, which has not been previously discussed under the No Action alternativess or the Proposed Action (section 4.1). Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. The economic and population characteristics for this alternative are summarized in table 4.2.2.7-1.

As a result of ongoing planning, DOE has revised the estimate of new jobs during peak operations from 3,995 to 3,500 new jobs (DOE, 1993d). The analysis presented in table 4.2.2.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 3,995 new jobs. The estimate of 3,500 new jobs is 12 percent lower than the 3,995 new jobs used in the following analysis, and this lower estimate would result in fewer economic benefits than the 3,995 new jobs. The construction, modification, and installation of facilities and equipment for the consolidation of electrical/mechanical and special products functions at Pinellas would require 1,149 employees at peak construction (FDI, 1993). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 3,995 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions will be filled through donor transfers, new hires, and internal reassignments. In addition to those jobs created directly by the project, other employment, indirectly created, would lead to further in-migration to the ROI.

Locating electrical/mechanical and special products functions at Pinellas would increase population in the ROI by approximately 838 during 1995, the peak construction year, and by an estimated 5,261 during 2000, the peak operations period. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force. In 2000, this project-related population would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 2,259,000. Except for Seminole, Largo, Pinellas Park, and Clearwater, none of the ROI cities or counties would experience population growth of more than 1 percent. Seminole would grow by almost 1 percent during peak construction and by about 5 percent by the year 2000. Largo, Pinellas Park, and Clearwater would each grow by about 1 percent by the start of peak operations in 2000.

The less than 1-percent change in population during construction required for consolidating the electrical/mechanical and special products functions would create the need for approximately 319 housing units, which is less than a 1-percent addition to this large urban area. For operations in the year 2000, the less than 1-percent change in population would not create the need for additional housing units beyond a 1-percent increase except in Seminole where the greatest increase (4 percent) would occur. In past years, housing units in the ROI have been built at an annual rate of 4 percent and at an annual rate of 6 percent in Seminole. Therefore, additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

As identified in the Affected Environment section, some water and wastewater systems would be nearing capacity by the year 2000, given the No Action future baseline. The Pinellas alternative would add no more than a 1-percent increase over the baseline projection to any of the affected systems.

In the 1989-1990 school year, school districts in Hillsborough and Pinellas counties were operating, on average, at 94 percent and 87 percent of capacity, respectively. However, these capacities are projected to be exceeded by the years 1995 and 2000 under the No Action future baseline. The largest increases are expected to occur in the school districts in Pinellas County, where enrollments are projected to exceed current capacities by 34 percent in 1995 and 43 percent in 2000. Smaller increases are expected to occur in the school districts in Hillsborough County, where enrollments are projected to exceed current capacities by 9 percent in 1995 and 17 percent in 2000. However, school capacities will be affected only slightly beyond what would naturally occur under the No Action baseline growth because the Pinellas alternative would not add more than 1 percent to enrollments during construction or operations.

Existing health care resources are more than adequate to accommodate the projected population increases. Current staffing levels for police and fire services in the ROI are also adequate to support the projected population increases, while maintaining current service standards, because none of the counties or cities, except Seminole, would grow by more than 1 percent over the No Action baseline. Seminole would need to add two police officers and seven firefighters by the year 2000 in order to maintain its present service standards.

Relative to baseline traffic projections, consolidation activities would have minimal impacts on the local transportation network serving Pinellas. Conditions on all route segments in the local transportation network are projected to remain consistent with baseline projections. Average daily truck traffic associated with construction activities would increase by 13 trips daily relative to historic levels (FDI, 1993). Annual vehicle accidents would increase by approximately 13, and associated fatalities would increase by less than 1.

Conditions on most route segments in the local transportation network during typical operations are projected to remain consistent with baseline projections. However, projected conditions along the segments of Belcher Road between Ulmerton Road and Park Boulevard and Bryan Dairy Road between Starkey Road and 66th Street would deteriorate from baseline congested flow conditions, with serious deterioration of service from disruptions, to heavy congestion and severe deterioration of service from disruptions due to consolidation activities. Average commercial truck traffic is estimated to increase to 85 trips daily relative to historic levels (FDI, 1993). An estimated 78 additional vehicle accidents and 1 associated fatality are projected to occur annually within the ROI due to consolidation activities.

In summary, peak activities at Pinellas would have a minor effect on transportation services at the plant and on roads near the plant. These services would be further burdened during the initial peak operations phase. The Pinellas alternative would not adversely affect other community resources beyond what would naturally occur in the No Action baseline.

Under the Pinellas alternative, 40 additional employees during peak construction and 105 additional employees during peak operations would be required at LANL (DOE, 1993b; FDI, 1993). The effect of this alternative on LANL would be less than with the Proposed Action. As a result of ongoing planning, DOE has revised work force estimates. Recently revised estimates of 118 additional operations employees at LANL would not affect this conclusion. SNL would require no additional employees. Effects on SRS, Mound, and RFP would be the same as with the Proposed Action. These changes in employment numbers would create no adverse effects on the related ROIs. Some adverse effects would occur at KCP as described in section 4.2.4.7.

4.2.2.8 Waste Management/Pollution Prevention

Solid waste generated during construction of new buildings would include discarded packaging and construction materials (e.g., plasterboard, brick, wood, and scrap steel). All construction waste would be disposed of offsite. Sanitation sewage would be handled by an outside contractor; therefore, existing site wastewater treatment facilities would not be affected.

Hazardous waste generated during construction would consist of materials such as waste adhesives, oils, cleaning fluids, solvents, and coatings. All hazardous waste would be appropriately packaged, manifested, and shipped under contract with DOT-registered transporters to RCRA-permitted offsite disposal facilities orrecyclers.

The consolidation of current nonnuclear manufacturing activities at Pinellas would generate additional hazardous and nonhazardous wastes at Pinellas. The additional hazardous wastes generated would consist of: halogenated and nonhalogenated solvents, both ignitable and toxic; spent plating bath solutions; corrosives; combustibles; TCLP materials; off-specification materials; sludge; oils/solvents; PCBs (expected to be phased out); and caustics and acid solutions. A summary of the wastes, effluents, and emissions, and discussions related to their management, can be found in appendix C, section C.2.

The increase in waste volumes at Pinellas due to consolidation at Pinellas could have an adverse environmental impact. New onsite facilities would have to be added to handle the additional hazardous wastes. Pinellas would have to manage a volume increase of more than 2 times for hazardous liquid waste and 111 times for hazardous solid wastes over existing volumes. The additional liquid hazardous waste volume of approximately 51,500 gallons per year and 12,300 ft^3/yr of solid hazardous waste would require additional waste management considerations.

The additional sanitary/industrial wastewater effluent discharge of approximately 153 MGY due to the consolidation at Pinellas could not be handled by the existing waste treatment system, which currently has a capacity of 110 MGY. A major upgrade/modification to the existing treatment plant would be necessary.

The estimated 473,000 ft^3/yr of additional solid nonhazardous wastes would shorten the life expectancy of the offsite sanitary landfill. The landfill would have to be expanded or another landfill utilized. Relocating only the tritium-handling functions at Mound to SRS would mean the addition of 50,900 lb/yr of hazardous waste at SRS; more than 99 percent of this waste is industrial wastewater pretreatment sludge. This waste could be stored onsite at SRS in three existing RCRA-permitted storage facilities. Because SRS has a contract with an offsite vendor to ship some hazardous waste offsite for treatment and disposal, there would be no need to add storage facilities. The industrial wastewater pretreatment sludge would be shipped offsite for landfill disposal, and other hazardous wastes, such as acid liquid, would be shipped offsite and incinerated.

Each of the functions transferring to Pinellas or SRS due to consolidation of nonnuclear manufacturing at Pinellas have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities. This environmental benefit would be transferred with the function. Once the transfer of the functions occurs, Pinellas and SRS would include the processes in required plans and reports on waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

4.2.2.9 Human Health: Facility Operations and Accidents

Discussions of impacts to members of the public and the environment, worker exposures, and accidents for the No Action alternatives (Affected Environment) and the Proposed Action are presented in section 4.1 and sections §4.1.1 to 4.1.8. Information specific to Pinellas (i.e., different from the Proposed Action) is discussed below; actions that are the same as those for the proposed consolidation at KCP were discussed earlier and not repeated here.

Releases of chemical pollutants as a result of Pinellas operations are discussed in the Air and Water Resources sections for Pinellas (§4.2.2.2 and 4.2.2.3, respectively). Cumulative releases of 1,4-dioxane, methylene chloride, and TCE result in onsite (worker) and site boundary (public) individual cancer risks of 4.2×10^{-5} and 3.1×10^{-6}, respectively. These risks are mainly attributed to methylene chloride and TCE. Solvents posing reduced risks will be substituted. Exposures to members of the public associated with radiological releases from current Pinellas operations are well below applicable permit, regulatory, and DOE operational requirements (PI DOE, 1991b). Consolidating functions at Pinellas would not result in any increases of radiological releases.

A review of the recent Pinellas annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986-1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future. Because the functions that would be consolidated at Pinellas are the same as or similar to those currently being performed at Pinellas, and would be conducted in Pinellas facilities, the current accident profile at Pinellas would not change as a result of consolidating these functions at Pinellas.

This alternative involves relocation of the electrical/mechanical and special products functions at Pinellas as an alternative to consolidation at KCP. Differences in site characteristics between Pinellas and KCP cause small differences of pollutant concentrations at Pinellas from those calculated for the KCP site. Both the existing and cumulative cancer risks exceed 10^{-6} (see table F-19b), which is the level considered acceptable, because this incidence of cancers cannot be distinguished from the normal risks to an individual member of the public. Chemical concentrations that result in cancer risks from operations that are greater than 10^{-6} would be mitigated by implementing appropriate measures to reduce the risk to less than 10^{-6}.

4.2.3 Rocky Flats Plant

Impacts of the RFP alternative are similar to the Proposed Action because the tritium-handling functions from Mound and Pinellas would be relocated to SRS (section 4.1.2) and LANL (section 4.1.3), respectively, and the neutron generator, cap assemblies, and thermal batteries functions from Pinellas and the milliwatt heat source surveillance function from Mound would be relocated to SNL (section 4.1.5). However, the impacts of this alternative would be less than the impacts of the Proposed Action at LANL (section 4.1.3), which would only receive the detonator and calorimeter functions from Mound and the neutron tube target loading function from Pinellas, but not the beryllium technology and pit support functions from RFP. The electrical/mechanical, special products, and beryllium technology and pit support functions currently performed at RFP would remain in place but at the same reduced workload as the Proposed Action.

4.2.3.1 Land Resources

Consolidation of electrical/mechanical functions at RFP would be relocated into existing, vacant space in Buildings 444, 447, 460, 881, and 883. New construction would include a one-story mechanical technology building, a three-story office/manufacturing building, a two-story parking structure, and new surface parking and access roads (figure 3.4.3-2). The new construction would occur west of the existing fenced security area and would result in approximately 72 acres of disturbed land (table 3.4.3-1). The new uses would be compatible with adjacent RFP uses, existing land use plans, and zoning.

During construction, the offsite land requirements for residential use would be approximately 26 acres, primarily distributed throughout Jefferson and Boulder counties. The project-related land requirements for residential land uses associated with operations would be approximately 238 acres. This acreage represents a small percentage of the land available for development within the two counties and the region.

Regional recreational opportunities are widespread and plentiful in the RFP ROI. This alternative would not adversely affect regional recreation during construction or operations.

The proposed new facilities would be located immediately adjacent to the west end of the fenced security area, which is heavily developed. The buildings would be similar in appearance to the existing structures and would be approximately 1.5 miles from State Highway 93, the closest public viewpoint. There would be no apparent change to the average offsite viewer. The impact to visual resources would be negligible and would not affect VRM classifications.

4.2.3.2 Air Quality and Acoustics

Air Quality. During construction, minor construction-related air quality impacts would occur, including the generation of particulate matter such as dust and dirt. These impacts would be controlled through standard construction practices, such as watering of construction sites. During operations, air emissions could increase at RFP for the criteria pollutants and for HAPs/toxics (FDI, 1993). The emissions inventory for the RFP alternative is presented in table D3.1.2-3. The predicted impacts at RFP from the RFP consolidation alternative are presented in table 4.2.3.2-1. Air emissions are all within applicable standards and guidelines except for ozone. The exceedance for ozone is associated with baseline conditions in the Denver metropolitan area (section 4.1.8.2). (See appendix D for a description of the input parameters, assumptions, and methodology used to estimate impacts of this alternative on air quality at RFP.) Normal operations result in the emission of radioactive materials at RFP. The RFP alternative to the Proposed Action would not result in an increase in the emission of radioactive materials.

Acoustic Conditions. Changes in noise levels during construction and operations have been estimated for the major traffic routes around RFP. The estimates are based on existing traffic volumes and projected changes in traffic volumes as a result of anticipated changes in employment at RFP. These changes in traffic volumes are predicted to result in an increase of less than 2 dB in peak-hour sound levels along State Highways 72 and 128, and Indiana Street. Changes in sound levels along other routes are estimated to be small. The increased noise levels along the major access routes would not be expected to increase the annoyance level to communities or individuals.

Noise emissions from onsite construction activities have not been analyzed but are not expected to result in any increase in offsite noise levels because of the distance to the site boundary. Construction activities include erecting a new building and renovation of existing buildings. Noise emissions from onsite operation activities should be similar to those from existing sources. The facilities would be designed to minimize noise levels at the site boundary. Noise emissions from construction equipment and machines, and from operational facilities, equipment, and machines, are not expected to cause ambient noise levels to exceed the EPA guidelines set to protect the public from the effect of broadband environmental noise and to protect the public against hearing loss.

Construction workers and personnel working at any of the reconfigured facilities at RFP will be exposed to varying levels of equipment noise. The requirements for worker hearing protection, as described previously for current facilities, would continue to be met at RFP.

Although no increase in annoyance is expected offsite from construction and operations onsite, measures would be necessary to protect workers' hearing. These measures include the use of standard silencing packages on construction equipment and providing workers in noisy environments with hearing protection devices meeting OSHA standards. Noise levels would be measured in worker areas and an effective hearing protection program conducted.

4.2.3.3 Water Resources

This section describes potential surface and groundwater impacts due to the RFP consolidation alternative.

Surface Water . As described in section 4.1.8.3, the 500-year floodplain of Walnut Creek corresponds to an elevation of approximately 5,925 feet (DOE, 1988 page 5-1). The elevation of the area of new construction was determined to range between 6,050 feet and 6,080 feet, well above the 500-year floodplain elevation. Therefore, the requirements of Executive Order 11988 and 10 CFR 1022 have been met and a floodplain assessment is not required.

Temporary water requirements during construction would result in the need for an additional 22,000 GPD, while the requirement due to consolidation operations would be approximately 0.97 MGD (tables 3.4.3-2 and 3.4.3-4, respectively). The water needed for construction represents approximately a 7-percent increase over the current water usage of approximately 0.32 MGD (table 3.2.4-3), with the water needed for operations an approximate 300-percent increase. Much of the water for RFP is obtained from the Denver Water Board; therefore, no impacts from site surface water withdrawals would occur.

RFP has a water supply contract with the Denver Water Board for 1.5 MGD, but this contract is not guaranteed. An additional daily requirement may require an amended agreement. The Denver Water Board's surface water sources are Gross Reservoir via the South Boulder Division Canal from the South Boulder Creek and Ralston Reservoir.

The existing RFP sewage treatment plant, which discharges to Pond B-3, is the only discharger to surface waters; it has a capacity of 150 MGY (table 3.2.4-2). The additional sanitary wastewater generated by the transferred processes is approximately 148 MGY (see table 3.4.3-3). This additional wastewater would represent an approximate 270-percent increase over the current sanitary wastewater generation rate of approximately 55.2 millions gallons annually (table 3.2.4-2). Additional wastewater treatment capacity would be required to accommodate this increase.

Surface Water Quality . Impacts to surface water quality may occur during the construction/modification phase due to land disturbance. Disturbed soils may be transported via surface runoff or wind to receiving waters. Appropriate erosion control measures would be used to minimize soil loss to surface waters.

As already described, additional wastewater treatment capacity would be required; the influent and effluent would be required to meet all Federal, state, and local discharge requirements.

The proposed new parking and building areas would increase the potential of nonpoint source pollutants being transported to Walnut and Woman Creeks. The treatment facilities and the capacity of the existing runoff-control holding ponds may have to be expanded due to the potential for increased runoff. Because water in the holding ponds is monitored before release to water bodies, no adverse impacts to downstream surface water bodies should occur as a result of increased runoff.

Groundwater . The Boulder Conservation Council supplies RFP with water from the Denver Basin aquifer for domestic and industrial use. Because no water is withdrawn from beneath RFP, there would be no adverse impacts to the available quantity of groundwater.

Groundwater Quality . The groundwater quality closest to the proposed building sites is summarized in table 4.1.8.3-2. All data are within water quantity criteria and should not have an adverse impact on the RFP alternative. There are no plans to discharge waste materials directly to groundwater. Given normal safeguards and precautions, no adverse impacts would result to groundwater quality.

4.2.3.4 Geology and Soils

Mass movement, subsidence, seismic activity, and volcanism are unlikely to occur at a level that would impact construction or operation activities. There are no landslides, sinkholes, or other nontectonic movements at RFP. No impact would result to regional or local geologic features from this action.

Under the RFP alternative, construction could temporarily disturb about 72 acres of land and lead to an increase in soil erosion from wind and water (table 3.4.3-1). Water erosion is likely to occur only sporadically during storm periods. Wind erosion is likely to occur intermittently depending on wind velocities. The maximum total soil loss rate associated with this construction is not expected to exceed the maximum acceptable soil loss of 5 tons per acre per year. Wind erosion control measures can include sprinkling, use of mulch, and other dust control methods. Water erosion control measures would include proper drainage and grading. Exposing only small areas for limited periods would reduce erosional effects and ensure that losses remain within acceptable levels.

Soil disturbance during operations would be reduced from that of the construction period as areas temporarily given over to laydown and haul-road use are restored. Environmental consequences to soils during operations would include permanent alteration of soil cover as the result of emplacement of structures, parking lots and other features. There would be no adverse impact to soils.

4.2.3.5 Biotic Resources

The construction, modification, and operation of facilities and equipment for nonnuclear consolidation at RFP would require the loss of natural vegetation and terrestrial wildlife habitat. Losses of approximately 72 acres of mostly short-grass prairie vegetation to the immediate west of the central developed area would be necessary to accommodate new buildings and parking, as well as construction laydown and construction parking. The latter would represent a temporary disturbance of about 28 acres and would be revegetated, where possible, using native species. Additionally, new wastewater treatment, hazardous waste storage, and landfill capacity would be required. Areas cleared of existing vegetation would be permanently occupied by structures, pavement, or new vegetation.

These actions would not represent a major reduction in the quantity or quality of terrestrial habitat surrounding RFP. Although approximately 72 acres of habitat would be lost, this represents 1.2 percent of the over 6,000-acre (section 4.1.8.1) security buffer zone. Potential mitigation measures include habitat disturbance minimization and revegetation with native species.

Although NWI maps do not show any wetlands within the areas subject to disturbance (RF FWS, 1975), a wetland delineation and discussions with the Corps of Engineers would be required to verify the absence. If any delineated wetlands are disturbed or destroyed during construction, compensatory replacement wetlands would be purchased or constructed elsewhere within RFP or its vicinity at a ratio designated by the Corps of Engineers.

Water for RFP is obtained from the Denver Water Board and thereby would not affect aquatic resources at RFP. Potential impacts to aquatic habitats could occur since discharge rates to onsite water bodies would significantly increase (section 4.2.3.3). All effluent discharged would be required to comply with conditions established in the NPDES permit. Therefore, adverse impacts to aquatic resources are not expected.

DOE has contacted the FWS and Colorado Natural Resources Department to determine whether the proposed construction would potentially impact threatened or endangered species. An inspection for the black-footed ferret (Mustele nigripes) (Federally- and state-listed endangered) would be performed if any development would affect areas within or close to where prairie dog colonies occur. Suitable habitat exists on RFP for the Ute's ladies tresses (Spiranths diluvialis) (Federally-listed threatened); however, no specimens were found during a recent survey (RF ESCO, 1992).

4.2.3.6 Cultural Resources

The construction, modification, and operation of facilities and equipment for the consolidation of electrical/mechanical functions at RFP may have impacts if important Native American resources are present and no impacts if such resources do not occur. No NRHP-eligible prehistoric or historic resources are expected to occur. Construction activities may physically disturb Native American resources and operations may decrease accessibility to traditional use areas or create audio or visual intrusions upon sacred locations. If selected as the consolidation site, consultation would be initiated for this project to identify important Native American resources.

The environmental consequences of locating functions at SNL, SRS, and LANL as part of this alternative are discussed in sections 4.1.5.6, 4.1.2.6, and 4.1.3.6, respectively.

4.2.3.7 Socioeconomics

The following section discusses the potential environmental impacts of the RFP alternative. To provide a context for potential socioeconomic impacts to the ROI, a discussion of the local employment, population, housing, community services, and transportation is included for this alternative, which has not been previously discussed under the No Action alternative or the Proposed Action (section 4.1). Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. The economic and population characteristics for this alternative are shown in table 4.2.3.7-1.

As a result of ongoing planning, DOE has revised the estimates of new jobs during peak operations from 3,710 to 3,300 new jobs (DOE, 1993d). The analysis presented in table 4.2.3.7-1 and discussed here uses the methodology presented in appendix E and the original estimate of 3,710 new jobs. The estimate of 3,300 new jobs is 10 percent lower than the 3,710 new jobs used in the following analysis, and this lower estimate would result in fewer economic benefits than the 3,710 new jobs.

The construction, modification, and installation of facilities and equipment for the consolidation of electrical/mechanical functions at RFP would require 958 employees at peak construction (FDI, 1993). Employee training for operations would begin in 1993 and employment would grow to a full complement of approximately 3,740 full time equivalent jobs for hourly and salaried personnel in 2000 (DOE, 1993b). These positions will be filled through donor transfers, new hires, and internal reassignments. In addition to those jobs created directly by the project, other employment, indirectly created, would lead to further in-migration to the ROI. Locating electrical/mechanical functions at RFP would increase population in the ROI by approximately 699 during 1995, the peak construction year, and by an estimated 5,594 during 2000, the peak operations period. The in-migrating population is primarily related to the in-migrating professional employees (and their families) from donor sites and other places outside of the regional labor force. In 2000, this project-related population would represent a negligible increase of less than 1 percent over the projected ROI baseline population of 2,100,000. The city of Golden would experience population growth of less than 1 percent during construction and about 2 percent above the projected No Action baseline during operations.

The less than 1-percent change in population during construction required for consolidating the electrical/mechanical functions would create the need for approximately 266 housing units, which is less than a 1-percent addition to this large urban area. For operations in the year 2000, the less than 1-percent change in population would not create the need for additional housing units beyond a 1-percent increase. Golden is the only city where additional housing units would need to be increased beyond 1-percent, but this need for additional units would not exceed a 2-percent increase. In past years, housing units in the ROI have been built at an annual rate of 3 percent. Therefore, additional housing needed to accommodate the in-migrating population could be built without any adverse effect on the cities and counties in the ROI.

As identified in the Affected Environment section, some wastewater systems would be nearing capacity by the year 2000, given the No Action future baseline. The Boulder system would be operating over 100 percent capacity. However, the RFP alternative would add no more than a 1-percent increase over the baseline projection to any of the affected systems.

In the 1989-1990 school year, school districts in Adams and Arapahoe counties were operating, on average, at 80 percent and 90 percent of capacity, respectively. Under the No Action future baseline, these capacities will not be exceeded in either 1995 or 2000. Currently, two school districts in Adams County exceed their capacities, but these capacities will be affected only slightly beyond what would naturally occur under the No Action baseline growth because the RFP alternative would not add more than 1 percent to enrollments during construction or operations.

Existing health care resources are adequate to accommodate the projected population increases. Current staffing levels for police and fire services in the ROI are also adequate to support the projected population increases, while maintaining current service standards, because none of the counties or cities would grow by more than 1 percent over the No Action baseline.

Relative to baseline traffic projections, consolidation activities would have minimal impacts on the local transportation network serving RFP. Conditions on most route segments in the local transportation network are projected to remain consistent with baseline projections. Average daily truck traffic associated with construction would increase by nine trips daily relative to historic levels (FDI, 1993). Annual vehicle accidents would increase by approximately 10, and associated fatalities would increase by less than 1.

Conditions on most route segments in the local transportation network during typical operations are projected to remain consistent with baseline projections. However, projected conditions along the segment of Colorado State Route 128 between I-70 and Colorado State Routes 93 and 121 would deteriorate from baseline stable flow conditions, with minor deterioration of service from disruptions, to a congested flow with greater deterioration of service from disruptions. Projected conditions along the segment of Indiana Street between Colorado State Routes 72 and 128 would also deteriorate from a baseline stable flow condition to a congested flow with considerable deterioration of service from disruptions. Average commercial truck traffic would increase to 82 trips daily (FDI, 1993). An estimated 110 additional vehicle accidents and 1 associated fatality are projected to occur annually within the ROI due to consolidation activities.

The direct and indirect additional jobs at RFP will help offset the closure of the Technical Training Center at Lowry Air Force Base located in Denver. The 1001st Space Systems Squadron, Defense Finance and Accounting Service, and the Air Force Reserve Personnel Center would remain open, but all technical training would be redistributed to other locations (RF DBCRC, 1991). It is estimated that this closure will result in the loss of approximately 6,500 persons of whom between 3,500 and 4,000 are students at the Technical Training Center.

Under the Rocky Flats alternative, 50 additional employees during peak construction and 75 during operations would be required at LANL (DOE, 1993b; FDI, 1993). The effect of this alternative on LANL would be less than with the Proposed Action. As a result of ongoing planning, DOE has revised work force estimates. Recently revised estimates of 90 additional operations employees at LANL would not affect this conclusion. Effects on SNL, SRS, Pinellas, and Mound would be the same as with the Proposed Action. These changes in employment numbers would create no adverse effect on the related ROIs. Some adverse effects would occur at KCP as described in section 4.2.4.7.

4.2.3.8 Waste Management/Pollution Prevention

Solid waste generated during construction of new buildings would include discarded packaging and construction materials (e.g., plasterboard, brick, wood, and scrap steel). All construction waste would be disposed of offsite. Sanitation sewage would be handled by an outside contractor; therefore, existing site wastewater treatment facilities would not be affected. Hazardous waste generated during construction would consist of materials such as waste adhesives, oils, cleaning fluids, solvents, and coatings. All hazardous waste would be appropriately packaged, manifested, and shipped under contract with DOT-registered transporters to RCRA-permitted offsite disposal facilities or recyclers.

The consolidation of current nonnuclear manufacturing activities at RFP would generate additional hazardous and nonhazardous wastes at RFP. The additional hazardous wastes generated would consist of: halogenated and nonhalogenated solvents, both ignitable and toxic; spent plating bath solutions; corrosives; combustibles; TCLP materials; off-specification materials; sludge; oils/solvents; PCBs (expected to be phased out); and caustics and acid solutions. A summary of the wastes, effluents, and emissions, and discussions related to their management, can be found in appendix C, section C.3.

The increase in hazardous and nonhazardous waste volume at RFP due to the consolidation of nonnuclear manufacturing at RFP would have an adverse environmental impact. RFP would have to manage a solid hazardous waste volume increase of more than 10 times existing volumes. The additional solid hazardous waste volume of approximately 12,300 ft^3/yr would require additional waste management considerations.

The additional sanitary/industrial wastewater to be handled as a result of the consolidation of electrical/mechanical functions at RFP is approximately 148 MGY, exceeding the current overall RFP sanitary sewage treatment capacity of 150 MGY. A major upgrade/modification to the existing treatment plant would be necessary.

The estimated 430,000 ft^3/yr of additional solid nonhazardous wastes would reduce the useful operating life of the existing onsite sanitary landfill, resulting in an accelerated schedule for future expansion of the existing landfill, or development of new onsite landfill(s). Amounts of paper and scrap metals available for recycling would also increase.

Each of the functions transferring to RFP due to consolidation of nonnuclear manufacturing at RFP have been subject to donor site programmatic pollution prevention controls such as source reduction, inventory control, and product substitution. Process Waste Assessment reviews have already been instituted to define the source and amount of waste generated by each process of an operation to maximize waste minimization opportunities. This environmental benefit would be transferred with the functions. Once the transfer of the functions occurs, RFP would include the processes in required plans and reports on RFP waste minimization activities. These plans and reports detail the types and volumes of waste streams being stored or generated, site-specific reduction goals, and strategies for preventing or minimizing additional generation of pollutants.

4.2.3.9 Human Health: Facility Operations and Accidents

Discussions of impacts to members of the public and the environment, worker exposures, and accidents for the No Action alternatives (Affected Environment) and the Proposed Action are presented in section 4.1 and sections §4.1.1 to 4.1.8. Information specific to RFP (i.e., different from the Proposed Action) is discussed below; actions that are the same as those for the proposed consolidation at KCP were discussed earlier and not repeated here.

Release of chemical pollutants as a result of current RFP operations is discussed in the Air and Water Resources sections for RFP (§4.2.3.2 and 4.2.3.3, respectively). New chemicals introduced to RFP which pose a cancer risk are 1,4-dioxane, methylene chloride, and TCE. The risks from 1,4-dioxane onsite (worker) would be 4.4×10^{-7} and 9.4×10^{-9} at the site boundary (public); the risks from methylene chloride would be 3.7×10^{-8} onsite and 7.4×10^{-10} at the site boundary; the risks from TCE would be 1.2×10^{-6} onsite and 2.6×10^{-8} at the site boundary. Cumulative methylene chloride releases result in a cancer risk of 2.3×10^{-6} to an onsite worker. Cumulative CCl_4 releases primarily due to nuclear operations would result in a cancer risk of 5.3×10^{-4} to an onsite worker and 1.2×10^{-5} at the site boundary. Cumulative TCE releases would result in a cancer risk of 1.2×10^{-6} onsite and 2.6×10^{-8} at the site boundary, all attributable to the new additions due to relocation. In the future, CCl_4 use would be reduced and methylene chloride and TCE replaced by non-carcinogenic solvents. Replacement non-carcinogenic solvents like TCA would be used as a substitute for CCl_4 (see table F-14b). Exposures to members of the public associated with radiological releases from current RFP operations are well below applicable permit, regulatory, and DOE operational requirements (RF EG&G, 1991e). Consolidating functions at RFP would not result in any increases of radiological releases.

A review of the recent RFP annual environmental and accident reports indicates that there have been no significant adverse impacts to workers, members of the public, or the environment. This review was performed to provide an indication of the site's accident history. The time of the review (1986Ä1990) was a period during which plant operations were much higher than in the past year and higher than anticipated in the future. Because the functions that would be consolidated at RFP are the same as or similar to those currently being performed at RFP and would be conducted in RFP facilities designed for these activities, the current accident profile at RFP would not change as a result of consolidating these functions at RFP.

This alternative involves consolidation of electrical/mechanical functions at RFP as an alternative to consolidation at KCP. Differences in site characteristics between RFP and KCP would cause small differences of pollutant concentrations at RFP from those calculated for the KCP site. However, the conclusion remains that releases associated with consolidating these functions would be below applicable permit, regulatory, and DOE operational and accident situation requirements. Additionally, the concentrations of potentially hazardous chemicals associated with the functions to be relocated are also not expected to exceed levels that would cause adverse human health effects (see appendix F). Releases of CCl_4 associated with current activities exceed applicable limits, as discussed earlier in this section. However, as indicated in section 4.2.3.2, relocating the identified functions to RFP would result in no increase of CCl_4 concentrations there.

4.2.4 Closeout Complex Missions at

Kansas City Plant

The closeout of Complex missions at KCP would present no visible change to the facility but would impact the current operations of the Bannister Federal Complex. Under a Memorandum of Understanding, DOE provides utilities to the tenants of the Complex. In addition, maintenance is provided for the utility systems, fire protection loop, and flood protection system. These services would have to be provided by others.

4.2.4.1 Land Resources

The closeout of Complex missions at KCP would not adversely impact the comprehensive planning and zoning of the city of Kansas City. A review of socioeconomic data in section 4.2.4.7 would indicate no change to demand placed on regional recreation resources. The closeout would also present no visible change to the facility. Future use of KCP surplus facilities would be evaluated in the transition process.

4.2.4.2 Air Quality and Acoustics

Air Quality. Closing out of the Complex missions at KCP would reduce emissions of criteria air pollutants from the major sources; i.e., the steam plant boilers and various manufacturing operations. Hazardous air pollutant emissions would be reduced from the laboratories and manufacturing operations. As a result, the air quality around KCP should improve.

Normal operations do not result in the emission of any radioactive materials at KCP. Therefore, closing out Complex missions at KCP would have no effect on the emissions of radioactive materials.

Acoustic Conditions. Traffic volumes on streets near KCP would be reduced and some reduction in traffic noise levels would result. Minimal reduction in sound levels in the community is expected from elimination of noise sources at KCP.

4.2.4.3 Water Resources

Surface Water. The closeout of DP activities would reduce cooling water discharges from KCP. This would not adversely impact water levels in the Big Blue River and Indian Creek.

Surface Water Quality. The closeout of Complex missions would reduce cooling water discharges to local surface waters. This would have no adverse impact on water quality in the Big Blue River and Indian Creek.

Groundwater. By closing out Complex missions at KCP, less water would be required from the Kansas City municipal water supply system. No adverse impact on water resources is expected.

Groundwater Quality. Spill protection systems and plans exist to contain and minimize effects of releases of hazardous substances. Given normal safeguards and precautions, no adverse impacts to groundwater quality are expected to result from closeout activities. Current environmental restoration programs would not be adversely impacted.

4.2.4.4 Geology and Soils

The proposed closeout of the Complex missions at KCP would not result in impacts on the geologic features of the area, nor would the geology have any impacts on the mission closeout of the plant.

Hazardous, radioactive, and mixed waste sources would be eliminated from the plant, thus decreasing future soil contamination potential. The proposed closeout of Complex missions at KCP would not impact the soils of the area.

4.2.4.5 Biotic Resources

The closeout of Complex missions at KCP would not adversely affect biotic resources; instead, the closeout would result in a reduction of existing operational impacts to natural habitats on and around the site. Because of continuing non-DP activities within the Bannister Federal Complex, closeout may not increase the quantity or quality of natural habitat.

4.2.4.6 Cultural Resources

If the closing out of Complex missions at KCP does not include ground disturbance or building modifications, then there would be no effect on cultural resources.

4.2.4.7 Socioeconomics

The following section discusses the potential environmental impacts of closing out existing Complex missions at KCP. To provide a context for potential socioeconomic impacts to the ROI, a discussion of the local employment, population, housing, community services, and transportation is included for this alternative, which has not been previously discussed under the No Action or the Proposed Action (section 4.1). Assumptions, methodologies, and supporting data for the assessment of environmental consequences are presented in appendix E. The economic and population characteristics for this alternative are shown in table 4.2.4.7-1.

The closeout of Complex missions would result in decreases in economic activity and employment in the ROI. The transfer of functions from KCP would decrease employment in the ROI by an estimated 9,800 jobs (3,800 direct and 6,000 indirect). This reduction in jobs would increase the ROI unemployment rate from a projected baseline level of 6.0 percent to 6.9 percent. Earnings in the ROI would be reduced by about $345.5 million, with a related decrease in total personal income of $429.6 million.

Closeout of Complex missions at KCP would reduce population in the ROI by approximately 4,980 persons. This project-related change would represent a slight population decrease of less than 1 percent from the projected ROI baseline of 1,335,000 persons. Populations in the cities of Belton and Lee's Summit would decrease by slightly more than 1 percent, and Harrisonville would lose about 2 percent of its projected population.

The less than 1-percent change in population after closeout of Complex missions would create an estimated additional 1,900 vacant housing units, a relatively minor increase for this large urban area. The cities of Harrisonville, Belton, and Lee's Summit would be the most affected. Vacant housing units in Belton and Lee's Summit would increase by 1 percent, and by 2 percent in Harrisonville.

The less than 1-percent estimated population loss would not adversely affect any community infrastructure and services in the ROI but would, instead, reduce the burden on the capacity of the existing systems. Existing public education and health care capacity burdens would also improve by reducing utilization. Current staffing levels for police and fire services in the ROI counties and cities would not be adversely affected, and local traffic conditions would improve slightly.

The ROI would be further affected by employment losses after the closure of the Defense Finance and Accounting Service Center located next to KCP at the Bannister Federal Complex. It is estimated that this closure will result in the loss of 1,000 jobs (KC DOD, 1992).

4.2.4.8 Waste Management/Pollution Prevention

Closeout of Complex missions at KCP would reduce annual onsite hazardous waste management by approximately 3,101,400 lb, having a beneficial impact on the environment. The majority of the reduction would be due to decreased generation of solvent, industrial wastewater processing facility sludge, demolition wastes, bulk oil, and oil/solvent debris. Operations that constitute the major generators of hazardous wastes such as wastewater treatment, plating and etching processes, and degreasing operations would be discontinued.

Closeout would initiate closure of existing onsite RCRA hazardous waste storage facilities. Closure would comply with a detailed closure plan and schedule approved by the Missouri Department of Natural Resources. Hazardous wastes in storage would be manifested and shipped under contract with DOT-registered transporters to DOT-registered offsite treatment and disposal facilities. Equipment, structures, and soils (if contaminated) would also be decontaminated and disposed of in accordance with all applicable environmental regulatory requirements. Existing inventories of LLW, mixed waste, and classified waste would be shipped offsite to DOE disposal facilities certified to accept such wastes.

Due to the closeout of Complex missions, KCP would no longer generate industrial wastewater effluents, which would have a positive impact on the environment. Treatment of dilute metal finishing rinsewaters, concentrated acids and caustics, chromium waste, and cyanide waste by the onsite industrial wastewater processing facility would discontinue. Treated industrial wastewater discharge effluents from the industrial wastewater processing facility to the Kansas City, MO, wastewater treatment system would cease.

Nonhazardous solid waste streams, such as paper, cardboard, glass, wood, plastics, scrap, and metal containers, would no longer be generated. Trash that would have been disposed of in the local sanitary landfill by a commercial contractor would cease, extending the operating life of the local landfill. Nonhazardous liquid wastes would no longer be discharged to the industrial wastewater processing facility or to the public sanitary sewer system.

4.2.4.9 Human Health: Facility Operations and Accidents

Closeout of KCP Complex missions would eliminate hazardous materials currently used in production processes. Consequently, mission closeout would result in a decrease in adverse effects. The impacts at the DOE facilities that would receive the relocated functions from KCP are discussed in their respective sections.

4.3 Comparison of Alternatives

A comparison of the environmental consequences of the Proposed Action and alternatives is presented in this section and summarized in table 4.3-1 which begins on page 4-244. This table compares the impacts to each environmental resource associated with the No Action alternatives; the Proposed Action (KCP); and the Mound, Pinellas, and RFP alternatives. Summaries of the environmental consequences associated with each alternative are presented below. Cumulative impacts, mitigation measures, and adverse impacts that cannot be avoided are also discussed in this section.

4.3.1 No Action

Recent initiatives to reduce the number of nuclear weapons are expected to substantially decrease the requirements for the number and type of nuclear weapons from current stockpile levels. As stockpile requirements decrease, fewer weapons would be built, which in turn means less manufacturing capacity would be needed. The impacts expected with the No Action alternative reflect the reduced stockpile requirements and manufacturing capacity.

The No Action alternative would not result in any significant environmental impacts at any sites. Land use surrounding each site would continue with no changes to land use plans or policies and no changes in land ownership. With the No Action alternative, gradual reductions in emissions of criteria and hazardous toxic air pollutants would occur in response to anticipated lessened workloads and facility upgrades. Except for Pinellas and RFP, all sites are in compliance with applicable Federal and state ambient air quality standards and regulations. At Pinellas, the analysis of chemicals used in current operations showed that two chemicals (TCE and methylene chloride) would cause excess cancer risks. The lifetime cancer risk at the site boundary was estimated at 3 in 1 million. At RFP, alternative solvents are gradually being introduced so that ambient concentrations of CCl_4 (due to operation of nuclear functions) will be well below levels which would have any health effect. Noise levels would not increase at any sites, and planned future production level decreases are expected to reduce current operational noise levels.

For the No Action alternative, water use associated with nonnuclear functions would not increase at any site, and planned future production decreases are expected to reduce current water use requirements at KCP, Mound, Pinellas, and RFP. Surface water and groundwater quality would not be degraded at any site and may improve with anticipated reduced production levels. Ongoing cleanup activities related to past contamination would continue with the No Action alternative. All effluents would be required to meet applicable regulatory permits and standards.

The No Action alternative would not have any effects on geology, soils, or biotic resources at any site. No disturbances to any biotic resources are expected from continued normal operations at any site. No impacts to cultural resources are expected due to continued normal operation at any site.

Continued operation at existing sites would not significantly impact socioeconomic and community services. Because of the expected lower future production levels, facility staff levels would be reduced causing economic changes at KCP, Mound, Pinellas, SRS, SNL, and Y-12.

No increases in annual waste volumes due to DP nonnuclear manufacturing activities are expected with normal operations at any site associated with the No Action alternative. Expected lower production levels would reduce annual waste volumes at most sites for certain waste types, thereby requiring less handling and reduced storage and disposal requirements.

At RFP, the toxic effects of chemicals to onsite (workers), a total onsite (worker) cancerrisk of $5.3x10^{-4}$ and a total site boundary (public) cancer risk of $1.2x10^{-5}$ indicate the potential for adverse human health effects to occur. However, the toxic effects and the excess cancer risk are mainly due to CCl_4 emissions related to nuclear activities at the site. If CCl_4 were eliminated, the primary source for adverse health effects would be removed. At Pinellas, the concentrations of methylene chloride and TCE result in a cancer risk to workers and the public of about $4x10^{-5}$ and $1.2x10^{-5}$ respectively. At KCP, there is a cancer risk of $1.2x10^{-5}$ to workers onsite and $4.7x10^{-6}$ to the public at the site boundary. An excess cancer risk of $1.5x10^{-6}$ would occur to workers onsite at LANL from exposure to chemicals. Impacts associated with potential accidents would remain the same or potentially decrease because of the lower production levels.

4.3.2 Proposed Action

At KCP, SRS, LANL, and SNL, changes and/or modifications to existing buildings would be compatible with existing land use plans and policies.

The same sites would experience short-term, minor increases in air emissions and noise during building renovations. During operations, increases in air emissions and noise are also expected but would not exceed applicable air quality standards. At Mound, Pinellas, and RFP, local air quality improvements could occur due to the closeout of Complex missions at these facilities. At KCP, SRS, and LANL, increases in water use would be less than 1 percent of current use. At SNL, the increase would be less than 4 percent. Water supplies are adequate to meet demand at all sites. No impacts to geologic resources or soils are expected at any site. No permanent disturbance of any biotic resources or impacts to wetlands or threatened and endangered species are expected at all sites from building renovations or operations.

Since consolidation activities would be primarily limited to interior renovation of existing buildings, adverse effects are not anticipated. The Federal, state and Native American response to the EA preapproval review process indicated no adverse effects on NRHP-eligible prehistoric or historic resources or important Native American resources at KCP, SRS, LANL, or SNL.

As a result of ongoing planning, DOE has revised the estimates of new jobs during peak operations. In addition, proposed Fiscal Year 1994 budget estimates would reduce the number of jobs lost at peak operations at Mound, Pinellas, and RFP. These revisions are slightly different than the original estimates used for analysis and are discussed in section 4.1. The revised estimates would not affect the following conclusions.

Changes to socioeconomic and community service at KCP, SRS, LANL, SNL, Mound, Pinellas, and RFP are expected. The Proposed Action would create 1,095 jobs (425 direct and 670 indirect) at KCP during peak operations. Total in-migration would be 558 persons. The change in population during peak construction would be less than 1-percent. The need for additional housing would be negligible.

At SRS, 103 jobs (45 direct and 58 indirect) would be created during peak operations. Total in-migration would be 60 persons. The change in population would be less than 1 percent. The need for additional housing units would be negligible.

At LANL, 294 jobs (115 direct and 179 indirect) would be created. Total in-migration would be 154 persons during peak operations. The change in population would be less than 1 percent. The need for additional housing would be negligible.

At SNL, 940 jobs (385 direct and 555 indirect) would be created during peak operations. Total in-migration would be 515 persons. The change in population would be less than 1 percent. The need for additional housing would be negligible.

Economic consequences would occur at Mound, Pinellas, and RFP due to the closeout of Complex missions at these sites. At Mound, approximately 2,846 jobs (1,070 direct and 1,776 indirect) would be lost. Earnings in the ROI would be reduced by about $93.1 million, with a related decrease in total personal income of $119.3 million. The less than 1 percent change in population after closeout would create an estimated 600 additional vacant housing units. The city of Miamisburg would lose an estimated $760,000 in income tax revenue, which represents about 10 percent of this revenue and about 4 percent of the city's total revenue. At Pinellas, approximately 3,038 jobs (1,050 direct and 1,988 indirect) would be lost. Earnings in the ROI would be reduced by about $103.1 million, with a related decrease in total personal income of $148.2 million. The less than 1-percent change in population after mission closeout would create an estimated 700 additional vacant housing units.

At RFP, approximately 2,917 jobs (750 direct and 1,167 indirect) would be lost. Earnings in the ROI would be reduced by about $68.5 million, with a related decrease in the total personal income of $82.2 million. The less than 1-percent change in population after closeout would create an estimated 400 additional vacant housing units.

Nonnuclear manufacturing activities associated with the Proposed Action would increase hazardous waste volumes by less than 5 percent at KCP, SRS, and SNL, and less than 7 percent at LANL, and have minor, insignificant waste management effects. Sanitary/industrial wastewater volumes would increase less than 2 percent at all sites. Solid nonhazardous waste volumes would increase by 1 percent or less at KCP, SRS and SNL, and by approximately 3 percent at LANL. At Mound, Pinellas, and RFP, nonnuclear production waste streams would be eliminated.

No adverse impacts to the health of workers and the public are expected from implementation or operation activities associated with the Proposed Action at KCP, SRS, or LANL. Activities relocated to SNL would result in risks of cancer to onsite workers of 6.0×10^{-6} due to the introduction of chemical solvents. These risks are within acceptable guidelines; however, appropriate measures, such as substituting less toxic solvents or modifying production processes, would be implemented to minimize these risks. The probability or consequences of potential accidents would not increase appreciably at any of the sites.

4.3.3 Mound Alternative

The Mound alternative would involve major new building construction; disturb or destroy approximately 62 acres of natural habitat; and require significant water resources and substantial new and/or upgraded infrastructure for wastewater treatment and parking.

For this alternative, SRS would not receive any new tritium-handling functions and would, therefore, not be affected. Impacts at SNL would be the same as those discussed in section 4.1.5 for the Proposed Action and summarized in section 4.3.2. The impacts at LANL (section 4.1.3) would be less with the Mound alternative than with the Proposed Action because only neutron tube target loading, beryllium technology, and pit support functions would be transferred.

New construction at Mound and changes and/or modifications to existing buildings would be compatible with existing land use plans and policies.

Construction-related air emissions and noise at Mound would be short-term and not significant with standard construction mitigation measures. Air emissions and noise from operations at Mound would increase but would not exceed applicable air quality standards. At KCP, Pinellas, and RFP, local air quality improvements could occur due to the mission closeout at these facilities. Construction-related soil erosion at Mound could occur but would be short-term and minor after incorporation of standard construction mitigation measures. Consolidation at Mound would increase water requirements during operations by a factor of two over current water use. Water supplies are adequate to meet this demand.

Approximately 62 acres of forested, old field, and other habitats would be lost to new construction. This loss would represent a substantial reduction in the remaining habitat at Mound but aninsignificant portion of this type of terrestrial habitat in the general region. No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands may occur if the Mound alternative was selected. Consultation would be initiated with the Corps of Engineers to determine potential wetland impacts and appropriate mitigation.

Consultations regarding potential cultural resources at Mound, particularly Native American resources, have not been initiated and the absence of such resources has not yet been confirmed. Construction of new facilities at Mound may have impacts if important Native American resources are present. Consultations would be initiated if Mound was selected as the preferred consolidation site.

Changes to socioeconomic and community services at Mound are expected. The Mound alternative would create 8,298 jobs (3,120 direct and 5,178 indirect) during peak operations. Total in-migration would be 4,143 persons. The change in population would be less than 1 percent. The need for additional housing would be negligible. Local transportation systems near Mound would be affected due to increased worker and in-migration-related traffic. As a result of ongoing planning, DOE has revised work force estimates. Recently revised estimates of 2,700 additional direct jobs at Mound would reduce the number of indirect jobs and there would be fewer economic benefits, but the revised estimates would not affect these conclusions.

Economic changes would occur at KCP, Pinellas, and RFP due to the closeout of Complex missions at these facilities. At KCP, approximately 9,800 jobs (3,793 direct and 5,982 secondary) would be lost due to closeout. This reduction in jobs would increase the ROI unemployment rate from a projected baseline level of 6.0 percent to 6.9 percent. The less than 1-percent change in population after closeout would create an estimated additional 1,900 vacant housing units. Socioeconomics effects due to the closeout of the Complex missions at Pinellas and the Complex nonnuclear missions at RFP would be the same as discussed for the Proposed Action in section 4.3.2. Consolidating nonnuclear manufacturing functions at Mound would increase hazardous waste volumes by approximately 18,664 ft^3/yr over current operational hazardous waste volumes of 5,348 ft^3/yr. Sanitary/industrial wastewater volumes would increase approximately 132 MGY over the current rate of approximately 47 MGY. This volume would exceed the current capacity of the Mound wastewater treatment plant. The closeout of the Complex missions at KCP and of Pinellas, and the Complex nonnuclear missions at RFP, would eliminate those facilities' waste streams.

No impacts to the health of workers and the public are expected from construction and operations activities associated with the Mound alternative at Mound and LANL. Activities relocated to SNL would result in cancer risks to workers of 6×10^{-6} due to the introduction of chemical solvents; however these risks are within acceptable guidelines. The probability or consequences of potential accidents would not increase appreciably with the Mound alternative.

4.3.4 Pinellas Alternative

The Pinellas alternative would involve major new building construction, disturb approximately 63 acres of land, and require significant water resources and new parking areas.

Y-12 would not be part of the Pinellas alternative and impacts discussed for LANL and SNL in sections 4.1.3 and 4.1.5, respectively, would be less because many of the functions transferred to these sites with the Proposed Action would remain at Pinellas (see figure 3.4.2-1). Impacts at SRS would be the same as described for the Proposed Action in section 4.3.2.

New construction at Pinellas and changes and/or modifications to existing buildings would be compatible with existing land use plans and policies.

Construction-related air emissions and noise impacts at Pinellas would be short-term and not significant with incorporation of standard construction mitigation measures. Air emission and noise from operations at Pinellas would increase but would not exceed applicable air quality standards. At KCP, Mound, and RFP, local air quality improvements could occur due to the closeout of Complex missions at these facilities. Consolidating nonnuclear manufacturing functions at Pinellas would increase its water use requirements by seven times over current annual water use. Because of the recent rise in regional water demand from drought conditions, periodic restrictions on water use have been initiated in the Pinellas area The expected increase in water use due to the Pinellas alternative could potentially impact the Pinellas County Water System. No impacts to geologic resources are expected. Construction-related soil erosion could occur at Pinellas but would be short-term and not significant after application of standard construction mitigation measures.

At Pinellas, approximately 21 acres of onsite existing old field vegetation would be lost to new construction. All of this habitat is currently in a highly disturbed condition, and none of it is unusual to the surrounding area. No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands may occur if the Pinellas alternative was selected. Consultation would be initiated with the Corps of Engineers to deterine potential wetland impacts and appropriate mitigation.

Consultations on cultural resources at Pinellas have not been initiated and the absence of such resources has not yet been confirmed. Construction of new facilities may have adverse impacts if important Native American resources are present. Consultations would be initiated if Pinellas was selected as the preferred consolidation site.

Changes to socioeconomic and community services at Pinellas are expected. Implementing the Pinellas alternative would create 11,559 jobs (3,995 direct and 7,564 indirect) at Pinellas by peak operations. Total in-migration would be 5,261 persons. The change in population would be less than 1 percent. The need for additional housing would be negligible, except in Seminole, where a 3-percent increase would occur. Local transportation systems at or near the plant would be affected due to increased worker and in-migration-related traffic. As a result of ongoing planning, DOE has revised workforce estimates. Recently revised estimates of 3,500 additional direct jobs at Pinellas would reduce the number of indirect jobs and there would be fewer indirect jobs, but the revised estimates would not affect these conclusions.

Economic changes would occur at KCP, Mound, and RFP due to the closeout of Complex missions at these facilities. Socioeconomic consequences discussed for the closeout of the Complex missions at KCP in section 4.3.3 and in section 4.3.2 for Mound and RFP would be the same for the Pinellas alternative.

Consolidating nonnuclear manufacturing functions at Pinellas would increase liquid hazardous waste volumes by approximately 51,500 gallons annually over current operation volumes of 49,555 gallons annually. Hazardous solid waste would increase by approximately 12,300 ft^3/yr over current operation volumes of 110 ft^3/yr. Sanitary/industrial wastewater volumes would increase 153 MGY over the current rate of 66 MGY. Increases in waste volumes could be handled by existing excess capacities or existing agreements with EPA authorized offsite treatment, reclamation, and disposal facilities. The closeout of Complex missions at KCP and Mound, and of Complex nonnuclear missions at RFP, would eliminate those facilities' waste streams.

Existing operations at Pinellas result in cancer risks of 3.9×10^{-5} and 3.7×10^{-5} to an onsite worker and a member of the public, respectively. These cancer risks would increase slightly to 4.0×10^{-5}, and 3.8×10^{-5}, respectively, after nonnuclear consolidation at Pinellas. Appropriate mitigation measures, such as substituting less toxic solvents or modifying production processes, would be implemented to reduce the cancer risks to less than 10^{-6} to both workers and the public. No adverse health effects to workers and the public have been identified at SRS, SNL, or LANL with this alternative. The probability or consequences of potential accidents would not increase appreciably with the Pinellas alternative.

4.3.5 Rocky Flats Plant Alternative

The RFP alternative would involve major new building construction, disturb approximately 72 acres of short-grass prairie vegetation, and require substantial new and/or upgraded infrastructure for hazardous waste storage, wastewater treatment, and parking areas.

With this alternative, LANL would not receive beryllium technology and pit support functions and would, therefore, be affected less than with the Proposed Action (as described in section 4.1.4). Impacts at SRS and SNL would be the same as described for the Proposed Action in sections 4.1.3 and 4.1.5, respectively, and summarized in section 4.3.2.

New construction at RFP and changes and/or modifications to existing buildings would be compatible with existing land use plans and policies.

Construction-related air emissions and noise impacts at RFP would be short-term and not significant with incorporation of standard construction mitigation measures. Air emissions and noise from operations at RFP would increase but would not exceed applicable standards. At KCP, Mound, and Pinellas, local air quality improvements could occur due to the closeout of Complex missions at these facilities. Consolidation at RFP would triple the current annual water use. Adequate water supplies are available; however, this increase would require renegotiation of the current water supply contract. No impacts to geologic resources are expected. Construction-related soil erosion at RFP could occur but would be minor and short-term after standard construction mitigation measures were instituted.

At RFP, approximately 44 acres of short-grass prairie vegetation would be lost to new construction. No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands may occur if the RFP alternative was selected. Consultation would be initiated with the Corps of Engineers to determine potential wetland impacts and appropriate mitigation.

Consultations on cultural resources at RFP have not been initiated and the absence of such resources has not yet been confirmed. Construction of new facilities at RFP may have adverse impacts if important Native American resources are present. Direct physical impacts are unlikely; however, Native American resources may exist if such resources are identified by Native American Groups. Consultations would be initiated if RFP were selected as the preferred consolidation site.

Changes to socioeconomic and community services at RFP are expected. The RFP alternative would create 9,558 jobs (3,740 direct and 5,818 indirect) during peak operations. Total in-migration would be 5,594 persons. The change in population would be less than 1 percent. The need for additional housing would be negligible. Golden is the only city where additional housing requirements would increase above 1 percent, but this need would not exceed 2 percent. As a result of ongoing planning, DOE has revised workforce estimates. Recently revised estimates of 3,300 additional direct jobs at RFP would reduce the number of indirect jobs and there would be fewer economic benefits, but the revised estimates would not affect these conclusions.

Economic changes would occur at KCP, Mound, and Pinellas due to the closeout of Complex missions at these facilities. Socioeconomic consequences discussed for the closeout of Complex missions at KCP in section 4.3.3 and in section 4.3.2 for Pinellas and Mound would be the same as the RFP alternative.

At RFP, liquid hazardous waste volumes generated from operations would increase by approximately 43,300 gallons per year over current operational waste volumes of 5,005 gallons annually. Solid hazardous waste volumes would increase approximately 12,300 ft^3/yr over the existing volume of 1,090 ft^3/yr. Sanitary/industrial wastewater volumes would increase approximately 148 million gallons annually over the current rate of 55.2 million gallons annually. This volume would exceed the current capacity of the RFP's wastewater treatment plant. A major upgrade/modification to RFP's wastewater treatment plant could, however, mitigate this impact. The closeout of Complex missions at KCP, Mound, and Pinellas would eliminate those facilities' waste streams.

Consolidation operations at RFP would result in cancer risks of 5.3×10^{-4} and 1.2×10^{-5} to an onsite worker and a member of the public, respectively. Activities relocated to SNL would result in cancer risks to workers of 6×10^{-6} due to the introduction of chemical solvents; however, these risks are within acceptable guidelines. Appropriate mitigation measures such as substituting less toxic solvents or modifying production processes would be implemented to reduce the cancer risks at RFP to within acceptable guidelines. The probability or conse- quences of potential accidents would not increase appreciably with the RFP alternative.

4.3.6 Cumulative Impacts

Cumulative impacts are those effects of the Proposed Action considered with other past, present, and reasonably foreseeable future actions. No past, present, or reasonably foreseeable future projects have been identified onsite or offsite which, when added to the effects of the Proposed Action, would result in a significant impact.

No Complex cumulative effects would occur because the Proposed Action represents a consolidation of existing activities and functions, rather than an initiation of new activities. In most instances, consolidation would reduce potential environmental impacts from those that would occur with the No Action alternative. Nonnuclear activities, now located within aging facilities at donor sites would be transferred to sites with newly refurbished facilities. These facilities would incorporate DOE ES&H planning decisions on Complex reconfiguration; meet all applicable codes, environmental requirements, and standards; and already contain almost all of these operations, materials, and/or hazardous waste streams. Consolidation would also reduce the number of sites with hazardous activities and/or materials within the Complex.

The Proposed Action would have no cumulative effects on land resources, noise, water resources, geology and soils, and cultural resources. No cumulative environmental effects are expected at Mound, Pinellas, or RFP with the Proposed Action.

Cumulative effects would be expected on air resources, socioeconomic and community services, waste management, and health effects to workers.

Implementing the Proposed Action would add air emissions which would contribute to existing and future air quality in the region at each site. The analysis presented in the air quality sections of the EA identify the contribution of pollutants attributed to the Proposed Action to the background, and compares the cumulative (addition plus background) to applicable regulatory standards and guidelines. Changes in background air quality, either increases or decreases, would affect the predicted values. As stated earlier, no major projects have been identified in the site areas that could contribute significant amounts of pollutants that would change the analysis. However, other nonpoint source activities such as a substantial increase of vehicle use in the region could result in cumulative impacts.

The cumulative socioeconomic and community services effects from the estimated peak construction and operations workforce requirements due to the Proposed Action at KCP, SRS, LANL, and SNL (see table 3.3-1) would result in less than 1-percent change in population and regional economic conditions. Because of the small size of the socioeconomic changes in relation to the socioeconomic study areas and the dispersed location of the sites involved in the Proposed Action, the cumulative socioeconomic impacts are expected to be minor. These effects were analyzed in Socioeconomic and Community Services discussions for each site in sections 4.1.1 to 4.1.8 and summarized in section 4.3.

Solid and liquid waste generated from Proposed Action activities, such as building decontamination to accommodate relocated activities and operations, would add incrementally to KCP, SRS, LANL, and SNL solid and liquid waste volumes and have cumulative impacts to offsite waste management facilities. Only small increases in operational waste volumes would occur, generally ranging from less than 1 percent to 5 percent. These changes in waste volumes when combined with the remediation values would reduce available treatment, storage, and disposal capacities, and would result in a cumulative impact to these sites' waste management activities. All sites can accommodate the anticipated Proposed Action waste volumes as well as all other non-project system demands within existing waste management programs. Offsite commercial waste management facilities can expand as necessary to accommodate market conditions, or the DOE sites can use alternative facilities in their respective areas. The cumulative impact on the onsite and offsite liquid and solid waste storage and treatment facilities is, therefore, expected to be minor in relation to the volumes treated and/or stored annually at each site.

Cumulative effects resulting from existing site and project area releases, and the releases of radionuclides and chemicals associated with relocated functions at KCP, SRS, LANL, and SNL are expected. The cumulative health effects are projected to be below applicable permit, regulatory, and DOE operational requirements, and would not cause adverse health effects. Appropriate waste minimization and pollution prevention program measures, such as substituting less toxic solvents or changing the production process, would be implemented to minimize cumulative health effects from non-radioactive toxic chemicals.

Because relocated functions involve activities that are the same as or similar to those that are currently being performed at the receiving site, the cumulative effects of accidents on human health are not expected to increase appreciably.

4.3.7 Mitigation Measures and Adverse Impacts That Cannot be Avoided

Proposed Action. At all Proposed Action sites, project design would include best available control technologies or modifying processes to reduce criteria and hazardous/toxic air emissions. All applicable mitigation measures for protection of the environment as required in DOE Order 6430.1A, General Design Criteria, would be incorporated in project design. Construction mitigation measures (e.g., dust control, vehicle maintenance to reduce air emissions, and erosion/sediment controls) would be used. Appropriate mitigation measures, such as substituting less toxic solvents or modifying processes, would be implemented to reduce chemical-related health effects to workers and the public to less than 10^{-6}. All relocated nonnuclear functions would be designed to meet waste minimization goals at receiving sites, and all modified facilities would include appropriate design features which improve contamination control and release prevention. These features could include measures such as not interconnecting stormwater systems, the sanitary waste systems, and radioactive or other hazardous material handling systems or areas; monitoring and sampling equipment; and spill overfill prevention devices.

Due to the closeout of Complex missions, unavoidable adverse economic consequences and out-migration of population would occur at Mound, Pinellas, and RFP. However, some DP workers could be redeployed to meet new mission requirements. Others might receive additional professional and vocational training at local schools during the transition period. DOE could also assist local colleges and vocational schools with the development of specialized curriculums.

Out-placement and counseling services could help mitigate the effects on workers who cannot be transferred. Such services could include academic and vocational counseling, help in preparing resumes and preparing for job interviews, financial planning, and job searching techniques. Other mitigation measures could include maintaining close coordination with local businesses and economic development agencies to identify available jobs, and to inform the business community of skilled personnel in the labor market. Limited opportunities, particularly technical, in the local communities may affect out-placement.

Mound Plant Alternative. Potential waste management impacts could occur with consolidation at Mound (see section 4.2.1.8). Projected waste volumes would greatly exceed existing waste management facility capacities. Potential mitigation measures, such as constructing new onsite hazardous waste storage facilities and upgrading or modifying the Mound wastewater treatment plant to handle the increased waste volumes, could reduce these impacts.

The loss of approximately 62 acres of forested and old field habitats to accommodate new construction at Mound would be an adverse impact that cannot be avoided. This impact would be partially mitigated through using indigenous vegetation to landscape the new facilities and revegetating construction laydown areas and parking lots. Potential mitigation measures for impacts to local transportation systems in the Mound area could include staggering work hours, carpooling, or modifying the road segments experiencing congestion. If cultural resources are found in the areas to be disturbed, mitigation measures would be coordinated with the SHPO.

The closeout of Complex missions at KCP and Pinellas and of the Complex nonnuclear missions at RFP under the Mound alternative would result in unavoidable adverse economic consequences and out-migration of population at these sites. Potential mitigation measures discussed above for the Proposed Action would also be applicable to this alternative.

Pinellas Plant Alternative. Land use impacts could occur during the construction phase because vacant land at Pinellas is limited and 63 acres are needed for construction activities (see sections 4.1.7.1 and 4.2.2.1). Specific mitigation measures would be required during the design phase. Potential measures could include using offsite land for material stockpiles/storage and other construction support, or phasing construction to use available onsite land.

The loss of approximately 21 acres of mowed field to accommodate new construction at Pinellas would be an adverse impact that could not be avoided. This impact would be partially mitigated through using indigenous vegetation to landscape the new facilities and revegetating construction laydown areas and parking lots. Potential mitigation measures for impacts to local transportation systems in the Pinellas area could include staggering work hours, carpooling, or modifying the road segments experiencing congestion. If cultural resources are found in the areas to be disturbed, mitigation measures would be coordinated with the SHPO.

The closeout of Complex missions at KCP and Mound, and the Complex nonnuclear missions at RFP under the Pinellas alternative would result in unavoidable adverse economic consequences and out-migration of population at these sites. Potential mitigation measures discussed above for the Proposed Action would also be applicable to the Pinellas alternative.

Rocky Flats Plant Alternative. Potential waste management impacts could occur with consolidation at RFP (see section 4.2.3.8). As with the Mound alternative, the volume of expected waste due to consolidation at RFP would exceed existing storage and treatment capacity. Potential mitigation measures and their effectiveness would be similar to those described for Mound.

Approximately 72 acres of mostly short grass prairie vegetation would be disturbed by new construction. Following construction, 28 acres would be revegetated with native species, resulting in a net loss of 44 acres of prairie vegetation. The loss of approximately 44 acres of short-grass prairie vegetation would be an adverse impact that could not be avoided. This impact would be partially mitigated through using indigenous vegetation to landscape the new facilities and revegetating of construction laydown areas and parking lots. Potential mitigation measures for impacts to local transportation systems in the RFP area could include staggering work hours, carpooling, or modifying the road segments experiencing congestion. If cultural resources are found in the areas to be disturbed, mitigation measures would be coordinated with the SHPO.

The closeout of Complex missions at KCP, Mound, and Pinellas with the RFP alternative would result in unavoidable adverse economic consequences and out-migration of population at these sites. Potential mitigation measures discussed for the Proposed Action would also be applicable to the RFP alternative.

4.4 Decontamination and Decommissioning

At the end of their useful life, all Complex facilities, including the nonnuclear manufacturing facilities, may require cleanup and remediation (i.e., D&D). Decontamination is the process of reducing and removing radioactive or hazardous materials from facilities, equipment, or soils. Decontamination techniques include washing, heating, chemical or electrochemical action, and mechanical cleaning. Decommissioning involves removing facilities, including those contaminated with radiation and hazardous materials, from active service. Cleanup and remediation activities involving soil and groundwater are also expected at most of the DP facilities. These cleanup and remediation activities are not addressed in this EA. They are independently driven by regulatory programs (primarily RCRA and CERCLA) and are conducted pursuant to regulatory requirements, independent of Complex activities or programmatic decisions.

It is important to recognize that the decisions to conduct near-term cleanup and D&D activities at the potential weapon mission closeout sites does not depend on whether the proposal for consolidation is implemented. Indeed, regardless of whether Complex missions are closed out at these sites, substantial cleanup of both soil and groundwater contamination is either planned or occurring as is substantial D&D of buildings already determined to be unnecessary for future operations. These cleanup and D&D activities, which are independent of nonnuclear consolidation decisions, represent a large majority of the total scope of activities that must occur at the potential mission closeout sites. At such time as there are specific proposals for the D&D of any facilities surplussed as a result of nonnuclear consolidation, the appropriate NEPA documentation will be prepared.

Depending on the level and type of contamination, D&D may involve decontamination and dismantling and return of an area to its original condition without restrictions on use or occupancy, or partial decontamination and isolation of remaining residues with continued surveillance and restrictions on use or occupancy. D&D of this latter type usually applies to facilities contaminated with long-lived radionuclides which can be expected to decay to levels that permit the property to be released for unrestricted use within a reasonable time (i.e., on the order of 100 years).

The D&D of Complex facilities is the responsibility of the DOE Office of Environmental Restoration and Waste Management. DOE is committed to remediate these sites, to comply with all applicable environmental requirements, and to protect the public's and workers' health and safety. EM is currently considering many technologies for the treatment of contaminated materials and equipment in D&D operations, and for the long-term management of sites following D&D. DOE is preparing an Environmental Restoration and Waste Management PEIS to analyze alternative strategies and policies for conducting its Environmental Restoration and Waste Management Program (see section 1.4 of this EA). The existing Environmental Restoration and Waste Management Program is divided into three areas: (1) environmental restoration; (2) waste management; and, (3) technology development. The program is driven by specific laws and regulations, and is regulated by the EPA and the states where facilities are located. Activities conducted by the Environmental Restoration and Waste Management program must integrate the requirements of several different regulatory programs under NEPA, CERCLA, TSCA, CAA, CWA, and RCRA, and must also integrate the requirements of state and local regulatory programs. The environmental analyses in the Environmental Restoration and Waste Management PEIS will support DOE decisions on how to best manage processes or facilities for treatment, storage, or disposal of radioactive, hazardous, or mixed waste; approaches to be used to remediate contaminated sites; treatment technology application or development; land use; and technology and policy consideration for D&D of DOE facilities at the end of their useful lives. To the extent that decisions based on the Environmental Restoration and Waste Management PEIS change DOE's current waste management and D&D operations, subsequent site- specific NEPA analysis will consider such new practices. At the same time, any substantial changes to existing regulatory program requirements, and the resulting impacts on DOE's operations will also be addressed by subsequent NEPA analysis.

4.4.1 Decontamination at Consolidation Sites

Site preparation of facilities to be modified to accept the missions associated with nonnuclear consolidation may include some decontamination and remedial measures. As discussed in section 3.3, these may include such measures as removal of asbestos floor tiles and insulation, PCB- and asbestos-contaminated concrete, and removal of tritium-contaminated equipment. These activities are not unlike decontamination and renovation of facilities currently conducted at all sites being considered for nonnuclear consolidation as part of their ongoing health and safety programs to protect workers and to adapt to changes in work requirements. Decontamination of any facilities resulting from nonnuclear consolidation activities would be conducted in accordance with site procedures and guidelines as directed by applicable Federal, state, and local regulations, and relevant DOE orders. Such activities could uncover additional contamination which may require environmental restoration. It is not expected that such activities will entail substantially greater levels of effort or environmental consequences than the ongoing decontamination and remedial activities conducted on a regular basis at all DOE facilities to protect the health and safety of workers.

All proposed facility modifications to accommodate nonnuclear consolidation functions would be designed to make future D&D of such facilities as simple and inexpensive as feasible, and to minimize the impacts of future D&D, as required by DOE Order 5820.2A, Radioactive Waste Management, and DOE Order 6430.1A, General Design Criteria . Examples of design features that may be incorporated into nonnuclear consolidation to facilitate future D&D are shown in table 4.4-1.

4.4.2 Decontamination and Decommissioning at Complex Mission Closeout Sites

The Proposed Action would result in the closeout of Complex missions at Mound and Pinellas, and the closeout of Complex nonnuclear missions at RFP, and would entail the transition of those plants to the DOE Office of Environmental Restoration and Waste Management for D&D. If one of the alternatives is selected, the Complex missions at KCP would be closed out and transferred to one of the alternative facilities. This would entail transition of KCP to environmental cleanup under the Office of Environmental Restoration and Waste Management.

The complexity and actual conduct of the D&D activities at closeout sites resulting from nonnuclear consolidation would vary from site to site. The required level of effort to complete D&D of sites would be a function of the types of chemical and radiological materials utilized when the site was operational, and the extent to which radioactive and hazardous/toxic materials have been deposited on the internal and external surfaces of components, systems, and structures. For example, at Mound, DP operations have included recovery and purification of tritium from scrap metals and investigations of chemical explosives, pyrotechnics, plastics, elastomers, and adhesives. At RFP, DP operations have included the manufacture of nuclear weapons components from plutonium, uranium, and beryllium; nuclear manufacturing; and chemical processing for plutonium recovery. At Pinellas, past DP operations involved the use of plutonium as a sealed source, while current operations involved the use of tritium in loading of neutron generator components, and analytical laboratory operations. At KCP, the principal operation performed is the manufacture of nonnuclear components for nuclear weapons; no radioactive materials are machined or processed.

The characterization of the extent and type of contamination, the decontamination and remedial measures required, and the schedule of D&D activities would be identified in the transition planning process conducted by the DOE Office of Environmental Restoration and Waste Management. The transition process is conducted on a building-by-building basis and involves a range of activities that begins when a specific building is formally declared surplus and ends when responsibility is transferred to EM and the building is ready for final disposition (i.e., decontamination and removal from service or transfer for alternative uses, including those by DOE, other government agencies, or the private sector). The transition of a specific building would be detailed in a Transition Program Management Plan prepared by DOE for each facility. Appropriate site-specific NEPA documentation will be performed for the D&D of any surplus building as a result of implementing alternatives selected for the nonnuclear consolidation proposal. As stated above, the proposal for D&D of specific facilities would require the preparation of appropriate NEPA documentation.

To achieve readiness for decontamination due to closeout of Complex missions at Mound, Pinellas, RFP, or KCP, specific building-level activities would be initiated at each proposed mission closeout site. The sequence of activities includes review and correction of immediate safety issues, initial screening of buildings, and hazard assessments; stabilization of physical and chemical conditions in the building; inventory and disposal of hazardous materials and chemicals;

consolidation and removal of classified documents, parts, products, tooling, and materials; safety evaluation and preparation of documentation to substantiate building condition (within the safety envelope); and need for decontamination and disposition. The D&D of equipment and facilities would be performed in accordance with standards and procedures based on DOE orders and other Federal and state laws, regulatory programs, and guidelines. As discussed below, D&D at potential closeout sites may be affected by some or all of these.

RFP was placed on the CERCLA National Priorities List in October 1989. The environmental restoration activities at RFP are implemented by an interagency agreement involving EPA, the State of Colorado, and DOE. The interagency agreement encompasses all activities associated with identifying environmental problems and all measures to be implemented for remediation of those problems that pose a threat to human health and the environment. The activities performed according to the interagency agreement are conducted under the regulatory authority and guidance of CERCLA and RCRA. Regulatory constraints at RFP are more stringent than those at the other proposed closeout sites due to the specific provisions of the Federal Facility Compliance Agreements in place, which require extensive site characterization and regulator approval of all demolition and construction activities. These constraints would impact the duration of D&D activities at RFP by limiting the rate at which particular buildings can be cleaned up and restricting the generation of certain waste types expected to result from the D&D activities until suitable treatment, storage, or disposal facilities are available.

Mound was designated as a CERCLA National Priorities List site in November 1989. A Federal Facilities Agreement between DOE and EPA followed in October 1990. The Statement of Work for the Federal Facilities Agreement requires DOE to characterize Mound in terms of all hazardous substances that potentially pose a threat to human health or the environment. A multi-year program of remedial investigations, feasibility studies, and actual remediation is in progress and will continue pursuant to the regulatory requirements of CERCLA and other applicable regulatory requirements, regardless of defense production activities. Mound also has a Groundwater Protection Management Program that was established pursuant to DOE Order 5400.1. These program and agreement constraints could also impact the duration of D&D activities at Mound.

A RCRA Hazardous and Solid Waste Amendments Permit was issued to Pinellas by EPA in February 1990. A condition of this permit requires site characterization and the remediation of several solid waste management units. D&D activities conducted at Pinellas would have to conform to the requirements of these activities, which could add additional time and administrative requirements to D&D activities.

In March 1989, DOE entered into a RCRA Section 3008(h) Administrative Order on Consent, requiring that DOE conduct all environmental restoration activities at KCP under RCRA. This requirement is not expected to appreciably affect any D&D activities that would be required at KCP.

4.5 Intersite Transportation

The proposed transfer of nonnuclear functions would not require transporting significant quantities of hazardous materials, such as chemicals, between DOE sites. Any hazardous materials, except tritium, to be transferred would be transported by commercial carriage in compliance with Department of Transportation (DOT) regulations. Tritium would be transported by authorized government means. The disposal or transfer of other hazardous materials at Mound and Pinellas would be addressed separately in site cleanup and closure plans during mission closeout of these sites.

Reservoir surveillance operations, gas transfer systems, neutron tube target loading, and commercial sales/inertial confinement fusion target loading involve the transportation of tritium and tritium components that have the potential to impact the environment under both normal (incident-free) and accident conditions. Of these activities, reservoir surveillance operations have the greatest potential for impact because they involve transportation of the largest quantities of tritium. Existing tritium reserves for the four functions are allocated approximately as follows: 95 percent for reservoir surveillance operations, 4 percent for commercial sales/inertial confinement fusion target loading, and less than 1 percent for gas transfer systems and neutron tube target loading combined. The quantities of tritium transported in connection with gas transfer systems, neutron tube target loading, and commercial sales/inertial confinement fusion target loading are very small. As such, these activities do not have the inherent potential to cause significant impacts from tritium-related transportation, and these activities do not require further analysis as a result of the Proposed Action. Thus, for both the No Action alternative and the Proposed Action, this section assesses the potential transportation impacts associated with reservoir surveillance operations. The reservoir surveillance operations would be transferred to SRS with the Proposed Action. The assessment consists of three elements: (1) a general discussion of normal (incident-free) and accident impacts associated with tritium transportation; (2) a discussion of tritium-related transportation that would continue with the No Action alternative scenario and would result from the Proposed Action; and, (3) a discussion of the changes in impacts that might result from the Proposed Action as compared to the No Action alternative baseline.

Tritium and tritium-containing components are shipped between Complex sites in compliance with regulations established by the DOT, Nuclear Regulatory Commission (NRC), and DOE orders. Tritium is always shipped in DOT/NRC/DOE-approved packagings that are designed and constructed so that under normal transport conditions, there would be no radioactive releases and no reduction in the effectiveness of the packaging.

Tritium shipments between Complex sites are managed by the DOE Transportation Safeguards System, and are made almost exclusively by air via DOE's contractor, Ross Aviation. A small number of shipments is made by DOE-owned and -operated safe secure trailers. The safe secure trailers are vehicles designed specifically to enhance structural and thermal performance and, in conjunction with internal DOT/NRC/DOE-approved packagings, provide a combined package for the safety and security of the tritium cargo. Shipments by safe secure trailers are accompanied by armed guards and are monitored by a tracking system.

Tritium, a low-energy beta emitter, is shielded by stainless steel in its packaging to prevent detectable radiation outside the packaging. Thus, during normal operations, radiation exposure to personnel involved in tritium-related transportation is negligible. The DOE Albuquerque Field Office is currently finalizing an aviation transport study of the Complex materials and components that is expected to show that the cumulative radiation exposure from tritium-related transportation to Ross Aviation flight crew members is zero (DOE, 1992f). Thus, during normal operations, tritium-related transportation poses no significant risk to transportation workers or the public.

The DOE Albuquerque study is also expected to show that the accident probability for Ross Aviation aircraft is 0.00023 per year. This equates to less than 1 accident in 4,000 years of operation. The annual accident probability is based on data from the last 10 of 19 years that Ross Aviation has logged over 60 million miles and 140,000 flying hours of operating transport aircraft for DOE. Finally, there have been no known deaths or serious injuries to the public or transportation industry personnel as a result of the radioactive nature of tritium involved in an accident.

DOE has evaluated the radiological risk to the public of transporting tritium between Mound and SRS (DOE, 1992g). Specifically, the study evaluated the probability of a tritium release corresponding to one shipment. The analysis assumed that 50,000 curies would be the maximum amount of tritium released in the elemental form for each transportation accident, except in the case of a fire combined with the release, where it was assumed that the entire release would be converted to the oxide form. It was estimated that a 50 percent probability of such a fire exists because of the prevalence of ignition sources, especially for an aircraft accident. In either the elemental form or oxide form, DOE's analysis estimated the probability of an environmental release per shipment to be 5.0×10^{-9}. In other words, there is about 1 chance in 200,000,000 shipments that a release would occur.

The closeout of tritium-related operations at Mound and Pinellas as a result of the Proposed Action would not cause any significant increase in the amount of tritium-related transportation from these sites. These sites are currently reducing their existing tritium inventories in response to future workloads that are expected to require less tritium. Thus, any closeout of tritium resulting from the Proposed Action would not cause any significant change and would be consistent with the No Action alternative.

During normal operations, the potential impacts from tritium-related transportation are negligible and independent of transport miles. Therefore, the transfer of reservoir surveillance operations functions from Mound to SRS as part of the Proposed Action would have no effect on potential impacts.

5 ENVIRONMENTAL PERMITS AND REGULATIONS

Federal environmental regulations have been established to protect the environment and to control the handling, emission, discharge, and disposal of waste substances. At the Federal level, these environmental regulations are promulgated and enforced primarily by the Environmental Protection Agency (EPA). Compliance with these national requirements must be met by all Federal agencies whether they are enforced directly by the Federal Government or delegated to the states. In many cases, these requirements are applied to sources of potential impact through review, approval, and permitting programs that control the release of pollutants or other impacts on the environment.

States can set stricter standards than those required by Federal law. Some of the Federal legislation that delegates permitting or review authority to qualifying states includes: the National Emission Standards for Hazardous Air Pollutants (NESHAP) and the Prevention of Significant Deterioration (PSD) permits under the Clean Air Act (CAA); the Water Quality Standards and the National Pollutant Discharge Elimination System (NPDES) program under the Clean Water Act (CWA); the Hazardous Waste Programs under the Resource Conservation and Recovery Act (RCRA); and the Drinking Water and Underground Injection Control programs under the Safe Drinking Water Act (SDWA). Conversely, the Toxic Substances Control Act (TSCA) is administered entirely by the Federal Government.

Except for limited Presidential exemptions, Federal agencies must comply with all provisions of Federal environmental statutes and regulations, as well as all applicable state and local requirements. In addition, Executive orders stress the mandate for Federal facilities to fully comply with environmental requirements and establish procedures for ensuring that this is accomplished. The Department of Energy (DOE) also expresses many of these requirements through DOE Orders and regulations.

When a specific site is unable to comply with regulatory standards, needs additional time to achieve compliance, or when the applicability of the actual standard is in doubt, DOE may enter into an agreement with the regulatory agency or agencies. Parties to the agreement normally concur on a time frame, interim standards, and a schedule for reaching full compliance. The agreement then becomes the applicable standard during the agreed-upon time frame.

Table 5-1 presents the Federal legislation applicable to the Proposed Action and other alternatives. This legislation is divided into seven categories: air resources, water resources, waste management, biotic resources, cultural resources, public/worker health, and other. Within each category a law is cited, the responsible agency is named, the permitting requirements are identified, and the "potential applicability" of that particular law is briefly indicated.

Table 5-2 presents the state legislation applicable to the Proposed Action at Kansas City Plant (KCP) in Missouri. Under the Proposed Action, different sites may receive various nonnuclear functions. When a function (e.g., neutron generator) is relocated to a site, a modification to an existing permit or the acquisition of a new permit may be required. In the "potential applicability" column, the permit requirements for each state are discussed. This approach is also used for the other three alternatives in table 5-3.

Table 5-3 presents the state legislation that is applicable to the other alternatives: the Mound alternative (Ohio), the Pinellas alternative (Florida), and the Rocky Flats Plant (RFP) alternative (Colorado).

Each alternative is composed of specific DOE sites that transfer or receive specific nonnuclear functions. In turn, each site must comply with its respective state legislation. This legislation covers air resources, water resources, waste management, and chemical and material storage.

Under each alternative, DOE must comply with the legislation of the respective state in which the specific sites are located.

Each alternative and the states affected by the respective alternative are listed below:

Proposed Action	Mound Alternative
Missouri	Ohio
New Mexico	New Mexico
Tennessee	
South Carolina	

Pinellas Alternative	RFP Alternative
Florida	Colorado
New Mexico	New Mexico
South Carolina	South Carolina

If the Mound alternative is chosen, the specific sites (and corresponding states) include: Mound (Ohio); and Sandia National Laboratories, New Mexico and Los Alamos National Laboratory (New Mexico).

If the Pinellas alternative is chosen, the specific sites (and corresponding states) include: Pinellas (Florida); Sandia National Laboratories, New Mexico and Los Alamos National Laboratory (New Mexico); and the Savannah River Site (South

Carolina).

If the RFP alternative is chosen, the specific sites (and corresponding states) include: RFP (Colorado); Sandia National Laboratories, New Mexico and Los Alamos National Laboratory (New Mexico); and the Savannah River Site (South Carolina).

Table 5-4 presents the environmental agreements currently in force that are applicable to the Proposed Action and other alternatives. The agreements between regulatory agencies and the DOE include Federal Facility Agreements, Federal Facility Compliance Agreements, Settlement Agreements, Agreements in Principle, and Consent Orders. They are divided into three categories: air resources, water resources, and land resources. The table identifies the facility, parties involved and effective date for each agreement plus a brief "scope of agreement" description.

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All references cited in the text can be found in the following list, organized by site. References or regulations that apply to multiple sites are found in the first two sections of this list. The references are organized in this same manner at the 15 designated reading rooms located near cities shown in figure 1.7-1.

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Glossary

Absorbed dose:

The energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest in that material. Expressed in units of rad or grays (Gy), where 1 rad = 0.01 Gy.

Acute standard:

A numerical limit on the amount of a particular contaminant that an organism may be exposed to over a short period of time.

Air Quality Control Region:

An interstate area designated by the Environmental Protection Agency (EPA) for the attainment and maintenance of National Ambient Air Quality Standards.

Air quality standards:

The level of pollutants prescribed by regulations that may not be exceeded during a specified time in a defined area.

Alkalinity:

Acid-neutralizing capacity of water.

Alluvial deposits:

Deposits of earth, sand, gravel, and other materials carried by moving surface water and deposited at points of weak water flow.

Alpha wastes:

Wastes containing radioactive isotopes which decay by producing alpha particles.

Ambient air:

The surrounding atmosphere, as it exists around people, plants, and structures.

American Indian Religious Freedom Act (AIRFA) (1978):

This Act establishes national policy to protect and preserve for Native Americans their inherent right of freedom to believe, express, and exercise their traditional religions, including the rights of access to religious sites, use and possession of sacred objects, and the freedom to worship through traditional ceremonies and rites.

Aquatic biota:

The sum total of living organisms within any designated aquatic area.

Aquifer:

A saturated geologic unit through which significant quantities of water can migrate under natural hydraulic gradients.

Archaeological sites (resources):

Any location where humans have prehistorically altered the terrain or discarded artifacts.

Atmospheric dispersion:

The process of air emissions being dispersed in the atmosphere. This occurs by the wind that carries the pollutants away from their source and by turbulent air motion that results from solar heating of the earth's surface and air movement over rough terrain and surfaces.

Atomic Energy Act (1946):

Created the Atomic Energy Commission (AEC) to supervise nuclear weapons design, development, manufacturing, maintenance, modification, and dismantlement.

Atomic Energy Commission (AEC):

A five-member commission, established by the Atomic Energy Act . In 1974, the AEC was abolished and some of its functions were transferred to the Energy Research and Development Administration, and was subsequently merged in 1977 with other Federal energy functions into the Department of Energy (DOE).

Attainment area:

An area considered to have air quality as good as or better than the national ambient air quality standards as defined in the Clean Air Act . An area may be an attainment area for one pollutant and a non-attainment area for others.

Average Daily Traffic (ADT):

The total volume of traffic during a given time period, in whole days greater than one day and less than one year, divided by the number of days in that time period.

Baseline:

A quantitative expression of conditions, costs, schedule, or technical progress to serve as a base or standard for measurement during the performance of an effort; the established plan against which the status of resources and the progress of a project can be measured. The environmental baseline is the site environmental conditions as they are projected to occur in a specified time period.

Bedroom community:

An area, adjacent to a city, where a large number of individuals who work in the city reside.

Beryllium:

An extremely lightweight, strong metal used in weapons systems.

Calorimeter:

A device used for measurement of thermal constants, such as specific heat, latent heat, or calorific value.

Capable fault:

A fault which has had movement at or near the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years.

Carbon monoxide (CO):

A colorless, odorless gas that is toxic if inhaled in high concentration over a period of time.

Carolina bay:

Ovate, intermittently flooded depression of a type occurring on the Coastal Plain from New Jersey to Florida.

Chronic standard:

A numerical limit on the amount of a particular contaminant that an organism may be exposed to over an extended period of time. The allowable exposure concentration for the chronic standard is less than that of the acute standard.

Clean Air Act Amendments (CAAA) of 1990:

Expands the EPA enforcement powers and adds restrictions on air toxics, ozone depleting chemicals, stationary and mobile emissions sources, and emissions implicated in rain and global warming.

Clean Air Act (CAA):

Federal law mandating and enforcing air pollutant emissions standards for stationary sources and motor vehicles.

Clean room:

An uncontaminated room with filtered air that meets a specific level of cleanliness in which work is performed or in which uncontaminated equipment and materials are stored.

Clean Water Act (CWA) (1972, 1987):

This law makes it illegal to discharge pollutants from a point source into navigable waters of the U.S. except in compliance with a National Pollution Discharge Elimination System (NPDES) permit.

Code of Federal Regulations (CFR):

All Federal Regulations in force are published in codified form in the Code of Federal Regulations.

Committed dose equivalent:

The predicted total dose equivalent to a tissue or organ over a 50-year period after an intake of radionuclide into the body. It does not include external dose contributions. Committed dose equivalent is expressed in units of rem (or Sv).

Committed effective dose equivalent: The sum of the committed dose equivalents to various tissues in the body, each multiplied by the appropriate weighting factor. Committed effective dose equivalent is expressed in units of rem (or Sv).

Community (biotic):

All plants and animals occupying a specific area under relatively similar conditions.

Complex:

The U.S. Nuclear Weapons Complex which is a set of Federal sites and government owned/contractor operated facilities administered by the DOE.

Complex 21:

The reconfigured nuclear weapons complex to be fully operational early in the 21st century that will sustain the nation's nuclear deterrent until the middle of that century.

Comprehensive Environmental Response Compensation and Liability Act (CERCLA or Superfund):

A statutory framework for remediation of past contamination from hazardous waste.

Concentration:

The quantity of a substance in a unit of sample media (e.g., milligrams per liter, or micrograms per kilogram).

Confined aquifer:

A permeable geological unit with an upper boundary that is at a pressure higher than atmospheric pressure.

Consumptive water use:

The difference in the volume of water withdrawn from a body of water and the amount released back into the body of water.

Container:

The metal envelope in the waste package that provides the primary containment function of the waste package and is designed to meet the containment requirements of 10 CFR Part 60.

Contrast:

The effect of a striking difference in form, line, color, or texture of a landscape's features.

Criteria pollutants:

Six air pollutants for which national ambient air quality standards are established by EPA: sulfur dioxide, nitric oxides, carbon monoxide, ozone, particulate matter (smaller than 10 microns in diameter or PM_{-10}), and lead.

Cultural chronology:

The science of arranging time in periods and ascertaining the dates and historical order of past events.

Cultural resources:

Archaeological sites, architectural features, traditional use areas, and Native American sacred sites.

Cumulative impact:

An impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what organization or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time and may be direct or indirect.

Day-Night Average Level (DNL):

The average noise level in dBA over a 24-hour period with a 10dB adjustment for events occurring during the night (10 p.m. to 7 a.m.), and ignoring an evening-hour adjustment.

Decibel (dB):

A unit of sound measurement. In general, a sound doubles in loudness for every increase of 10 decibels.

Decibel, A-weighted (dBA):

A unit of weighted sound pressure level, measured by the use of a metering characteristic and the "A" weighting specified by the American National Standard Institute (ANSI) S1.4-1971(R176).

Decommissioning:

Removing facilities contaminated with radiation (such as processing plants, waste tanks, and burial grounds) from service and reducing or stabilizing radioactive contamination. Decommissioning includes the following concepts: (1) decontamination, dismantling, and return of an area to its original condition without restrictions on use or occupancy, and (2) partial decontamination, isolation of remaining residues, and continued surveillance and restrictions on use or occupancy.

Decontamination:

The removal of radioactive or chemical contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques.

Depleted uranium:

Uranium whose content of the isotope U-235 is less than 0.7 percent, which is the U-235 content of naturally occurring uranium.

Derived concentration guide:

The concentration of a radionuclide in air or water which, under conditions of continuous exposure by one exposure mode (i.e., ingestion of water or submersion or inhalation of air), for one year, a "Reference Man" would receive the most restrictive of: (1) an effective dose equivalent or 100 mrem, or (2) a dose equivalent of 5 rem to any tissues, including skin and lens of the eye.

Design Laboratory:

DOE facilities involved in the design of nuclear weapons.

Direct economic effects:

The initial increases in output from different sectors of the economy resulting from some new activity within a predefined geographic region.

Disposition:

The ultimate "fate" or end use of a surplus DOE facility following the transfer of the facility to the Office of Environmental Restoration and Waste Management (EM).

Dose equivalent:

The product of absorbed dose in rad (or Gy) in tissue (quality factor.) Dose equivalent is expressed in units of rem or Sievert (Sv), where 1 rem = 0.01 Sv. The dose equivalent to an organ, tissue, or the whole body will be that received from the direct exposure plus the 50-year committed dose equivalent received from the radionuclides taken into the body during the year.

Drainage basin:

An above-ground area that supplies the water to a particular creek or stream.

Drawdown:

The height difference between the natural water level in a formation and the reduced water level in the formation caused by the withdrawal of groundwater.

Drinking-water standards:

The prescribed level of constituents or characteristics in a drinking water supply that cannot be exceeded legally.

Effective dose equivalent:

The summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor. This sum is a risk-equivalent value and can be used to estimate the health effects risk of the exposed individual. The tissue-specific weighting factor represents the fraction of the total health risk resulting from uniform whole-body irradiation that would be contributed by that particular tissue. The effective dose equivalent includes the committed effective dose equivalent from internal deposition of radionuclides, and the effective dose equivalent due to penetrating radiation from sources external to the body. Effective dose equivalent is expressed in units of rem (or Sv).

Effluent:

A gas or fluid discharged into the environment.

Emission standards:

Legally enforceable limits on the quantities and kinds of air contaminants that can be emitted into the atmosphere.

Endangered Species Act:

Established in 1973, this act requires Federal agencies, with the consultation and assistance of the Secretaries of the Interior and Commerce, to insure that their actions will not likely jeopardize the continued existence of any endangered or threatened species or adversely affect the habitat of such species.

Endangered species:

Animals, birds, fish, plants, or other living organisms threatened with extinction by man-made or natural changes in their environment. Requirements for declaring species endangered are contained in the Endangered Species Act .

Environment, Safety, and Health Program (ES&H):

In the context of DOE, this program encompasses those DOE requirements, activities, and functions in the conduct of all DOE and DOE-controlled operations that are concerned with impacts to the biosphere; compliance with environmental laws, regulations, and standards controlling air, water, and soil pollution; limiting the risks to the well-being of both operating personnel and the general public to acceptably low levels; and protecting property adequately against accidental loss and damage. Typical activities and functions related to this program include, but are not limited to, environmental protection, occupational safety, fire protection, industrial hygiene, health physics, occupational medicine, and process and facilities safety.

Environmental Assessment (EA):

A written environmental analysis which is prepared pursuant to the National Environmental Policy Act (NEPA) to determine whether a Federal action would significantly affect the environment and thus require preparation of a more detailed Environmental Impact Statement (EIS). If the action does not significantly affect the environment, then a finding of no significant impact (FONSI) is prepared.

Environmental audit: A documented assessment of a facility to monitor the progress of necessary corrective actions, to ensure compliance with environmental laws and regulations, and to evaluate field organization practices and procedures.

Environmental documentation:

Documents describing information and results from studies and evaluations required by NEPA. This documentation includes both an EA and EIS.

Environmental Impact Statement (EIS):

A document required of Federal agencies by NEPA for major proposals or legislation significantly affecting the environment. A tool for decision making, it describes the positive and negative effects of the undertaking and alternative actions.

Equivalent sound (pressure) level (L eq):

The equivalent steady sound level that, if continuous during a specified time period, would contain the same total energy as the actual time-varying sound. For example, L eq (1-hr) and L eq (24-hr) are the 1-hour and 24-hour equivalent sound levels, respectively.

Exceedance:

Violation of environmental protection standards by exceeding allowable limits or concentration levels.

Finding of No Significant Impact (FONSI): A document by a Federal agency briefly presenting the reasons why an action, not otherwise excluded, will not have a significant effect on the human environment and will not require an EIS.

Floodplain: The lowlands adjoining inland and coastal waters and relatively flat areas including at a minimum that area inundated by a 1 percent or greater chance flood in any given year. The base floodplain is defined as the 100-year (1.0 percent) floodplain. The critical action floodplain is defined as the 500-year (0.2 percent) floodplain (Source: 10 CFR Part 1022.4(i)).

Gaussian plume:

The distribution of material (a plume) in the atmosphere resulting from the release of emissions from a stack or other source. The distribution of concentrations about the centerline of the plume, which is assumed to decrease as a function of its distance from the source and centerline (Gaussian distribution), depends on the mean wind speed and atmospheric stability.

General public:

Individuals who are normally at and beyond the DOE facility boundary; includes individuals who are on DOE facility open-access ways (roads, rivers, creeks, railways, etc.).

Glass melter:

A development refractory chamber containing molten glass over which the waste is burned.

Glove box:

An airtight box used to work with hazardous material, vented to a closed filtering system, having gloves attached inside of the box to protect the worker.

Groundwater:

The supply of fresh water found beneath the Earth's surface, usually in aquifers, which may supply wells and springs.

Guideline level:

A suggested, desired level of concentration. It is not a regulatory value, but is a value offered as desirable by an agency to protect human health or the environment.

Hazardous material:

A substance or material, including a hazardous substance, which poses a risk to health, safety, and property when transported or handled.

Hazardous/toxic waste:

Any solid waste (can also be semisolid or liquid, or contain gaseous material) having the characteristics of ignitability, corrosivity, toxicity, or reactivity, defined by the Resource Conservation and Recovery Act (RCRA) and identified or listed in 40 CFR 261 or by the Toxic Substances Control Act (TSCA).

Heavy metals:

Metallic or semimetallic elements of high molecular weight, such as mercury, chromium, cadmium, lead, and arsenic, that are toxic to plants and animals at known concentrations.

HEPA Filter:

A filter used to remove particulates from dry gaseous effluent streams.

High-level waste:

The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid. High-level waste contains a combination of transuranic waste and fission products in concentrations requiring permanent isolation.

Highly-enriched uranium:

Uranium in which the abundance of the isotope U-235 is increased well above normal (naturally occurring) levels.

Historic resources:

Archaeological sites, architectural structures, and objects produced after the advent of written history dating to the time of the first Euro-American contact in an area.

Honeycomb:

A structural configuration of material that allows for an increase in strength without a significant increase in weight.

Inertial confinement fusion:

A laser initiated nuclear fusion using the inertial properties of the reactants as a confinement mechanism.

In-migration:

The relocating of persons to a defined geographic area as a result of the proposed program, usually calculated on an annual basis.

Interim (Permit) Status:

Period during which treatment, storage, and disposal facilities coming under RCRA in 1980 are temporarily permitted to operate while awaiting denial or issuance of a permanent permit. Permits issued under these circumstances are usually called "Part A" or "Part B" permits.

Isotope:

An atom of a chemical element with specific atomic number and atomic mass. Isotopes of the same element have the same number of protons but different numbers of neutrons and different atomic masses.

Lab packs:

Small containers that contain laboratory hazardous wastes such as chemical bottles, rags, wipes, etc. These lab packs are placed in over-packed drums.

Lacustrine:

Found or formed in lakes; also, a type of wetland situated on or near a lake.

Level of service (LOS):

A qualitative measure describing operating conditions within a traffic stream as perceived by motorists and/or passengers.

Lithic scatter:

An archaeological site consisting only of stone artifacts (incomplete and complete tools).

Low-level waste (LLW):

Waste that contains radioactivity but is not classified as high-level waste, transuranic waste, spent nuclear fuel, or "11e(2) by-product material" as defined by DOE Order 5820.2A. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentration of transuranic waste is less than 100 nCi/g. Some LLW is considered classified because of the nature of the generating process and/or constituents, as the waste would tell too much about the process.

Maximum Contaminant Level:

The maximum permissible level of a contaminant in water delivered to any user of a public water system. MCLs are enforceable standards.

Milliwatt generator heat source surveillance (MGHS):

The heat source, encapsulated plutonium-238 used in an Radioisotopic Thermoelectric Generator (RTG).

Mixed Waste:

Waste that contains both hazardous and radioactive waste.

Modified Mercalli Intensity (MMI):

A level on the Modified Mercalli scale. A measure of the perceived intensity of earthquake ground shaking with 12 divisions, from I (not felt by people) to XII (damage nearly total).

Nano:

Prefix indicating one thousandth of a micro unit; one billionth; 1 nanocurie=10 -9 curie.

National Ambient Air Quality Standards (NAAQS):

Air quality standards established by the Clean Air Act . The primary NAAQS are intended to protect the public health with an adequate margin of safety, and the secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

National Emission Standards for Hazardous Air Pollutants (NESHAP):

A set of national emission standards for listed hazardous pollutants emitted from specific classes or categories of new and existing sources. These were introduced in the Clean Air Act Amendments of 1977.

National Environmental Policy Act (NEPA) (1969):

The basic national charter for the protection of the environment. It requires the preparation of an EIS for every major Federal action that may significantly affect the quality of the human or natural environment. Its main purpose is to provide environmental information to decision makers so that their actions are based on an understanding of the potential environmental consequences of a proposed action and its reasonable alternatives.

National Environmental Research Parks (NERP):

Outdoor laboratories set aside for research to study the environmental impacts of energy developments. The parks were established under DOE to provide protected land areas for research and education in the environmental sciences and to demonstrate the environmental compatibility of energy technology development and use.

National Historic Preservation Act (NHPA) 1966, as amended:

This law provides that property resources with significant national historic value be placed on the National Register of Historic Places. It does not require any permits but, pursuant to Federal code, if a proposed action might impact an historic property resource, consultation with the proper agencies is required.

National Pollutant Discharge Elimination System (NPDES) Federal permitting system required for hazardous effluents regulated through the Clean Water Act (CWA).

National Register of Historic Places (NRHP):

A list maintained by the National Park Service of architectural, historical, archaeological, and cultural sites of local, state, or national significance. The list is expanded as authorized by Section 2(b) of the Historic Sites Act of 1935 (16 U.S.C. 462) and Section 101(a)(1)(A) of the NHPA.

Nitric acid (HNO_3):

The acid used to dissolve nuclear fuel rods so that the fissionable elements can be extracted.

Nitrogen dioxide (NO_2):

A major component of photochemical smog. When nitrogen dioxide combines with volatile organic compounds, such as ammonia or carbon monoxide, ozone is produced.

Noise Control Act (1972):

This law directs all Federal agencies to carry out programs in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health or welfare.

Nonattainment Area:

An air quality control region (or portion thereof) in which the U.S. Environmental Protection Agency has determined that ambient air concentrations exceed national ambient air quality standards for one or more criteria pollutants.

Nonnuclear production:

Production operations for components of nuclear weapons that are not fabricated from plutonium, uranium, or other special nuclear materials. Raw material stock may include beryllium.

Notification level:

A term used only in NPDES permitting. Discharges are permitted under NPDES for particular parameters; however, when parameters that have not been permitted appear in excess of a predetermined concentration (i.e., 100 mg/L), the discharger is required by his NPDES permit to notify the permitter (EPA) that a new parameter has appeared. Violations of NPDES concentration limits are usually called "noncompliances."

NO_X:

Refers to the oxides of nitrogen, primarily NO and NO_2. These are produced in the combustion of fossil fuels and can constitute an air pollution problem.

Nuclear facility:

A facility whose operations involve radioactive materials in such form and quantity that a nuclear hazard potentially exists to the employees or the general public. Included are facilities that: produce, process, or store radioactive liquid or solid waste, fissionable materials, or tritium; conduct separations operations; conduct irradiated materials inspection, fuel fabrication, decontamination, or recovery operations; or, conduct fuel enrichment operations. Incidental use of radioactive materials in a facility operation (e.g., check sources, radioactive sources, and X-ray machines) does not necessarily require a facility to be included in this definition.

Nuclear material:

Composite term applied to: (1) special nuclear material; (2) source material such as uranium or thorium or ores containing uranium or thorium; and, (3) by-product material, which is any radioactive material that is made radioactive by exposure to the radiation incident to the process of producing or using special nuclear material.

Nuclear production:

Production operations for components of nuclear weapons that are fabricated from nuclear materials, including plutonium and uranium.

Nuclear reactor:

A device in which a fission chain reaction is maintained, and which is used for irradiation of materials or heat for the generation of electricity.

Nuclide:

A species of atom characterized by the constitution of its nucleus and hence by the number of protons, the number of neutrons, and the energy content.

Occupational Safety and Health Administration (OSHA):

Oversees and regulates workplace health and safety, created by the Occupational Safety and Health Act (1970).

Outfall:

The discharge point of a drain, sewer, or pipe as it empties into a body of water.

Ozonation process:

A water treatment process in which ozone is employed as a disinfectant.

Ozone (O_3):

The triatomic form of oxygen; in the stratosphere, ozone protects the Earth from the sun's ultraviolet rays, but in lower levels of the atmosphere, ozone is considered an air pollutant.

Paleoindian:

American hunting and gathering peoples existing in the late Pleistocene and later who hunted large game animals.

Palustrine:

Found or formed in marshes; also, a type of wetland situated in or near a marsh.

Peak Hour Volume (PHV):

The maximum volume of vehicles in an hour long period passing a point during a given day, often estimated to be 10 percent of total ADT.

pH:

A measure of the hydrogen ion concentration in an aqueous solution; specifically, the negative logarithm of the hydrogen ion concentration. Acidic solutions have a pH from 0 to 7; basic solutions have a pH greater than 7.

Pits:

An assembly at the center of a nuclear device containing a sub-critical mass of fissionable material.

Plume:

The elongated pattern of contaminated air or water originating at a point-source, such as a smokestack or a hazardous waste disposal site.

Plutonium:

A heavy, radioactive, metallic element with the atomic number 94. It is produced artificially in a reactor by bombardment of uranium and is used in the production of nuclear weapons.

Population (biological term):

All the members of a given species that live at a given time in a particular area.

Potentiometric surface:

An imaginary surface defined by the level that water will rise to in a tightly-cased well.

Prevention of Significant Deterioration (PSD):

Regulations established by the 1977 Clean Air Act Amendments to limit increases in criteria air pollutant concentrations above baseline.

Prime farmland:

Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oil-seed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor without intolerable soil erosion, as determined by the Secretary of Agriculture (Farmland Protection Policy Act , 7 CFR 7, paragraph 658).

Protected area:

An area encompassed by physical barriers, subject to access controls, surrounding material access areas, and meeting the standards of DOE order 5632.2A.

Protohistoric:

Of or relating to times just preceding recorded history.

Quality factor:

The principal modifying factor that is employed to derive dose equivalent from absorbed dose.

Radioisotopic Thermoelectric Generators (RTG):

An electric generator using a thermocouple with the decaying heat of encapsulated plutonium-238 as its heat source.

Radioactive waste:

Materials from nuclear operations that are radioactive or are contaminated with radioactive materials, for which use, reuse, or recovery are impractical.

Radionuclide:

A radioactive element characterized according to its atomic mass and atomic number which can be man-made or naturally occurring. Radioisotopes can have a long life as soil or water pollutants, and are believed to have potentially mutagenic effects on the human body.

Receiving waters:

Rivers, lakes, oceans, or other bodies of water into which wastewaters are discharged.

Rem:

The unit of radiation dose for biological absorption: equal to the product of the absorbed dose in rads, a quality factor, and a distribution factor.

Residual noise level:

The residual level represents a low-level value to which the ambient environmental noise level frequently drops, but seldom goes below.

Resource Conservation and Recovery Act (RCRA):

A "cradle to grave" regulatory program for hazardous waste which established, among other things, a system for managing hazardous waste from its generation until its ultimate disposal.

Retort:

A container in which substances are distilled or decomposed by heat.

Riparian wetlands:

Wetlands on or around rivers and streams .

Risk assessment:

The qualitative and quantitative evaluation performed in an effort to define the risk posed to human health and/or the environment by the presence or potential presence and/or use of specific pollutants.

Safe Drinking Water Act (SDWA):

This law protects the quality of public water supplies, water supply and distribution systems, and all sources of drinking water.

Safety Analysis Report (SAR):

A safety document providing a concise but complete description and safety evaluation of a site, design, normal and emergency operation, potential accidents, predicted consequences of such accidents, and the means proposed to prevent such accidents or mitigate their consequences. A safety analysis report is designated as final when it is based on final design information. Otherwise, it is designated as preliminary.

Saltcrete:

A solidified mixture of salt residue from the evaporation process at a liquid waste treatment facility and Portland Cement.

Saltstone:

A low-permeability (less than 10^{-7} centimeter per second) mixture of cement/flyash/slag or lime/flyash/slag used to immobilize low-level radioactive or mixed wastes for disposal.

Sanitary wastes:

Any waste, liquid or solid (includes sludge), which is neither a RCRA-regulated waste, a TSCA-regulated waste, nor radioactive.

Scintillation:

Minute flash caused when alpha, beta, or gamma rays strike certain phosphors.

Secondary system:

The system that circulates a coolant (water) through a heat exchanger to remove heat from the primary system; also called the cooling water or light-water system.

Sedimentation:

The settling out of soil and mineral solids from suspension in water.

Seepage basin:

An unlined excavation in the ground that receives aqueous effluent.

Seismic zone:

An area defined by the U.S. Uniform Building Code (1991), designating the amount of damage to be expected as the result of earthquakes. The U.S. is divided into six zones: (1) Zone 0 - no damage; (2) Zone 1 - minor damage; corresponds to intensities V and VI of the MMI scale; (3) Zone 2A - moderate damage; corresponds to intensity VII of the MMI scale (eastern U.S.); (4) Zone 2B - slightly more damage than 2A (western U.S.); (5) Zone 3 - major damage; corresponds to intensity VII and higher of the MMI scale; (6) Zone 4 - areas within Zone 3 determined by proximity to certain major fault systems.

Seismic:

Pertaining to any earth vibration, especially an earthquake.

Shrink-swell potential:

Refers to the potential for soils to contract while drying and expand after wetting.

Silica:

Silicon dioxide, a common mineral that occurs naturally as quartz.

Sinter:

To coalesce into a single mass under the influence of heat, without actually liquefying.

Special nuclear materials:

Plutonium, uranium enriched in the isotope 233 or 235, and any other material that DOE, pursuant to the provisions of Section 51 of the Atomic Energy Act of 1954 , determines to be special nuclear material.

Sulfur dioxide (SO_2):

A heavy pungent, colorless gas (formed in the combustion of coal), which is considered a major air pollutant.

Surface water:

Water on the earth's surface, as distinguished from water in the ground (groundwater).

Surplus:

Any equipment, facility, building, or site that has no identified or planned programmatic use as determined by the program secretarial office currently administering the program.

System:

A collection of interdependent equipment and procedures assembled and integrated to perform a well-defined purpose. It is an assembly of procedures, processes, methods, routines, or techniques united by some form of regulated interaction to form an organized whole.

Threatened species:

Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Threshold limit values (TLV):

The recommended concentrations of airborne contaminants workers may be exposed to according to the American Council of Governmental Industrial Hygienists.

Tiger Team:

A team set up by the Secretary of Energy to assess the environment, safety, and health operations at all DOE facilities to determine whether changes were needed to improve the protection of the environment, safety, and health.

Transition:

The range of activities that begins when a building is formally declared surplus to its production mission and ends when responsibility is formally transferred to the Office of Environmental Restoration and Waste Management and is ready for final disposition.

Transuranic (TRU) waste:

Waste contaminated with alpha-emitting radionuclides with half-lives greater than 20 years and concentrations greater than 100 nanocuries/gram at time of assay. It is not a mixed waste.

Trim:

Machine cutting fluids used to cool parts that are being milled.

Tritium:

A radioactive isotope of the element hydrogen with two neutrons and one proton. Common symbols for the isotope are H 3 and T.

Unconsolidated:

Loosely arranged or uncemented sediment.

Uranium:

A heavy (atomic mass = 238.03), silvery-white metal with 14 radioactive isotopes. Uranium-235 is most commonly used as a fuel for nuclear fission. Another isotope, uranium-238, is transformed into fissionable plutonium-239 following its capture of a neutron in a nuclear reactor.

Viewshed:

The extent of the area that may be viewed from a particular location. Viewsheds are generally bounded by topographic features such as hills or mountains.

Visual Resource Management (VRM) Classes:

These classes define the different degrees of modification allowed to the basic elements of landscape. They are Class 1Äapplied to wilderness areas, wild and scenic rivers, and other similar situations; Class 2Äcontrasts are seen but do not attract attention; Class 3Äcontrasts caused by a cultural activity are evident, but remain subordinate to the existing landscape; Class 4Äcontrasts that attract attention and are dominant features of the landscape in terms of scale, but repeat the contrast of the characteristic landscape; Class 5Äapplied to areas where unacceptable cultural modification has lowered scenic quality, (where the natural character of the landscape has been disturbed to a point where rehabilitation is needed to bring it up to one of the four other classifications).

Vitrification:

A waste treatment process that uses glass (e.g., borosilicate glass) to encapsulate or immobilize radioactive wastes to prevent them from reacting in disposal sites.

Volatile organic compounds (VOC):

A broad range of organic compounds, often halogenated, that vaporize at ambient or relatively low temperatures, such as benzene, chloroform, and methyl alcohol.

Water quality standard and criteria:

Concentration limit of constituents or characteristics allowed in water; often based on water use classifications (e.g., drinking water, recreation use, propagation of fish and aquatic life, and agricultural and industrial use). Water quality standards are legally enforceable: water quality criteria are non-enforceable recommendations based on biotic impacts.

Weighting factor:

Represents the fraction of the total health risk resulting from uniform whole-body irradiation that could be contributed to that particular tissue.

Well injection:

Process in which liquids are injected into an underlying geologic formation through wells.

Wetland:

Land or areas exhibiting hydric soil conditions, saturated or inundated soil during some portion of the year, and plant species tolerant of such conditions.

Woodland Period:

A stage of prehistoric cultural development, recognized throughout North America, primarily characterized by horticultural economies in most regions. The material remains are usually recognized by the presence of ceramics, and the construction of earthworks and burial mounds. Specific characteristics and dates of the Woodland Period vary from one region to another.

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Mound Plant

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Y-12 Plant

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Acronyms and Abbreviations

ADT **average daily traffic**

AEC **Atomic Energy Commission**

APZ Accident Potential Zone

AQCR Air Quality Control Region

CAA Clean Air Act, as amended

CDR conceptual design report

CEQ Council on Environmental Quality

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CFR Code of Federal Regulations

Complex Nuclear Weapons Complex

CWA Clean Water Act, as amended

D&D decontamination and decommissioning

DNL day-night sound levels

DOD Department of Defense

DOE Department of Energy

DOI Department of the Interior

DOT Department of Transportation

DP Defense Programs

EA Environmental Assessment

EIS Environmental Impact Statement

EM DOE Office of Environmental Restoration & Waste Management

EPA Environmental Protection Agency

ES&H environment, safety, and health

FONSI finding of no significant impact

FWS U.S. Fish and Wildlife Service

HAP hazardous air pollutants

HE high explosive

HEPA High Efficiency Particulate Air

HLW high-level waste

HVAC heating, ventilation, and air conditioning

INEL Idaho National Engineering Laboratory

ISCST Industrial Source Complex Short Term

KAFB Kirtland Air Force Base, Albuquerque, NM

KCP Kansas City Plant

LANL Los Alamos National Laboratory

L eq equivalent sound level

LLNL Lawrence Livermore National Laboratory

LLW low-level waste

LOS level of service

MCL maximum contaminant level

MMES Martin Marietta Energy Systems

MMI Modified Mercalli Intensity

Mound Mound Plant

MSL mean sea level

NAAQS **National Ambient Air Quality Standards**

NCP **Nonnuclear Consolidation Plan**

NEPA **National Environmental Policy Act of 1969, as amended**

NERP **National Environmental Research Park**

NESHAP **National Emissions Standards for Hazardous Air Pollutants**

NOI **Notice of Intent**

NPDES **National Pollutant Discharge Elimination System**

NRC **Nuclear Regulatory Commission**

NRHP **National Register of Historic Places**

NTS **Nevada Test Site**

NWI **National Wetland Inventory**

NWS **National Weather Service**

OEL **occupational exposure limit**

ORNL **Oak Ridge National Laboratory**

ORR **Oak Ridge Reservation**

OSHA **Occupational Safety and Health Administration**

P. L. **Public Law**

PEIS **Programmatic Environmental Impact Statement**

PEL **permissible exposure limit**

PHV **peak hour volume**

Pinellas **Pinellas Plant**

PSD **Prevention of Significant Deterioration**

R&D **research and development**

RAPCA **Regional Air Pollution Control Agency**

RCRA **Resource Conservation and Recovery Act, as amended**

RD&T **research, development, and testing**

RFP **Rocky Flats Plant**

ROD **record of decision**

ROI **region-of-influence**

RTF **Replacement Tritium Facility**

RTG **Radioisotopic Thermoelectric Generator**

SAR **Safety Analysis Report**

SARA **Superfund Amendments and Reauthorization Act**

SDWA **Safe Drinking Water Act, as amended**

Secretary **Secretary of Energy**

SHPO **State Historic Preservation Office**

SNL **Sandia National Laboratories, New Mexico**

SRS **Savannah River Site**

START **Strategic Arms Reduction Talks**

TA **Technical Area**

TCLP **toxicity characteristic leaching procedure**

TLV **Threshold Limit Value**

TRU transuranic

TSCA Toxic Substances Control Act, as amended

TSP total suspended particulates

TWA time-weighted average

USAF U.S. Air Force

VRM Visual Resource Management

WSRC Westinghouse Savannah River Company

Y-12 Y-12 Plant, Oak Ridge Reservation

Chemicals and Units of Measure

BGY billion gallons per year

CCl_4 carbon tetrachloride

CO carbon monoxide

CFC chlorofluorocarbons

CFC-12 dichlorodifluoromethane

CFC-113 trichlorotrifluoroethane

dB decibel

dBA decibel A-weighted

DCE 1,2-dichloroethylene

ft^2 square feet

ft^3 cubic feet

ft^3/s cubic feet per second

gal **gallon**

GPD **gallons per day**

gpm **gallons per minute**

GPY **gallons per year**

HCFC-22 **chlorodifluoromethane**

HMX **cyclotetramethylenetetranitramine, or 1,3,5,7-tetranitro-1,3,5,7-tetrazocine**

hr **hour, hours**

kg **kilogram**

kV **kilovolt**

kVA **kilovoltampere**

kW **kilowatt**

kWh **Kilowatt hour**

lb **pound, pounds**

lb/hr **pound per hour, pounds per hour**

lb/yr **pound per year, pounds per year**

mg **milligram (one-thousandth of a gram)**

mg/L **milligram per liter**

MGD **million gallons per day**

MGY **million gallons per year**

mrem **millirem**

MVA **megavoltampere**

MW **megawatt**

MWh **megawatt hour**

NO_2 **nitrogen dioxide**

NO_x **nitrogen oxides**

O_3 **ozone**

Pb **lead**

PCB **polychlorinated biphenyl**

pCi/L **picocuries per liter**

PETN **pentaerythritoltetranitrate**

PM_{10} **particulate matter of aerodynamic diameter (diameter less than 10 micrometers)**

ppb **parts per billion**

ppm **parts per million**

RDX **cyclotrimethylenetrinitramine**

SO_2 **sulfur dioxide**

TATB **triaminotrinitrobenzene**

TCA **1,1,1-trichloroethane**

TCE **trichloroethylene**

TNT **trinitrotoluene**

TOC **total organic compounds**

VOC **volatile organic compounds**

yd^3 **cubic yards**

æg **microgram (one-millionth of a gram)**

æg/kg **micrograms per kilogram**

æg/L **micrograms per liter**

æg/m 3 **micrograms per cubic meter**

æm **micron (one-millionth of a meter)**

Acronyms and Abbreviations

ADT **average daily traffic**

AQCR **Air Quality Control Region**

BEIR **Biological Effects of Ionizing Radiation**

CAA **Clean Air Act, as amended**

DOD **Department of Defense**

DOE **Department of Energy**

DOT **Department of Transportation**

EA **Environmental Assessment**

EPA **Environmental Protection Agency**

HAP **hazardous air pollutants**

HE **high explosive**

HEPA **high efficiency particulate air**

IDLH **Immediate Danger to Life and Health**

ISCST **Industrial Source Complex Short Term**

KAFB **Kirtland Air Force Base, Albuquerque, NM**

KCP **Kansas City Plant**

Leq **equivalent sound level**

LANL **Los Alamos National Laboratory**

LLW **low-level waste**

LOS **level of service**

Mound **Mound Plant**

NAAQS **National Ambient Air Quality Standards**

NCP **Nonnuclear Consolidation Plan**

NESHAP **National Emissions Standards for Hazardous Air Pollutants**

NIOSH **National Institute for Occupational Safety and Health**

NPDES **National Pollutant Discharge Elimination System**

NTS **Nevada Test Site**

NWS **National Weather Service**

OEL **occupational exposure limit**

ORR **Oak Ridge Reservation**

OSHA **Occupational Safety and Health Administration**

PEL **permissible exposure limit**

PHV **peak hour volume**

Pinellas **Pinellas Plant**

PSD **Prevention of Significant Deterioration**

RAPCA **Regional Air Pollution Control Agency**

RCRA **Resource Conservation and Recovery Act, as amended**

RfC **reference concentration**

Rfd **reference dose**

RFP **Rocky Flats Plant**

ROI **region-of-influence**

SARA **Superfund Amendment and Reauthorization Act**

SNL **Sandia National Laboratories, New Mexico**

SRS **Savannah River Site**

TLV **threshold limit value**

TSCA **Toxic Substances Control Act, as amended**

TSP **total suspended particulates**

TWA **time-weighted average**

Y-12 **Y-12 Plant, Oak Ridge Reservation**

Chemicals and Units of Measure

CCl4 **carbon tetrachloride**

CO **carbon monoxide**

dB **decibel**

dBA **decibel A-weighted**

ft2 **square feet**

ft3 **cubic feet**

ft3/s **cubic feet per second**

gal gallon

GPD gallons per day

GPY gallons per year

HMX cyclotetramethylenetetranitramine, or 1,3,5,7-tetranitro-1,3,5,7-tetrazocine

mg/kg milligrams per kilogram

mg/L milligrams per liter

mg/m3 milligrams per cubic meters

MGD million gallons per day

MGY million gallons per year

NO2 nitrogen dioxide

NOx nitrogen oxides

O3 ozone

Pb lead

PCB polychlorinated biphenyl

PETN pentaerythritoltetranitrate

PM10 particulate matter of aerodynamic diameter (diameter less than 10 micrometers)

ppb parts per billion

SO2 sulfur dioxide

TCA 1,1,1-trichloroethane

TCE trichloroethylene

VOC volatile organic compounds

yd3 cubic yards

yr year

æg microgram (one-millionth of a gram)

æg/kg micrograms per kilogram

æg/L micrograms per liter

æg/m3 micrograms per cubic meter

æm micron (one-millionth of a meter)

APPENDIX A: CURRENT OPERATIONS

This appendix contains more detailed descriptions of the nonnuclear manufacturing activities currently located at existing facilities which might be consolidated. It also contains backup data concerning waste management operations at these facilities. The Kansas City Plant (KCP) is discussed in section A.1, the Mound Plant (Mound) in section A.2, the Pinellas Plant (Pinellas) in section A.3, and Rocky Flats Plant (RFP) in section A.4.

A.1 Kansas City Plant (section 3.2.1)

A.1.1 Description

A.1.1 Description of Kansas City Plant Functions

Electrical/Mechanical Activities.

Squib Valve Assembly.

The manufacture of pyrotechnic devices that provide valving functions for various nuclear weapons systems. Assembly of these valves requires handling of Class 1.4 explosives in a static-free environment using fixture-assisted assembly techniques.

Hybrid Microcircuit Assembly.

The manufacture of hybrid microcircuit resistor/conductor networks using alumina oxide substrates with thin-film or thick-film technologies for radars, programmers, timers, and fire sets. Assembly includes the attachment of electrical components to these networks. Assembly of this product requires a Class 10,000 clean room with temperature and humidity controls.

Hybrid Microcircuit Assembly for Joint Test Assemblies.

The manufacture of hybrid microcircuits that consist of an insulating substrate, such as alumina, that contains a thin or thick resistor/conductor network interconnected with active (transistors and integrated circuits) and passive (resistors and capacitors) components that are enclosed in a metal or ceramic package.

Microminiature Electrical Assembly.

The manufacture of hybrid microcircuits (semi-conductors packaged in ceramic leadless chip carriers, transistor outline headers, or kovar (alloy of nickel, cobalt, and iron) flatpacks). These products perform multiple electronic functions in weapons systems such as switches, radars, programmers, fire sets, clocks, and telemetry.

Telemetry Assembly.

The manufacture of telemetry assemblies, neutron detectors, and test component firing systems. The telemetry assemblies and neutron detectors, as part of the joint test assembly, provide warhead scoring data in flight tests. The test component firing systems are high energy transfer systems manufactured for use in underground testing at the Nevada Test Site (NTS).

Radar Assembly.

The manufacture of radars used in weapons fuzing systems for bombs and warheads. Included in this product line are antenna assemblies that can be an integral part of a radar fuze assembly or a separate component used in the fuzing system. Facility requirements include controlled humidity environment, solvent cleaning stations, and electrostatic control.

Timers, Programmers, and Trajectory Sensing Signal Generators.

The manufacture of trajectory sensing signal generators (electronic assemblies that accept environmental data, verify correctness of that data, and produce predetermined and sequenced output functions for the weapon). The trajectory sensing signal generators product is part of the nuclear safety system of the weapon. The primary function is to help assure that accidental detonation due to abnormal thermal and shock environments does not occur.

Test Equipment Design and Fabrication.

The manufacture of custom designed and fabricated test equipment able to accept products produced internally and by vendors. This function is capable of performing electrical and mechanical design, producing definition drawings, developing computer software, and fabricating the necessary hardware.

Cellular Silicone and Filled Elastomers.

The production of cellular silicone cushions that are used as filler to cushion components and to allow for thermal expansion.

Foam Molding.

The production of structural foam supports using urethane foam materials.

Syntactic Foam Molding and Plastics Machining.

The production of foam molding that is capable of withstanding higher operating temperatures than conventional foam molding supports. These products are made using high temperature resins and microspheres, which are sintered in a high temperature oven. Facility requirements include an environmentally-controlled (temperature & moisture) plastics machining facility, due to the physical requirements of plastic products.

Laminates and Desiccants.

The production of aluminum silicate desiccant powders and resins used to provide a dry environment in sealed nuclear assemblies, and the production of fiber-reinforced plastic laminates.

Noncryptographic Coded Switch Assembly.

The manufacture of electronic devices utilizing hybrid microcircuits and magnetic core memory used in the Permissive Action Link to permit the controlled use of nuclear weapons upon proper authorization and to prevent unauthorized use under all conditions.

Strong Link Switch Assembly.

The manufacture of complex electromechanical safety devices used in all modern weapons programs. Facility re-quirements include clean rooms for switch assembly and testing.

Fire Set Assembly.

The manufacture of high-voltage circuitry firing systems capable of supplying the energy required to initiate a weapon system. Energy is derived from low-voltage battery power and is converted by this system to several thousand volts and stored until an initiating signal is received. Components include: capacitors, inductors, hybrid microcircuits, flat cable and flex circuit technologies, and switches.

Composite Structures.

The manufacture of fiber-reinforced molding resins.

Stockpile Support.

Evaluation of components and subsystems removed from stockpile for reuse, systems testing, or component cycle testing. No unique processes, materials, or technologies are utilized for stockpile support.

Category F Permissive Action Link Electronics Assembly.

The manufacture of electronic assemblies that are part of the nuclear surety system.

Special Products-Special Electronics Assembly.

Restricted access area where electronic products having special security requirements are manufactured. The primary product line is a special access program; the product description and function are limited to those with an absolute need-to-know.

Cryptographic Coded Switch Assembly.

The assembly of a Permissive Action Link Switch Adapter, an electronic device designed to provide an "electrical block" to the arming switch of the weapon. The Permissive Action Link Switch Adapter utilizes both thin and thick film hybrid microcircuit technology and is packaged in a foam plastic housing.

T-Gear Containing Cryptographic Keying Material.

The manufacture of cryptographic keying material used to code and recode Permissive Action Link Switch Adapter devices in weapons. The presence of these codes prevents unauthorized access to weapons.

MK5 Arming, Fuzing, and Firing Set Assembly.

The assembly of arming, fuzing, and firing assemblies. This assembly incorporates a radar, a programmer, an accelerometer, a decelerometer, thermal batteries, a fire set, a contact fuze, and a force balance integrating accelerometer.

B83 Weapon Subassembly.

The assembly of electronic and mechanical structures into a case structure with environmental protection. Assemblies provide distance, timing, velocity sensing, velocity control, and electrical power for weapon assemblies.

Machining Technology.

Activity providing a wide variety of traditional and non-traditional metal- removing processes including conventional and numerically controlled turning, milling, drilling, boring, and grinding processes.

Other Mechanical Technology.

Activity providing support for mechanical product manufacturing including sheet metal hydroforming, fire edge blanking, punch pressing, riveting, laser marking, threaded insert installation, and manual assembly operations.

Plastics Technology.

The manufacture of a wide range of polyurethane foam components, epoxy encapsulants, and modified commercial products for the Nuclear Weapons Complex (Complex).

Electrical/Electronic Fabrication and Assembly Technology.

The fabrication of printed wiring assemblies which are used in weapon timers, programmers, trajectory sensing devices, and various other electrical and electronic components.

Secondary Support Areas.

Activity providing support functions that service nearly all product lines, including a broad range of standard industrial processes (plating, painting, heat treating & welding), some of which are uniquely tailored to meet special weapon requirements.

A.1.2 Waste Management

Waste operations at KCP consist of management of four broad waste types: low-level waste (LLW), mixed waste, hazardous/toxic waste, and non-hazardous waste. Information on waste stream generation processes and activities, onsite man-agement, storage and treatment capabilities and ultimate disposition of the four waste types is provided in tables A1-1 through A1-4.

Yearly inventories of hazardous waste are provided in table A1-1. The numbers reflect quantities generated, disposed of, or reclaimed. The major hazardous waste streams and the current offsite disposal methods are listed in table A1-2. KCP currently operates ten Resource Conservation and Recovery Act (RCRA) interim status waste storage areas for containerized nonradioactive hazardous waste, one RCRA interim status waste storage area for containerized LLW and mixed waste, and six bulk storage tanks for nonradioactive hazardous waste, as shown in table A1-3. Onsite waste processing facilities at KCP are listed in table A1-4. A summary of hazardous waste disposal quantities and number of shipments is provided in table A1-5.

A.2 Mound Plant (section 3.2.2)

A.2.1 Description

A.2.1 Description of Mound Plant Functions

Electrical/Mechanical Activities.

Flat Cable Products.

The manufacture of slapper used to detonate the main explosive charge of the weapon.

Mechanical Assemblies.

The manufacture of electro-mechanical devices consisting of a slapper cable discriminator assembly and actuator assembly.

Round Wire Detonator Cables.

The manufacture of exploding bridgewire detonators for igniting various explosive devices used in weapons systems.

Nonnuclear Acorn.

The manufacture of the nonnuclear components of reservoirs. This activity complements the RFP reservoir production activities.

Plastic Headers. The manufacture of transfer molded plastic devices having imbedded electrode wires, to which bridgewires are ultimately attached.

Tritium Handling.

Reservoir Surveillance Operations.

The activity providing assessment of quality, reliability, and safety of gas boosting systems, including pre-production evaluations, gas transfer systems functions, material testing, and product acceptance testing.

Gas Transfer Systems.

The activity providing the development of processes and components for the manufacture of gas transfer systems. This includes research into component manufacturing/development, filling and storage, and function testing. In addition, activities necessary to empty tritium from transfer system components are included.

Commercial Sales/Inertial Confinement Fusion Target Loading.

This function consists of loading small uranium beds (U-beds), stainless steel cylinders, and inertial confinement fusion microspheres for commercial customers.

Detonators.

High Power Detonators.

This function includes the following components:

- Slapper Detonators. The manufacture of detonator assemblies used in explosive devices.
- Explosive Powder Processing. The processing of explosives such as cyclotetramethylenetetranitramine (HMX) and pentaerythritoltetranitrate (PETN) powders to be incorporated into various devices in weapons systems.
- Explosive Component Testing. The process of destructively testing explosive components in support of production, development, and surveillance efforts.
- Explosive Component Surveillance. Activities such as stockpile, shelf life, and accelerated aging evaluations, specified by the three design laboratories.

- Exploding Bridgewire Detonators. The assembly of detonators used in main charge initiation trains, timing subsystems, disablement devices, and other applications.
- Explosive Fireset Assembly.
  The assembly of precision electrical components used to produce the electrical energy required to initiate explosive systems.

Special Products.

Calorimeters.

This mission consists of manufacturing, calibrating, testing, and storing heat standards equipment.

A.2.2 Waste Management

The major hazardous waste types, nature, and handling procedures at Mound are described in table A2-1. Low-level mixed waste types and quantities in storage at Mound are described in table A2-2. Hazardous waste storage and treatment facilities at Mound are described in table A2-3. Radioactive waste management facilities at Mound are described in table A2-4.

A.3 Pinellas Plant (section 3.2.3)

A.3.1 Description

A.3.1 Description of Pinellas Plant Functions

Electrical/Mechanical Activities.

Support Pads.

The manufacture of model pads from synthetic foam materials with controllable mechanical crushing characteristics that are used to protect weapons components within the weapon assembly.

Optoelectronics Assemblies.

The production of electrical devices using the properties of light rather than electrical conductivity to transfer information, perform switching functions, and act as sensors.

Neutron Detectors.

The production of electronic detectors used to verify the output of neutron generators in joint test assemblies.

Lightning Arrestor Connectors.

The production and testing of electrical connectors for weapons cables that are designed to short circuit lightning strike pulses to ground.

Transducers.

The manufacture of mechanical shock sensing devices used in weapons testing sequences.

Tritium-Handling Activities.

Neutron Tube Target Loading.

The loading of small amounts of tritium into specific neutron generator components.

Neutron Generators, Cap Assemblies, and Batteries.

Thermal Batteries.

This activity provides for development and backup manufacturing capabilities for thermal batteries. Thermal batteries are currently procured from commercial sources.

Neutron Generators.

The production of neutron generators which provide a controlled source of neutrons. Major subassemblies that are produced include neutron tubes, electronic and ferroelectric power supplies, and vacuum switch tubes. These tubes are low-energy arc-activated, high-vacuum gap switches designed to withstand high thermal and mechanical shock and capable of holding off 10,000 volts.

Cap Assemblies.

This process involves the manufacture of a weapons component associated with gas transfer systems.

Lithium Ambient Batteries.

The production of long-life battery assemblies using individual lithium ambient battery cells procured from commercial suppliers.

A.3.2 Waste Management

Waste operations at Pinellas consist of management of three broad types of waste: LLW, hazardous/toxic waste, and nonhazardous waste.

Pinellas does not dispose of hazardous/toxic wastes onsite. Annually, Pinellas shipped approximately 400 drums of hazardous/toxic waste (including laboratory wastes), 3,500 gallons of ignitable hazardous waste, and an average of 422 drums of LLW for offsite disposal in 1990, 1991, and 1992 (PI DOE, 1992d).

Table A3-1 provides quantities of hazardous wastes shipped offsite in 1992. Table A3-2 shows the offsite disposition of the hazardous wastes. Table A3-3 defines the hazardous waste container and tank storage units at the site and table A3-4 shows radioactive solid waste volumes for 1990, 1991, and 1992.

A.4 Rocky Flats Plant (section 3.2.4)

A.4.1 Description

A.4.1 Description of Rocky Flats Plant Nonnuclear Functions

Electrical/Mechanical Activities.

Reservoirs.

Production involves the fabrication, assembly, and shipping of weapon and working gas reservoir assemblies. Typically these units are fabricated from stainless steel. The fabrication process for these parts begins with metal forging at the Oxnard, CA, facility. The parts are then machined, inspected, radiographed, cleaned, and welded. Assemblies undergo final dimensional, visual, nondestructive, and proof testing.

Special Products.

Nuclear Grade Steels/Oxnard.

This activity involves the procurement, certification, and storage of bulk stock for a variety of metals for the Complex. These materials are fabricated and certified to tightly defined material specifications, and are generally available in a wide range of sizes in bar, plate, and thin-wall tubing configurations.

Safe Secure Trailers.

The fabrication, repair, and refurbishment of safe and secure highway semi-tractor trailers used to transport weapon components and material.

Weapon Trainer Shop.

This activity provides weapon component and assembly illustrations as well as display and instructional models for use within the Complex and the Department of Defense (DOD). The illustrations are of delivery systems and cutaway views of weapon assemblies, missiles, and bombs. The models range from fractional scale to full size. The models often incorporate working features and cutaway sections to illustrate internal features. Typical models include nuclear warheads, aircraft, and transport vehicles.

Metrology Services.

Metrology services are provided to several nonnuclear weapon component customers. The metrology activities are related to calibration of dimensional standards such as thread gauges, height blocks, comparator charts, special design gauges, surface plates, optical flats, etc.

Beryllium Technology and Pit Support.

Beryllium Technology.

A commercial supplier provides semi-machined beryllium parts to RFP for finish machining, ultrasonic cleaning, heat treatment, inspection, nondestructive testing, and other post-machining processing such as coating or brazing. Development and support activities include:

- Vacuum Induction Melting. This facility combines recycled scrap beryllium with varying amounts of pure beryllium flake to produce a casting of the desired chemical composition and impurity levels for powder production. Vacuum Induction Melting is also used to cast the scrap metal into anodes for the electrorefining process.
- Near Net Shape Forming. These processes consolidate powder into formed part shapes for machining. The processes provide the range of combinations of shape and mechanical properties required by customers.

Pit Support Functions.

- Pit Support Forming Operation. This operation consists of spin-forming and press-forming techniques which produce parts from vendor-supplied metal blanks. The parts are manufactured from various non-uranium materials.
- Heat Treating Operation. This operation involves heat treating various metal shells. Heat treating occurs in electrically heated furnaces after spin-forming operation.
- Machining Operation. This operation consists of a machine shop utilizing a T-bed lathe to perform the finish machining of the various metal shells, provide material samples for certification and testing, and support miscellaneous developmental efforts.
- Post-Machining Operation. This is performed on finished metal shells. The operations consist of analysis, testing, and certification of the finished metal shells.
- Pit Support Functions (Tubes). These functions consist of machining, joining, and post-joining operations. Machining operations involve cutting and boring the tubing with a small jeweler's lathe. The tubing is procured as certified tubing from an outside vendor and cut and bored to meet required specifications.
- Joining Operations. These consist of operations required to join the tubes to various pit components and involves brazing and welding. The welding operations required for the tubing consist of electron beam and gas tungsten arc welds, depending on the type of material being welded and the location of the welded tubing on the pit components. The brazing operation is performed in a vacuum brazing furnace.
- Post-Joining Operations. These involve inspecting, testing, and certifying the tubes that are installed on the pit components.

A.4.2 Waste Management

The majority of the process wastes generated at the site are radioactive; thus, treatment and handling facilities have been designed to provide the additional safeguards necessary to effectively manage radioactive wastes. Treatment technologies include thermal, chemical, physical, immobilization, and waste solidification techniques.

Table A4-1 provides the quantities of hazardous wastes shipped offsite in 1992. Table A4-2 shows the capacities of the onsite hazardous/toxic and radioactive waste storage facilities.

Table A4-3 shows the low-level and low-level mixed waste streams generated at RFP in 1990. Table A4-4 lists the principal RFP treatment facilities and the categories of waste treated.

APPENDIX B: WASTE MANAGEMENT - PROPOSED ACTION

This appendix contains detailed information concerning waste management operations at the sites involved in consolidating activities in the Proposed Action.

B.1 Kansas City Plant Consolidation (Section 3.3.1) Waste Management

Products from the nonnuclear weapons component manufacturing operations at the Pinellas Plant (Pinellas), the Mound Plant (Mound), and Rocky Flats Plant (RFP) would be consolidated into the existing production space at the Kansas City Plant (KCP). Table B1-1 lists the operations proposed for transfer to KCP. Table B1-2 shows the additional annual amounts of liquid and solid hazardous/toxic and nonhazardous wastes. It is not anticipated that low-level waste (LLW) or mixed waste would be generated by the relocated functions.

Support Pads.

All processes that are being transferred would affect the volume of plant waste streams. However, there would be no additional waste streams. Because only the volumes of existing plant waste streams are affected, no special waste-handling capability would be needed.

Optoelectronics Assemblies.

All processes that are being transferred would affect the volume of plant waste streams. However, there would be no additional waste streams added. Existing capabilities would be used to handle the small yearly increase from the optoelectronics production.

Neutron Detectors.

The volume of plant waste streams would be affected, but no new waste streams would be added. No special waste-handling capability would be needed.

Lightning Arrestor Connectors.

The most significant new process is the chemical preparation of varistor (variable resistance semiconductor) material. No significant increases in wastes and effluents have been identified as a result of lightning arrestor connector production. No new waste-handling capability would be required. Additional lead-monitoring equipment would be required in the lead titanate development area.

Transducers.

The volume of plant waste streams would be affected, but no new waste streams would be added due to the transfer processes. No special waste-handling capabilities would be needed.

Flat Cable Products.

There would be no new waste streams, but there would be slight increases in existing stream volume. No special waste-handling capability would be needed.

Round Wire Detonator Cables.

This work would result in a small volume increase in waste streams that are the same as the waste streams in machining. No special waste-handling capability would be needed.

Plastic Headers.

This work would result in a slight increase in volume of KCP waste streams. No special waste-handling capability would be needed.

Lithium Ambient Batteries.

This work would result in a slight increase in volume of KCP waste streams. No special waste-handling capability would be needed.

Reservoirs and Nonnuclear Acorn.

The volume of plant waste streams would be affected, but no new waste streams would be added due to the transferred processes.

Nuclear Grade Steels/Oxnard.

Procurement and testing activities would yield no new waste streams at KCP. Any waste generated would be minor incremental additions to existing KCP waste streams.

Safe Secure Trailers.

Manufacturing of trailers at KCP would yield no new waste streams. Any wastes generated would be incremental additions to existing KCP waste streams.

Weapon Trainer Shop.

Shop activities would yield no new waste streams at KCP. Any waste generated would be minor incremental additions to current KCP waste streams.

Metrology Services.

Metrology support activities would yield no new waste streams at KCP. Any waste generated would be minor incremental additions to current KCP waste streams.

B.1.1 Management of Radioactive Waste Streams

No radioactive solid or liquid waste streams are anticipated as a result of the relocated nonnuclear functions.

B.1.2 Management of Hazardous/Toxic Waste Streams

No new hazardous waste streams would be generated at KCP as a result of consolidation operations.

As shown in table B1-2, the largest annual liquid hazardous waste streams are from the reservoirs and nonnuclear Acorn function (68,850 lb), mechanical assemblies (6,646 lb), and flat cable products (2,414 lb). The major contributor to the reservoirs and nonnuclear Acorn waste stream is 64,000 lb of coolant.

The major contributors of hazardous wastes from existing KCP operations include wastewater treatment, plating and etching processes, degreasing operations, and remedial action. The quantities of solid and liquid hazardous wastes due to the Proposed Action represent incremental additions to the current KCP waste streams.

Waste generated from the consolidation of operations would continue to be managed and disposed of through KCP's Waste Management Department. KCP's existing 11 waste storage areas for containerized waste and 6 bulk storage tanks are identified in table A1-3. The March 1987 Resource Conservation and Recovery Act (RCRA) Part A Application identifies the use of container-storage and tank-storage facilities with total storage design capacities of 44,000 cubic feet (ft^3) for liquid hazardous wastes and 83,000 ft^3 for solid hazardous wastes, respectively (KC DOE, 1988).

The goals of KCP's Pollution Prevention Program call for the reduction of chlorofluorocarbons, chlorinated hydrocarbons, and potential carcinogenic materials. The reduction or elimination of these materials would be pursued both during and after actual transition of operations. Table B1-3 shows the waste minimization activities for incoming processes.

B.1.3 Management of Nonhazardous Waste Streams

As shown in table B1-2, more than 16.7 million lb of liquid industrial effluents would be generated annually from the relocated functions. Most of these liquid acidic and alkaline effluents would be suitable for treatment in the KCP industrial waste pretreatment facility. The largest annual waste streams would include aqueous cleaners from the reservoirs (15 million lb) and the support pads (1.5 million lb). KCP's industrial waste pretreatment facility design capacity is approximately 1.3 million gallons per day (MGD). According to the supervisory engineer, the addition of less than 5,000 gallons per day (GPD) of relatively "clean" wastewater, as compared to spent plating baths, is beneficial to operations.

Nonhazardous solid waste streams consist mainly of recyclable products such as steel chips, copper, and aluminum wire, and would not place any long-term storage burdens on existing KCP storage capabilities. Machining in the production of reservoirs could generate an estimated 12,000 lb of stainless steel metal chips, which would require recycling at a scrap processor.

B.2 Savannah River Site (Section 3.3.2) Waste Management

Tritium-handling functions from operations at Mound would be relocated to the Savannah River Site (SRS). Table B2-1 lists the three operations proposed for transfer to SRS. Table B2-2 shows the additional annual amounts of hazardous liquid wastes, hazardous solid wastes, nonhazardous liquid wastes, nonhazardous solid wastes, liquid and solid LLW, and liquid and solid mixed waste associated with the relocated functions.

Reservoir Surveillance Operations.

Functions include measurement, monitoring, testing, and evaluation operations.

Gas Transfer Systems.

Activities include: component manufacturing and development; general metal cleaning, machining, welding, assembly and inspection-type operation; tritium recovery; and, environmental storage, an activity where tritium-containing units transferred from Mound would be stored in environmental chambers.

Commercial Sales/Inertial Confinement Fusion Target Loading . This activity receives empty, small uranium beds, small stainless steel cylinders, and glass/plastic microspheres from various commercial sources that use tritium in their operation. Uranium beds and cylinders are checked for exterior contamination, measured to determine any residual amounts of tritium, and filled and shipped to commercial customers or research institutions. Helium-3, a decay byproduct of tritium, is purified for sale to commercial users.

B.2.1 Management of Radioactive Waste Streams

No high-level radioactive, transuranic (TRU), or mixed wastes would be generated at SRS from relocated tritium functions. All radioactive waste generated would be LLW. A small portion of the LLW would be classified.

The reservoir surveillance operations, gas transfer systems, and commercial sales/inertial confinement fusion target loading would generate both compactible and non-compactible LLW from nitrogen- and argon-blanketed glove boxes and waste resulting from decontamination of tritium-contaminated components (gloves, aprons, plastic sheets). Non-compactible materials may include nonrepairable contaminated equipment such as disabled pumps, motors, metal shavings, etc. Such wastes must be free of liquids prior to disposal. These wastes would be checked for radioactivity, off-gassing tritium, and hazardous contamination, and placed in 96-ft ^{3} metal containers, before removal to a temporary storage facility and eventual disposal in the Area-E burial ground per DOE Order 5820.2A. The reservoir surveillance operations would generate 200 ft ^{3} /yr of LLW. The quantity of LLW anticipated at SRS due to gas transfer systems and commercial sales/inertial confinement fusion target loading is 300 ft ^{3} /yr.

B.2.2 Management of Hazardous/Toxic Waste Streams

The reservoir surveillance operations functions, gas transfer systems, and commercial sales/inertial confinement fusion target loading operations would not generate hazardous liquid or solid wastes.

B.2.3 Management of Nonhazardous Waste Streams

The reservoir surveillance operations functions would generate 82,125 gallons annually and 500 ft ^{3} /yr, respectively, of liquid and solid nonhazardous wastes. Nonhazardous wastes would be sent to the onsite sanitary landfill for disposal.

Gas transfer systems and commercial sales/inertial confinement fusion target loading operations would generate 219,000 gallons annually and 500 ft ^{3} /yr, respectively, of liquid and solid nonhazardous wastes.

The gas transfer systems process, in which component parts are cleaned using ethanol and water, would generate small quantities of wastewater. The wastewater is not expected to be hazardous, and will be disposed of at the onsite industrial wastewater treatment plant. The remaining gas transfer systems missions would not generate any liquid wastes. The commercial sales/inertial confinement fusion target-loading operation would not generate any wastewater effluents.

B.3 Los Alamos National Laboratory (Section 3.3.3) Waste Management

As shown in table B3-1, high-power detonators and calorimeters operations at Mound are proposed for transfer to Los Alamos National Laboratory (LANL). The beryllium technology and pit support functions from RFP and neutron tube target loading from Pinellas would also be transferred to LANL. Table B3-2 shows the additional annual amounts of hazardous liquid wastes, hazardous solid wastes, nonhazardous liquid wastes, nonhazardous solid wastes, liquid and solid LLW, and solid mixed wastes associated with the relocated functions.

High-Power Detonators.

This activity includes manufacture of detonator assemblies used in explosive devices, explosive powder processing, explosive component testing, surveillance, and assembly of precision electrical components.

Calorimeters.

This activity is required for measurement of various heat-producing nuclear materials for accountability purposes. No new waste management facilities would be required for LANL to manage calorimeter waste streams.

Neutron Tube Target Loading.

In this process, pure tritium gas is transferred from a uranium bed onto the assemblies where it is captured by a previously deposited, thin, metal film through the hydriding process.

Beryllium Technology.

The liquid waste streams generated would include beryllium-contaminated process water, beryllium-contaminated dilute nitric acid solutions, and non-contaminated waste machine oils and lubricants. It is assumed that the only solvents used in the process would be the non-RCRA solvent "Water Chaser 140" and, possibly, small amounts of isopropyl alcohol (not in RCRA amounts). The solid wastes generated would include beryllium-contaminated scrap metal, beryllium-contaminated combustibles, and beryllium-contaminated non-metals. Several steps in the processing of beryllium would generate scrap metal in the form of fines, chips, prototype parts, destructive testing remnants, etc. Since the scrap beryllium is recyclable, it is not considered waste.

Pit Support Functions.

Pit support function components could be manufactured in Building 141 where permitted beryllium activities currently take place.

B.3.1 Management of Radioactive Waste Streams

Low-level Waste. The high-power detonators, calorimeters, pit support function, and beryllium technology operations would generate no additional LLW.

It is expected that there will be as much as 30 gallons annually of liquid LLW from analysis dissolution and 200 ft^3/yr of solid LLW consisting of cloth, protective clothing, and contaminated tools generated . The liquid and solid LLW will be treated/solidified or packaged and stored on site until disposed of as solid LLW at LANL or an alternate offsite burial site.

Mixed Waste. Only neutron tube loading is expected to generate any mixed waste. The estimated 20 ft^3/yr will be stored onsite until a disposal option can be identified.

B.3.2 Management of Hazardous Waste Streams

Calorimeter operations and neutron tube target loading would generate no hazardous liquid or solid wastes.

The high-power detonator operations would generate 7,000 gallons annually of liquid hazardous waste and 205 ft^3/yr of solid hazardous waste after onsite processing and incineration. Liquid waste would include high explosive (HE)-contaminated solvents. Solid waste would include scrap HE, HE-contaminated metal parts, HE-contaminated solid waste, epoxies, and glues. No new storage facilities would be required to store these wastes. All HE hazardous waste and potentially contaminated HE waste is picked up by LANL and delivered to the TA-16 incinerator or flash pad where it is burned. Ash residue is treated to remove its hazardous characteristics and the residue disposed of in the industrial non-RCRA landfill. All developer and fix photo wastes, ferric chloride and sodium hydroxide liquid, and solid hazardous wastes would be packaged for transport and incineration at offsite RCRA-approved facilities by a commercial contractor.

Beryllium technology functions would generate 500 gallons annually of liquid hazardous wastes from acid etching of steel cans and solvent baths. Sixty ft^3/yr (ten 55-gallon drums) of solid hazardous wastes from dust collectors, high efficiency particulate air (HEPA) filters, and residue from destructive testing will also be generated. Beryllium activities are currently conducted in LANL Building 141. No additional waste management facilities would be necessary to support the additional waste streams.

Pit support functions would generate 8 gallons annually of liquid hazardous wastes from solvents used in parts cleaning, and 40 ft^3/yr of solid hazardous wastes from various miscellaneous metal-contaminated materials, filters, tools, protective clothing, and destructive examination residues that cannot be recycled.

B.3.3 Management of Nonhazardous Waste Streams

The high power detonator facility would generate 2,000 ft^3/yr of nonhazardous solid wastes and 244,400 gallons annually of nonhazardous liquid wastes. Nonhazardous solid wastes would be disposed of at an offsite sanitary landfill.

The neutron tube target loading facility would generate 2,000 ft^3/yr of nonhazardous solid wastes and 41,600 gallons annually of nonhazardous liquid wastes. Acidic wastewater from various analyses and lab uses will be treated in the wastewater treatment plant. The disposal of nonhazardous solid wastes would be disposed of at an offsite sanitary landfill.

The calorimeter operations would generate 2,000 ft^3/yr of nonhazardous solid wastes and 98,800 gallons annually of nonhazardous liquid wastewater effluents. The solid wastes would be checked for radiation, stored in 55-gallon drums, and sent offsite for disposal in a sanitary landfill. The liquid waste stream would be treated in the onsite industrial wastewater treatment system.

The beryllium technology functions would generate 26,000 gallons annually of wastewater effluent, which would be treated onsite at the LANL wastewater treatment plant. This function would also generate 3,120 ft^3/yr of solid nonhazardous waste that would be disposed of at an offsite sanitary landfill.

The pit support functions would generate 31,200 gallons annually of liquid nonhazardous wastes, which would be treated onsite at the LANL wastewater treatment plant. This function would also generate 1,560 ft^3/year of solid nonhazardous waste that would be disposed of at an offsite sanitary landfill.

B.4 Y-12 Plant (section 3.3.4) Waste Management

Beryllium technology and pit support functions from RFP might be relocated to Y-12 Plant, Oak Ridge Reservation (Y-12). Table B4-1 lists the two operations proposed for transfer to Y-12. These operations are discussed in section B.3. Table B4-2 shows the additional annual amounts of hazardous liquid wastes, hazardous solid wastes, nonhazardous liquid wastes, nonhazardous solid wastes, liquid and solid LLW, and liquid and solid mixed wastes associated with the relocated functions. Process-specific wastes, generation rates, and waste management alternatives are shown in table B4-3. Beryllium technology and pit support function waste streams are described in section B.4.1.

B.4.1 Management of Radioactive Waste Streams

Due to relocation of the beryllium technology and pit support functions, 22.2 ft^3/yr of additional solid LLW would be generated at Y-12. The LLW would be compacted, if necessary, in the Y-12 Waste Feed Preparation Facility, placed in metal 4 ft x 6 ft x 4 ft waste storage boxes, and temporarily stored in the salvage yard. No liquid LLW or mixed wastes would be generated.

B.4.2 Management of Hazardous/Toxic Waste Streams

Beryllium technology functions would generate less than 100 gallons annually of liquid organic hazardous wastes. These wastes would be treated and disposed of in the K-25 Toxic Substances Control Act (TSCA) incinerator. An estimated 4,210 gallons annually of liquid aqueous hazardous wastes would be treated in the West End Treatment Facility and Central Pollution Control Facility waste treatment facilities at Y-12. An estimated 632 ft^3/yr of solid hazardous waste sludges would be stored at the Y-12 tank farm and removed offsite to RCRA-permitted disposal facilities. Other solid hazardous wastes (less than 318 ft^3/yr) would be disposed of onsite in a new hazardous waste landfill. No additional waste management facilities would be necessary to support the additional waste streams.

Pit support functions would generate small quantities of various metallic wastes as a result of the shell and tube component manufacture. These wastes would be recycled or stored for future disposal.

B.4.3 Management of Nonhazardous Waste Streams

The beryllium technology functions and the pit support functions would generate 3,579 gallons annually of wastewater effluents, which would be treated onsite at the Y-12 wastewater treatment plants. Negligible amounts of solid nonhazardous waste would be generated.

B.5 Sandia National Laboratories, New Mexico (section 3.3.5) Waste Management

As shown in table B5-1, neutron generators, thermal batteries, and cap assemblies operations at Pinellas and milliwatt heat source surveillance from Mound are proposed for transfer to Sandia National Laboratories, New Mexico (SNL). Table B5-2 shows the additional annual amounts of hazardous liquid wastes, hazardous solid wastes, nonhazardous liquid wastes, nonhazardous solid wastes, liquid and solid LLW, and liquid and solid mixed wastes associated with the relocated functions.

Neutron Generators.

Additional waste would be generated at SNL as a result of the relocation of the neutron generator manufacturing capability. Effluent wastewaters in the form of liquid sanitary sewage, industrial wastewater, and tritium-contaminated waste consisting of solids and water would result from the operation of the neutron generator function. Various neutron generator fabrication steps produce hydrogen waste. Metal machining and forming operations during neutron tube assembly generate a contaminated coolant stream. Chemical cleaning is a small batch-type operation utilizing degreasers, cleansers, solvents, and acids that become contaminated with metals that generate a liquid chemical waste stream. Metallizing, involving airbrush screen painting and hand-painting, generates paint waste. Plating and firing operations occasionally generate a spent plating solution waste stream.

Thermal Batteries.

Additional effluent wastewaters in the form of liquid sanitary sewage and process wastewater would result from the operation of the thermal battery facility.

Cap Assemblies.

Additional effluent wastewaters in the form of liquid sanitary sewage and process and industrial wastewater would result from the operation of the cap assemblies facility.

Milliwatt Heat Source Surveillance.

Additional waste would be generated at SNL as a result of the relocation of milliwatt heat source surveillance activities. These activities involve thermal aging, pressure-vent testing, and evaluation of heat source container samples. Liquid and solid hazardous waste and nonhazardous wastes would be generated.

B.5.1 Management of Radioactive Waste Streams

Low-level Waste. The neutron generator function could generate up to 100 gallons annually of LLW tritiated wastewater. The tritium-contaminated water would be collected in drums at the source. This water would be treated by solidification or an approved alternate technology, and disposed of at an approved site.

The neutron generator function may generate 294 ft^3/year of solid LLW in the tritium management area due to wiping tritium-contaminated surfaces with wipes and solvents. Solid LLW would be taken to the Radioactive and Mixed Waste Management Facility (Building 6920). If necessary, to meet transportation or disposal site requirements, the LLW would be repackaged. It would then be shipped to an authorized offsite disposal site. The Radioactive and Mixed Waste Management Facility is expected to begin operation in 1996.

There are no radioactive wastes from thermal batteries production and milliwatt heat source surveillance.

Mixed Waste. The only relocated function to generate any mixed waste is cap assemblies. Approximately 0.005 ft 3 /yr of solid mixed wastes would be generated from this function.

B.5.2 Management of Hazardous/Toxic Waste Streams

The neutron generator function would generate 1,000 gallons annually of liquid hazardous wastes and 150 ft 3 /yr of solid hazardous wastes. The hazardous wastes would be stored in local accumulation areas before transfer to the SNL hazardous waste storage area.

Thermal batteries function would generate 44 ft 3 /yr of solid hazardous waste. Waste would be stored in local accumulation areas and then transferred to the SNL hazardous waste storage area.

The cap assemblies would generate approximately 250 gallons annually of additional liquid hazardous wastes and 3 ft 3 /yr of solid hazardous wastes. Waste would be stored in local accumulation areas and then transferred to the SNL hazardous waste storage area.

Milliwatt heat source surveillance would generate 2 gallons annually of additional liquid hazardous waste and 12 ft 3 /yr of additional solid hazardous waste. Waste would be stored in local accumulation areas and then transferred to the SNL hazardous waste storage area.

Acidic or basic wastes not disposed of through SNL's hazardous waste program would be neu-tralized at the Building 870 Chemical Wastewater Neutralization Facility.

B.5.3 Management of Nonhazardous Waste Streams

Neutron generator operations would generate 3 million gallons per year (MGY) of liquid sanitary wastewater effluent. Administrative offices and the cafeteria produce nonhazardous sanitary solid wastes and sanitary sewage. The medical department would produce nonhazardous sanitary sewage. Sanitary sewage would be sent directly to a Kirtland Air Force Base (KAFB) sanitary sewer system and then to the city of Albuquerque sanitary sewer system to be treated at the municipal wastewater treatment plant. The estimated sanitary sewage flow is 35,000 GPD (12.25 MGY based on 350 days per year).

Neutron generator operations would generate 8,500 ft 3 /yr of nonhazardous solid wastes. These wastes would be disposed of in the onsite sanitary landfill.

The thermal batteries functions would result in no increase in sanitary sewage or chemical wastewater volume. Existing sanitary tie-ins and chemical drain system would be utilized.

Cap assemblies would generate 216,000 gallons annually of liquid sanitary wastewater effluent, and 800 ft 3 /yr of solid nonhazardous waste. The solid wastes would be disposed of in the onsite sanitary landfill.

Milliwatt heat source surveillance would generate no additional liquid nonhazardous waste but would generate 40 ft 3 /yr of additional solid nonhazardous waste. The solid wastes would be disposed of in the onsite sanitary landfill.

APPENDIX C: WASTE MANAGEMENT - CONSOLIDATION ALTERNATIVES

This appendix discusses the waste management of the alternative consolidation sites of the Mound Plant (Mound), the Pinellas Plant (Pinellas), and the Rocky Flats Plant (RFP).

C.1 Mound Alternative ()section 3.4.1)

The additional consolidation wastes generated from the nonnuclear consolidation at Mound are low-level wastes (LLW), hazardous/toxic wastes, and nonhazardous wastes. No mixed waste generation is projected.

C.1.1 Radioactive Waste Management

The additional consolidation LLW volumes, based on 1991 as a representative year, are estimated at 15 ft 3 /yr. The additional LLW includes: tritium exit signs, smoke detectors, irradiated components and analytical equipment sources that have been declared excess; static master brushes; gap tubes removed from electronic assemblies; and small amounts of contaminated clean-up towels, disposable gloves, and packing materials.

All liquid LLW would be solidified in concrete or plaster of paris prior to being temporarily stored in an indoor, limited-access storage area. LLW would be transferred offsite for final disposal.

Mixed waste could be potentially generated from equipment sources in leaded shielding or cleanup debris. The mixed wastes would be stored in the same area as LLW in a Resource Conservation and Recovery Act (RCRA)-permitted facility.

C.1.2 Hazardous/Toxic Waste Management

All existing hazardous/toxic wastes generated at Mound are currently shipped offsite for treatment or disposal. Prior to offsite shipment, all hazardous/toxic waste is packaged in Department of Transportation (DOT)-approved containers, usually 55-gallon drums. Plating bath waste and other corrosive wastes are packaged in polyethylene-lined steel drums or other chemically-compatible containers. Small quantity lab chemical wastes are sorted by hazard class and placed in 55-gallon drums for offsite landfill disposal or incineration.

Onsite storage facilities include a building and storage tanks constructed and equipped to comply with Environmental Protection Agency (EPA) hazardous waste storage requirements. The building is divided into three storage areas to maintain segregation of incompatible materials. These are: liquid waste, solid waste, and miscellaneous laboratory waste areas. The liquid waste area contains all liquid drummed wastes, which include waste epoxy resin, waste methylene chloride/resin, and chemical waste streams awaiting disposal approval, including laboratory packs. The solid waste area stores solidified process solutions, batteries, solid debris, and off-specification materials. The miscellaneous laboratory waste area stores miscellaneous laboratory chemicals until properly identified and classified for packaging, shipping, and disposal.

All bulk liquid waste streams are stored in above-ground, concrete-diked storage tanks with the exception of nonhazardous petroleum-based oils, which are held in a storage tank. Chemicals stored in separate tanks include flammable liquids, halogenated hydrocarbons, waste polychlorinated biphenyls (PCB), caustic and acid solutions, and nonhazardous metal cutting coolant. Hazardous/toxic wastes generated at the plant site are shipped to commercial treatment facilities or to offsite disposal facilities.

Table C1-1 summarizes the increase of the hazardous/toxic wastes and the disposal method. The additional liquid hazardous wastes and solid hazardous/toxic wastes are shown in table C1-2 and C1-3 for the nonnuclear consolidation at Mound.

C.1.3 Nonhazardous Waste Management

Mound currently has an activated sludge process to treat the sanitary waste generated throughout the site. The sewage treatment plant provides secondary treatment of sanitary waste using biologically extended aeration with disinfection. The treatment consists of primary settling, aeration, sludge digestion, clarification, and chlorination. After processing, the sanitary sludge is sent to a belt dryer, mixed with flyash and sorbond, and packaged for offsite disposal. The sanitary effluent is discharged through a pipe to the Great Miami River. The quantity of the sanitary effluent is monitored continuously to document compliance with the Mound National Pollutant Discharge Elimination System (NPDES) permit. The sewage treatment plant has a capacity of approximately 47.4 million gallons per year (MGY). The additional wastewater to be handled due to consolidation at Mound is 132 MGY.

The additional solid nonhazardous wastes for the nonnuclear consolidation at Mound is estimated at approximately 359,000 ft^3/yr.

C.2 Pinellas Alternative (3.4.2)

The additional wastes generated from the nonnuclear consolidation at Pinellas are LLW, hazardous/toxic wastes, and nonhazardous wastes. No mixed waste generation is projected.

C.2.1 Radioactive Waste Management

See section C.1.1 for discussion of radioactive waste management associated with nonnuclear consolidation for the alternative sites.

C.2.2 Hazardous/Toxic Waste Management

The additional required hazardous waste management facilities include onsite storage and offsite disposal facilities. Onsite storage facilities include a building and storage tanks constructed and equipped to comply with EPA hazardous waste storage requirements. The building is divided into three storage areas to maintain segregation of incompatible materials. These are: liquid waste, solid waste, and miscellaneous laboratory waste areas. The liquid waste area contains all liquid drummed wastes which include waste epoxy resin, waste methylene chloride/resin, and chemical waste streams awaiting disposal approval, including laboratory packs. The solid waste area stores solidified process solutions, batteries, solid debris, and off-specification materials. The miscellaneous laboratory waste area stores miscellaneous laboratory chemicals until properly identified and classified for packaging, shipping, and disposal.

All bulk liquid waste streams are stored in above-ground, concrete-diked storage tanks with the exception of nonhazardous petroleum-based oils, which are held in a storage tank. Chemicals stored in separate tanks include flammable liquids, halogenated hydrocarbons, caustic and acid solutions, and nonhazardous metal cutting coolant. Hazardous/toxic wastes generated at the plant site are shipped to commercial treatment facilities or to offsite disposal facilities.

Table C2-1 summarizes the increase of the hazardous/toxic wastes and the disposal method. The additional liquid hazardous/toxic wastes and solid hazardous/toxic wastes are shown in table C2-2 and C2-3 for the nonnuclear consolidation at Pinellas.

C.2.3 Nonhazardous Waste Management

Pinellas is currently treating industrial wastewater by equalization/neutralization onsite, then mixing it with site-generated sanitary waste. This combined waste is then discharged to the municipal wastewater treatment facility. The existing Pinellas discharge rates for the industrial wastes and sanitary wastes are approximately 43 MGY and 29 MGY, respectively. The existing combined discharge rate is 72 MGY. The additional wastewater discharge rates due to the consolidation is approximately 153 MGY. The existing sanitary sewage treatment system has a capacity of approximately 110 MGY.

The additional solid nonhazardous wastes for the nonnuclear consolidation at Pinellas is estimated at approximately 473,000 ft^3/yr.

C.3 Rocky Flats Alternative ()3.4.3)

The additional wastes generated from the nonnuclear consolidation at RFP are LLW, hazardous/toxic wastes, and nonhazardous wastes. No mixed waste generation is projected.

C.3.1 Radioactive Waste Management

See section C.1.1 for discussion of radioactive waste management associated with nonnuclear consolidation for the alternative sites.

C.3.2 Hazardous/Toxic Waste Management

All existing hazardous/toxic wastes generated at RFP are currently shipped offsite for treatment or disposal. The additional required hazardous waste management facilities include onsite storage and offsite disposal facilities.

Onsite storage facilities include a building and storage tanks constructed and equipped to comply with EPA hazardous waste storage requirements. The building is divided into three storage areas to maintain segregation of incompatible materials. These are: liquid waste, solid waste, and miscellaneous laboratory waste areas. The liquid waste area contains all liquid drummed wastes, which include waste epoxy resin, waste methylene chloride/resin, and chemical waste streams awaiting disposal approval, including laboratory packs. The solid waste area stores solidified process solutions, batteries, solid debris, and off-specification materials. The miscellaneous laboratory waste area stores miscellaneous laboratory chemicals until properly identified and classified for packaging, shipping, and disposal requirements.

All bulk liquid waste streams are stored in above-ground, concrete-diked, storage tanks with the exception of nonhazardous petroleum-based oils, which are held in a storage tank. Chemicals stored in separate tanks include flammable liquids, halogenated hydrocarbons, waste PCBs, caustic and acid solutions, and nonhazardous metal cutting coolant. Hazardous/toxic wastes generated at the plant site are shipped to commercial treatment facilities or to offsite disposal facilities.

Table C3-1 summarizes the increase of the hazardous/toxic wastes and the disposal method. The additional liquid hazardous wastes and solid hazardous wastes are shown in tables C3-2 and C3-3, respectively, for the nonnuclear consolidation at RFP.

C.3.3 Nonhazardous Waste Management

RFP currently has an activated sludge process to treat the sanitary waste generated throughout the site. The sewage treatment plant provides secondary treatment of sanitary waste using biologically extended aeration with disinfection. The treatment consists of primary settling, aeration, sludge digestion, clarification, and chlorination. After processing, the sanitary sludge is digested and then dried before being sent to the RFP landfill, which is located within the buffer zone. The sanitary effluent is discharged to Pond 3 for recycling or is used for irrigation.

Due to consolidation, the additional wastewater to be handled at RFP is 148 MGY. The overall sanitary sewage treatment plant capacity is 150 MGY.

The additional amount of nonhazardous solid wastes for the nonnuclear consolidation at RFP is estimated at approximately 430,000 ft^3/yr.

APPENDIX D: - AIR QUALITY AND ACOUSTICS

D.1 Methodology

The methodology used to assess potential impacts to air resources is described in this appendix. Models used and associated assumptions are described.

D.1.1 Air Quality

The assessment of air quality at each site requires applicable input data, including ambient air quality monitoring data representative of background conditions and emissions inventories of criteria hazardous and toxic pollutants. Concentrations determined from the modeling of these emissions are then compared to applicable standards and guidelines.

The Industrial Source Complex-Short Term (ISCST) model (EPA, 1986a), recommended by the Environmental Protection Agency (EPA), was used to model emissions. The ISCST model estimates dispersion of emissions from stack (point), area, and volume sources. The model estimates the dispersion from stack and volume sources using a steady-state Gaussian plume equation and estimates dispersion from area sources using the equation for a continuous and finite crosswind line source.

Field data have been used to evaluate the performance of the ISCST model including its point source submodel (EPA, 1977; EPRI, 1983, 1985, and 1988) and its special features, such as the gravitational settling/dry deposition option (EPA, 1981 and 1982) and the building downwash option (EPA, 1981; Schulman, 1986). The validation studies for the point source model (CRSTER) indicate that the model acceptably predicts the upper percentile of the frequency distribution of 1-hour (hr) concentrations and of the corresponding distributions of 24-hr concentrations. Concentrations over the remainder of the frequency distributions are significantly underpredicted. The highest second-highest 1-hr concentrations were predicted within a factor of two at two-thirds of the field sampling sites for elevated power plant plumes. The highest second-highest 24-hr concentrations were underpredicted by the model, with the ratio of predicted concentration to measured concentration ranging from 0.2 to 2.7 at approximately 90 percent of the sampling sites (EPA, 1977).

In other validation studies for the point source model, the CRSTER model predicted peak short-term (1-, 3-, and 24-hr) concentration values within 30-70 percent at a level, unobstructed site (EPRI, 1983). The CRSTER model predicted peak 1-hr concentrations within 2 percent and underpredicted peak 3-hr concentrations by approximately 30 percent at a moderately complex terrain site (EPRI, 1985). The ISCST model overpredicted 1-hr concentrations by approximately 60 percent, with better predictions for longer time periods at an urban site (EPRI, 1988). The gravitational settling/dry deposition and building downwash options improve the model's performance significantly over that of the model without such features (EPA, 1981 and 1982; Schulman, 1986).

The ISCST modeling was performed according to EPA's guideline on air quality modeling (EPA, 1986b). The model input data included the emissions inventories, source characteristics (stack height, stack diameter, exit velocity, and exit temperature), and one full year of hourly meteorological data and twice daily mixing height data. Emissions inventories and source characteristics were generally provided by each DOE site.

To achieve a conservative estimate, the "highest-high" concentration was selected for comparison to applicable standards and guidelines, instead of the "highest second-highest" concentration as recommended by the EPA (EPA, 1986b). This concentration was the maximum occurring at or beyond the site boundary.

Terrain data for the ISCST model were inputted for the sites considered to be other than "flat." The sites with terrain considered in the modeling were as follows: Kansas City Plant (KCP), the Mound Plant (Mound), Oak Ridge Reservation Y-12 Plant (Y-12), Los Alamos National Laboratory (LANL), and Rocky Flats Plant (RFP). The terrain data were based on information contained on U.S. Geological Survey topographical maps.

Required input data for the model were provided by each of the sites. The input parameters include emissions inventories (release rates) and source characteristics (stack height, stack diameter, and effluent velocity), meteorological data, source locations, and distances to the site boundary and critical receptors. Modeling was performed for all compounds that had projected emission rates greater then 100 lb/yr. However, modeling was performed for compounds at emission rates less than 100 lb/yr if emissions at these rates could cause an exceedance of Federal or state air quality standards or guidelines. This was accomplished by obtaining the maximum concentration at or beyond the site boundary for a compound emitted at 100 lb/yr. Since this concentration would be the same for any compound emitted at 100 lb/yr, the concentration was compared to applicable air quality standards for all other regulated compounds. If the air quality standard of a regulated compound could be exceeded by emissions below 100 lb/yr, then information on emission rates for the compound were requested from the appropriate DOE field office or from the architect/engineer (A&E). The concentration of the compound was then calculated and compared to applicable air quality standards. All exceedances of quality standards are discussed.

The emission rates for each pollutant were those provided by each site or by the Architect/Engineer who provided the design information. For most sources, data were provided on an annual emission rate basis in units of pounds per year or tons per year. The ISCST model requires units in pounds per hour. The data provided were converted to pounds per hour assuming that the source was operated for the entire year, or 8,760 hours (the number of hours in a year). Data generally were not available to determine actual operating hours.

Not all characteristics were provided for each emission source. In those cases, characteristics were assumed based on similar source configurations at the particular site, or from other sites with similar processes.

It was also assumed that the emissions for each site originated from a single point source located in the approximate center of each site. This assumption resulted in higher concentrations than would actually occur, since emission sources are generally geographically separated from one another.

Meteorological data were either provided by the site or obtained from representative offsite sources. These were generally collected at National Weather Service (NWS) stations, considered representative of onsite meteorology. Use of NWS data for modeling purposes is in accordance with EPA guidance (EPA, 1986b).

D.1.2 Acoustics

This section describes the analyses performed to assess noise impacts from the Proposed Action and each alternative. In-depth noise impact analyses of construction and operation for each site were not performed because the detailed information on the construction and design of these facilities necessary for such an analysis has not been developed. Analyses of traffic noise impacts have been performed for each site based on baseline traffic volumes and the maximum projected construction and operation employment for each alternative. For those sites where more detailed analysis of employee distribution was performed, that information was incorporated in the traffic noise analysis.

To estimate the noise levels resulting from highway traffic for existing conditions and for each alternative, a computerized version of the Federal Highway Administration's Traffic Noise Prediction Model, Version OFA (FHWA, 1978) was used. The model calculations take into account the traffic volume and vehicle mix (i.e., automobiles, medium-duty trucks, and heavy-duty trucks), as well as the speed of traffic flow, number of lanes, and slope of the road. The modeling assumed that areas next to the roads were covered with vegetation and that there were no barriers along the roads. The model assumes standard day meteorological conditions (59 ^{o}F (15 ^{o}C), 70 percent relative humidity). Equivalent sound levels (L_{eq}) were estimated for the peak traffic hour. Noise level increases from highway traffic were estimated at a distance of 50 ft (15 meters) from the centerline of the nearest lane.

The criterion used to evaluate the degree of impact caused by intermittent traffic noise is based on the fact that noise levels, both in time and space, can fluctuate by as much as 5 decibels (dB). Previous experience shows that a change in noise level of less than 5 dB would not produce a significant change in community reaction to the noise (Stevens, 1955).

The performance of the Federal Highway Administration model has been verified with actual noise measurements (FHWA, 1978). The overall correlation coefficient for linear least-squares regression of 66 predicted values versus measured values at distances of 50, 100, and 200 feet (15, 30, and 60 meters) from the centerline of the nearest lane of the roadway was greater than 0.9. The correlation coefficient was higher (0.93) at 50 feet, but lower (0.86) at 200 feet. No measured value exceeded the predicted value by more than 3 dB, although the predicted value was sometimes as much as 5 dB greater than the measured value. The model overpredicts the higher end of noise levels at a given distance from the roadway centerline.

D.2 Affected Environment

This section provides supporting information related to the baseline environment for air quality and acoustics for each of the eight reconfiguration sites. Data are presented on applicable standards, background monitoring results, and relevant emissions inventories.

D.2.1 Air Quality

D.2.1.1 Kansas City Plant

KCP is located in Jackson County, MO, within the Metropolitan Kansas City Intrastate Air Quality Control Region (AQCR). This AQCR is designated as attainment for all criteria pollutants (40 CFR 81.326). An attainment area is any area that meets the national primary or secondary ambient air quality standard for the pollutant. The criteria pollutants are those for which national ambient air quality standards exist, defined in 40 CFR 50. These pollutants are sulfur dioxide (SO_2), nitrogen dioxide (NO_2) or nitrogen oxides (NO_x), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter less than 10 microns in diameter (PM_{10}). The National Ambient Air Quality Standards (NAAQS) and Missouri ambient air quality standards are listed in table D2.1.1-1.

Ambient air quality within and near KCP is monitored at three site perimeter locations for each of the criteria pollutants. The data from each of these monitoring stations for 1990 are presented in table D2.1.1-2. With the exception of the ozone (1-hr) standard, the ambient air quality in the Bannister Federal Complex area does not exceed applicable guidelines or regulations. The ozone standard is exceeded primarily due to chemical reactions that involve vehicle emissions.

The principal sources of criteria air pollutants are from the four boilers serving the entire Bannister Federal Complex. Table D2.1.1-3 presents the emissions inventory from these sources.

Federal standards for Prevention of Significant Deterioration (PSD) were promulgated to regulations (40 CFR 52.21) in 1977. PSD is defined such that if increases in concentrations of SO_2, NO_2, and total suspended particulates (TSP) are above certain limits, those increases constitute "significant deterioration." The magnitude of the allowable increment depends upon the classification of the area affected, with a Class I area (National Parks, wilderness areas) having the smallest increment. Table D2.1.1-4 presents the maximum allowable PSD increments. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at KCP.

Table D2.1.1-5 presents 1991 estimated and 1995 projected emission rates and maximum ground level concentrations of hazardous/toxic air pollutants from KCP. With the exception of hydrogen chloride, phosphoric acid, and sulfuric acid, concentrations are low in comparison to the proposed standards. Note that projected 1995 emission rates for 1,1,1-trichloroethane (TCA), dichlorodifluoromethane, trichloroethylene (TCE), and trichlorotrifluor-oethane are significantly lower than estimated 1991 rates.

Missouri has standards for the pollutants regulated by the National Emission Standards for Hazardous Air Pollutants (NESHAP). In May 1992, the Missouri Department of Natural Resources published guidance levels of hazardous air pollutants (HAP) and toxics. These include the 189 HAPs specified in the 1990 Clean Air Act Amendments (CAA).

D.2.1.2 Mound Plant

Mound is located in Montgomery County, OH, within the Metropolitan Dayton Intrastate AQCR. In addition to Montgomery County, this AQCR includes Clark, Darke, Greene, Miami, and Preble counties. The region is under the authority of the Regional Air Pollution Control Agency (RAPCA), which monitors ambient levels of criteria pollutants. This AQCR is designated as attainment with respect to SO_2, NO_2, and CO (40 CFR 81.336). However, several counties within the AQCR, including Montgomery County, have been classified as non-attainment for TSP and O_3. The NAAQS and Ohio state ambient air quality standards are listed in table D2.1.1-1.

Table D2.1.2-1 shows the maximum ambient air quality concentrations data measured from the RAPCA regional monitoring program and that of the Southwestern Ohio Air Pollution Control Agency for sites near Mound (MD RAPCA, 1987, 1988, 1989, 1990, 1991).

The principal sources of criteria air pollutants at Mound are the two boilers associated with the steam plant and the Keystone heat exchanger. Other sources include fugitive particulate emissions from process emissions, and emissions from laboratory operations and vehicles. Predominant hazardous/toxic air pollutant emissions from Mound include acetone, TCA, isopropyl alcohol, and nitric acid. The emissions inventory is presented in table D2.1.2-2.

Table D2.1.1-4 presents the maximum allowable PSD increments. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at Mound.

The Ohio EPA has standards for the pollutants (asbestos, beryllium, mercury, benzene, vinyl chloride, and radionuclides) regulated by NESHAP. As of July 1991, the Ohio EPA has not promulgated standards for the additional 189 HAPs specified in the 1990 CAA. However, Ohio EPA uses the American Conference of Governmental Industrial Hygienists list of pollutants threshold limit values (TLV). Maximum 1-hr ground-level concentrations cannot exceed the TLV time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists, divided by a "safety conversion factor" of 42 (Ohio EPA, 1991). Table D2.1.2-3 presents the emission rates and maximum ground-level concentrations of hazardous/toxic air pollutants from Mound.

D.2.1.3 Pinellas Plant

Pinellas is located in Pinellas County, FL, within the West Central Florida Intrastate AQCR. This AQCR is designated as attainment for all criteria pollutants with the exception of O_3 (40 CFR 81.310). The NAAQS and Florida state ambient air quality standards (which are the same as the NAAQS) are listed in table D2.1.1-1.

Ambient air quality within and near Pinellas is monitored by the state for each criteria pollutant. The ambient air quality data for SO_2, CO, TSP, and O_3 collected at these stations during 1990 are presented in table D2.1.3-1.

The principal sources of criteria air pollutants at Pinellas are the boilers and diesel generators in Building 500. Building 100 is a source of solvent, acid, and particulate emissions and Buildings 700 and 1040 are sources of emissions from solvent use or storage and other particulate sources (PI DOE, 1992d). Other sources include vehicular emissions (PI DOE, 1989). The emissions inventory used in the analysis is included in table D2.1.3-2.

Table D2.1.1-4 presents the maximum allowable PSD increments. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at Pinellas.

The Florida Department of Environmental Regulation has standards for the hazardous pollutants regulated by NESHAP. In addition, the Florida Department of Environmental Regulation maintains a working list of toxics, which is used in regulatory and air permitting analyses of sources for HAPs. This list, published in January 1992, is the Draft Florida Air Hazardous Permitting Strategy Guidelines (FL DER, 1992), and covers 751 compounds including all 189 HAPs listed under Title III of the 1990 CAA. HAPs/toxics from the plant include acids, resin compounds, and common industrial solvents. Sources include laboratories, coating and plating operations, production and test facilities, and various manufacturing operations. Table D2.1.3-3 presents the potential emission rates and resulting ground-level concentrations for HAPs/toxics from Pinellas used in the assessment. As shown in the table, the Florida Department of Environmental Regulation Air Toxic Working List annual guidelines are not exceeded at the Pinellas boundary for any pollutant.

D.2.1.4 Rocky Flats Plant

RFP is located in Jefferson County, in the Metropolitan Denver Intrastate AQCR. As of 1991, the areas within this AQCR were designated as non-attainment with respect to the NAAQS for PM_{10}, TSP, O_3, and CO, and listed as attainment for SO_2 and NO_2 (40 CFR 81.306); that is, listed as "does not meet primary standards" for PM_{10}, TSP, O_3, and CO, and "cannot be classified" or "better than national standards" for SO_2 and NO_2. The NAAQS and Colorado state ambient air quality standards are listed in table D2.1.1-1.

Ambient air monitoring data provide an indication of the background air quality unaffected by the site. Ambient air quality data used in the analyses have been obtained from monitoring programs conducted near the east entrance to the plant (RF Rockwell, 1986b, 1987, 1988, 1989 and RF EG&G, 1990a, 1991e). Monitoring data collected at this station include TSP, PM_{10}, Pb, CO, O_3, SO_2, and NO_2. The ambient air quality data collected at this station are presented in table D2.1.4-1.

The principal sources of criteria pollutants at RFP are the steam plant boilers. Minor combustion sources include various small boilers and diesel generators. Other sources include fugitive particulate emissions from construction processes, roads, and vehicular emissions. The emissions inventory for the sources used in the analysis is presented in table D2.1.4-2 .

PSD regulations (40 CFR 52.21) limit the maximum allowable incremental increases in ambient concentrations of SO_2, NO_2, and TSP above established baseline conditions. The PSD regulations, which are designed to protect ambient air quality in attainment areas, apply to new sources and major modifications to existing sources. The maximum allowable increments are listed in table D2.1.1-4. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at RFP.

The Colorado Department of Health has standards for the hazardous pollutants regulated by NESHAP. The Colorado Department of Health has not promulgated HAPs regulations for new sources. Emission estimates and predicted concentrations for the HAPs/toxics used in the analysis are presented in table D2.1.4-3. It is expected that concentrations of carbon tetrachloride (CCl_4) will be substantially reduced with the replacement of CCl_4 over the next 2 to 3 years. CCl_4 is associated predominantly with nuclear activities.

D.2.1.5 Savannah River Site

The Savannah River Site (SRS) is located in Aiken, Barnwell, and Allendale counties, SC, in the Augusta-Aiken Interstate AQCR. As of 1991, the area within this AQCR was designated as attainment with respect to the NAAQS (40 CFR 81.341). The basis for assessing the air quality of a given location is by comparison to applicable Federal and state ambient air quality standards. The applicable Federal standards are the NAAQS (40 CFR 50), and the applicable state standards are those adopted by the South Carolina Department of Health. Table D2.1.1-1 presents these standards for the criteria air pollutants (SO_2, NO_2, PM_{10}, TSP, CO, and Pb). South Carolina also has standards for gaseous fluorides. These are also presented in the table.

Currently, ambient air quality within the SRS site boundary is monitored at five locations. The ambient air quality data, as summarized in table D2.1.5-1, are small percentages of the limits set in applicable ambient standards.

The emissions inventory for the criteria pollutants used in the analysis is presented in table D2.1.5-2. The principal sources of criteria air pollutants at SRS are: the nine coal-burning and four fuel-oil burning boilers for producing steam and electricity (A-, D-, H-, K-, and P-Areas); and fuel and target fabrication (M-Area) and processing facilities (F- and H-Areas). Other emissions include fugitive particulate emissions from coal piles and coal processing facilities, vehicular emissions, and temporary emissions from various construction-related activities.

Since the adoption of PSD regulations, PSD permits have not been required for any of the new SRS emission sources or modifications to existing sources. In South Carolina, the only source in the Augusta-Aiken Interstate AQCR that has been issued a PSD permit is located near Orangeburg, about 40 miles northeast of the nearest SRS boundary. Four sources in the Georgia portion of the AQCR have been issued PSD permits. The closest of these is approximately 10 miles west of the nearest SRS boundary (DOE, 1991c). Because of the substantial distances between these sources and the SRS boundary, the PSD concentration increments used at the SRS boundary by these sources are expected to be negligible (see table D2.1.1-4 for the maximum allowable PSD increments).

The annual emission rates of HAPs/toxics from existing SRS facilities during 1990 and the estimated maximum 24-hr average ground-level concentrations at the SRS boundary are listed in table D2.1.5-3. These are compared to the applicable HAPs/toxics concentration limits adopted by the South Carolina Department of Health (SC DHEC, 1991).

D.2.1.6 Los Alamos National Laboratory

LANL is located in Los Alamos County, NM, within the New Mexico Intrastate AQCR (AQCR 157). All of the areas within LANL and its surrounding counties are designated as attainment areas with respect to the NAAQS (40 CFR 81.332). The nearest non-attainment area for CO and TSP is in Bernalillo County, about 40 miles south. The applicable NAAQS and New Mexico ambient air quality standards are given in table D2.1.1-1.

PSD regulations (40 CFR 52.21) limit the maximum allowable incremental increases in ambient concentrations of SO_2, NO_2, and TSP above established baseline conditions. The PSD regulations, which are designed to protect ambient air quality in attainment areas, apply to new sources and major modifications to existing sources. One PSD Class I area, the Bandelier National Monument's Wilderness Area, borders LANL to the south. The maximum allowable PSD increases are listed in table D2.1.1-4. Since the promulgation of the PSD regulations (40 CFR 52.21) in 1977, no PSD permits have been required for any source at LANL (LANL, 1990a).

Ambient air quality within and near the LANL site boundary is currently monitored for TSP (LANL, 1990a). The ambient air quality data are summarized in table D2.1.6-1.

The principal sources of criteria air pollutants at LANL (LANL, 1990a) are: the steam plants and power plant; beryllium operations including machining in shop 4 at area TA-3-39 and in shop 13 at area TA-3-102, the beryllium shop at area TA-35-213, and the beryllium processing facility at area TA-3-141; the asphalt plant; burning of high-explosive (HE) wastes and experimental detonation of conventional explosives at the TA-16 burnground; and the lead pouring facility for casting lead at area TA-3-38. Other emissions include fugitive particulate emissions from waste-burial activities and coal piles, other process emissions, vehicular emissions, and temporary emissions from various construction activities. Emission estimates for the sources used in the analyses are presented in table D2.1.6-2.

Ambient concentration limits have been adopted by New Mexico for HAPs/toxics. Applicants for new sources must meet emission limits or ambient concentration limits at or beyond the site boundary. For new sources, the concentrations cannot exceed a factor of one one-hundredth of the occupational exposure limit (OEL) contained in New Mexico Environmental Improvement Board regulation 702, appendix A (NM EIB, 1991a). Existing sources must demonstrate that the ambient concentrations are less than the OEL as contained in New Mexico Environmental Improvement Board regulation 752, appendix A (NM EIB, 1991a). The emission rates of HAPs/toxics from existing LANL facilities during 1989 and estimates of their maximum 8-hr average ground-level concentrations at the boundary are listed in table D2.1.6-3. For a conservative estimate of existing sources, one one-hundredth of the OEL is presented in the table for these sources.

D.2.1.7 Y-12 Plant

Y-12 is located within the Oak Ridge Reservation (ORR). ORR is located in Anderson and Roane counties in the Eastern Tennessee-Southwestern Virginia Interstate AQCR. As of 1990, the areas within this AQCR were designated as attainment with respect to any of the NAAQS (40 CFR 81.343); that is, listed as "cannot be classified" or "better than national standards" for TSP, SO_2, O_3, CO, and NO_2. Table D2.1.1-1 presents the NAAQS and Tennessee standards for the criteria air pollutants.

Ambient air monitoring data provide an indication of the background air quality unaffected by the site. Ambient air quality within Y-12 is monitored at two locations. The data from these monitoring stations for 1989 and 1990 are presented in table D2.1.7-1. The maximum background concentrations were used in the analysis.

The principal source of criteria air pollutants at Y-12 is the ORR steam plant. Other sources include fugitive particulate emissions from coal piles, other process emissions, vehicular emissions, and temporary emissions from various construction processes (Y-12 MMES, 1987). Table D2.1.7-2 presents criteria pollutants emissions from ORR by source group.

PSD regulations (40 CFR 52.21) limit the maximum allowable incremental increases in ambient concentrations of SO_2, NO_2, and TSP above established baseline conditions. The PSD regulations, which are designed to protect ambient air quality in attainment areas, apply to new sources and major modifications to existing sources.

Table D2.1.1-4 presents the maximum allowable PSD increments. Since the promulgation of the PSD regulations, no PSD permits have been required for any source at ORR.

The Tennessee Department of Health and Environment (TN DH&E, 1991b) uses the list of HAPs promulgated by Title III of the 1990 CAA. The acceptable ambient concentration is defined as 10 percent of the TLV or permissible exposure limit (PEL), whichever is the most restrictive. For those "high-risk pollutants," the acceptable ambient air concentration is defined as 1 percent of the TLV or PEL, whichever is the most restrictive.

Table D2.1.7-3 presents the estimated emissions and predicted concentrations of HAPs/toxics from the Y-12 Plant.

D.2.1.8 Sandia National Laboratories, New Mexico

Sandia National Laboratories, New Mexico (SNL) is located in Bernalillo County, NM, within the Albuquerque Mid-Rio Grande New Mexico Intrastate AQCR. This AQCR is designated as nonattainment for CO and TSP (40 CFR 81.332) and attainment for the other criteria pollutants. The applicable NAAQS and New Mexico ambient air quality standards are given in table D2.1.1-1.

Ambient air quality is currently monitored by the state at various locations throughout Albuquerque for NO_2, PM_{10}, O_3, and CO. Ambient air data collected at these monitoring stations are summarized in table D2.1.8-1.

The principal sources of criteria air pollutants at SNL (SNL, 1988) are: the steam plant at Area I; the paint shops, hazardous material machine shop, process development laboratory, and emergency diesel generator plant located at Area I; and the explosive testing at Area II. Other emissions include fugitive particulate emissions from waste-burial activities, other process emissions, vehicular emissions, and temporary emissions from various construction activities. Emission estimates for these sources are presented in table D2.1.8-2.

Since the promulgation of the PSD regulations in 1977, no PSD permits have been required for any source at SNL. Table D2.1.1-4 presents the maximum allowable PSD increments. One PSD Class I area, the Bandelier National Monument's Wilderness Area, is approximately 60 miles north of SNL.

Ambient concentration limits have been adopted by New Mexico for HAPs/toxics. Applicants for new sources must meet emission limits or ambient concentration limits at or beyond the site boundary for HAPs/toxics. For new sources, the concentrations cannot exceed one one-hundredth of the OEL contained in New Mexico Environmental Improvement Board regulation 702, appendix A (NM EIB, 1991a). Existing sources must demonstrate that the ambient concentrations are less than the OEL as contained in New Mexico Environmental Improvement Board regulation 752, appendix A (NM EIB, 1991a). The emission rates of HAPs/toxics from existing SNL facilities during 1991 and estimates of their maximum 8-hr average ground-level concentrations at the SNL boundary are listed in table D2.1.8-3. For a conservative estimate of existing sources, one one-hundredth of the OEL is presented in the table.

D.2.2 Acoustics

D.2.2.1 Kansas City Plant

Kansas City noise control regulations specify an L_{eq} at a residential property boundary of 60 decibels A-weighted (dBA) during the daytime (7 a.m. to 10 p.m.) and 55 dBA during nighttime (10 p.m. to 7 a.m.), and 80 dBA at a property boundary with a commercial/light industrial district (Kansas City, 1982).

D.2.2.2 Mound Plant

The city of Miamisburg noise ordinance (Miamisburg, 1981) specifies a maximum sound level at a residential property boundary of 60 dBA during the hours 7 a.m. to 9 p.m. and 50 dBA during the hours 9 p.m. to 7 a.m.. Sound levels at a commercial property boundary are limited to 65 dBA and at an industrial property boundary to 70 dBA.

D.2.2.3 Pinellas Plant

The Pinellas County Ordinance (Pinellas County, 1974) specifies a maximum noise level at the property boundary of an industrial source of 72 dBA at an adjoining commercial zone, 66 dBA at an adjoining residential zone between 7 a.m. to 6 p.m., Monday through Saturday, and 55 dBA at a residential property all other times. An exception is provided for established industrial or commercial businesses when development has encroached upon such facilities.

D.2.2.4 Rocky Flats Plant

There are no state or local regulations applicable to RFP that specify environmental noise levels.

D.2.2.5 Savannah River Site

Ambient sound level data collected at SRS in 1989 and 1990 were summarized in a 1990 report (SR NUS, 1990b). The States of Georgia and South Carolina, and the counties in which SRS is located, have not yet established any noise regulations that specify acceptable community noise levels except for a provision of the Aiken County Nuisance Ordinance which limits daytime and nighttime noise by frequency band (table D2.2.5-1).

D.2.2.6 Los Alamos National Laboratory

Los Alamos County has adopted a noise ordinance that specifies maximum sound levels in residential areas (Los Alamos County, 1983). Sound levels at a residential property line are limited to 65 dBA during the hours 7 a.m. to 9 p.m., and to 53 dBA during the hours 9 p.m. to 7 a.m. The 65 dBA limit may be exceeded by up to 10 dB for up to 10 minutes of any hour between 7 a.m. and 9 p.m.

D.2.2.7 Y-12 Plant

Maximum allowable noise limits for the city of Oak Ridge are presented in table D2.2.7-1. The limits range from 50 to 75 dBA for residential districts to major streets, respectively.

D.2.2.8 Sandia National Laboratories, New Mexico

The city of Albuquerque has adopted a noise ordinance that specifies a maximum sound level in residential areas (Albuquerque, 1984). Sound levels at a residential property line are limited to 50 dBA during nighttime hours, or 10 dB above the ambient sound level.

D.3 Environmental Consequences

This section provides additional information in support of the conclusions on environmental consequences related to ambient air quality and acoustics.

D.3.1 Air Quality

Major sources of air pollutant emissions and the associated environmental consequences for the Proposed Action at each site are described in section 4.1. An emissions inventory associated with each action is presented in these sections.

D.3.1.1 Proposed Actions

Table D3.1.1-1 presents the emissions inventory related to activities of consolidation of the electrical/mechanical functions at KCP (KC ASAC, 1993b). Consolidation activities are not expected to create additional criteria pollutants at KCP. Consolidation activities would take place in existing facilities without significant change in heating and electrical requirements that are currently supplied by the four Bannister Federal Complex boilerhouses, the source of criteria pollutants at KCP.

Table D3.1.1-2 presents the emissions inventory associated with the transfer of nonnuclear functions to SNL (SN FDI, 1992).

The emissions related to relocating nonnuclear functions to LANL, SRS, and Y-12 are expected to be negligible (LA DOE, 1992; WSRC, 1992a-c; and Y-12 MMES, 1992b).

D.3.1.2 Other Alternatives

Tables D3.1.2-1 through D3.1.2-3 present the emissions inventories for other alternatives; i.e., consolidating functions to Mound, Pinellas, or Rocky Flats, respectively (FDI, 1993). The potential changes to air quality for each of these alternatives are presented in section 4.2.

D.3.2 Acoustics

Sections D3.2.1 through D3.2.8 describe the results of traffic noise analyses performed for each site.

D.3.2.1 Kansas City Plant

The change in peak hourly traffic noise levels along the major roads leading to KCP were estimated for the Proposed Action for the peak construction year (1995) and for operation (2000). Estimated change in peak hourly traffic noise levels along the major roads leading to KCP are small based on the anticipated increase in employment and operation for the Proposed Action.

The estimated maximum noise level increase during construction or operation along Troost Avenue and Bannister Road is less than 2 dBA. No change in community reaction to traffic noise is expected.

D.3.2.2 Mound Plant

Estimated peak hourly traffic volumes and associated noise levels along the major roadways leading to Mound are listed in table D3.2.2-1 for baseline years, and for the relocation to Mound alternative. The estimated maximum noise level increase of 5 dBA along Mound Road during operation may result in some increase in community reaction to traffic noise. The increase in traffic and the resulting increase in noise levels along Mound Road could be mitigated by providing access to the new facilities from Benner Road. Increases in traffic noise along the other roads during construction and operation are less than 3 dBA. No increase in community reaction to traffic noise along these roads is expected.

The phaseout of Mound under the Proposed Action would be expected to result in a decrease in traffic noise levels along the Mound Road and other roads leading to Mound.

D.3.2.3 Pinellas Plant

Estimated peak hourly traffic volumes and associated noise levels along the major roadways leading to Pinellas are listed in table D3.2.3-1 for baseline years, and for relocation to Pinellas alternative. The estimated maximum noise level increase of 1 dBA along Belcher Road during operation is less than 5 dBA, the increase below which no significant change in community reaction is expected.

Increases in traffic noise along Belcher Road during construction and along other roads during construction and operation are expected to be less than 1 dBA. No increase in community reaction to traffic noise along these routes is expected.

The phaseout of Pinellas under the Proposed Action would result in a decrease in traffic noise levels along Belcher Road and other nearby roads.

D.3.2.4 Rocky Flats Plant

Estimated peak hourly traffic volumes and associated noise levels along the major roadways leading to RFP are listed in table D3.2.4-1 for baseline years and for relocation to RFP alternative. The estimated maximum noise level increase of 1 dBA along Highway 72, Highway 128, and Indiana Street is less than 5 dBA, the increase below which no significant change in community reaction is expected.

Increases in traffic noise along other roads during construction and operation are expected to be less than 2 dBA. No increase in community reaction to traffic noise along these routes is expected.

The phaseout of RFP under the Proposed Action would be expected to result in some decrease in traffic noise near RFP.

D.3.2.5 Savannah River Site

The estimated changes in peak hourly traffic noise levels along the major roadways leading to SRS are small, based on the small increase in employment for construction and operation for the Proposed Action. The estimated maximum noise level increase along U.S. 125 and other routes is less than 1 dBA. No change in community reaction to traffic noise is expected.

D.3.2.6 Los Alamos National Laboratory

The estimated changes in peak hourly traffic noise levels along the major roadways leading to LANL are small, based on the small increase in employment for construction and operation for the Proposed Action. The estimated maximum noise level increase along Route 4 and other routes is less than 2 dBA. No significant change in community reaction to traffic noise is expected.

D.3.2.7 Y-12 Plant

The estimated changes in peak hourly traffic noise levels along the major roadways leading to ORR are small, based on the small increase in employment for construction and operation for the Proposed Action. The estimated maximum noise level increase of 1 dBA along TN 95 and other routes is less than 5 dBA, the increase below which no significant change in community reaction is expected.

D.3.2.8 Sandia National Laboratories, New Mexico

The estimated changes in peak hourly traffic noise levels along the major roadways leading to SNL are small, based on the small increase in employment for construction and operation for the Proposed Action. The estimated maximum noise level increase along Eubank Boulevard is less than 1 dBA. No significant change in community reaction to traffic noise is expected.

APPENDIX E: SOCIOECONOMICS AND COMMUNITY SERVICES

E.1 Introduction.c.

This appendix includes the methodologies, models, assumptions, and supporting data used for assessing the potential impacts on each of the resources in the Socioeconomics and Community Services sections. Section E.2 presents the methods and assumptions used to evaluate the potential socioeconomic effects of the proposed consolidation of nonnuclear manufacturing functions of the Nuclear Weapons Complex (Complex). The socioeconomic analysis for this environmental assessment (EA) involved two major steps: (1) the characterization and projection of existing social, economic, and infrastructure conditions surrounding each of the selected consolidation sites (i.e., the Affected Environment); and, (2) the evaluation of potential changes in socioeconomic conditions that could result from the construction and operation of nonnuclear manufacturing functions in the eight regions involved in the consolidation program (i.e., the Environmental Consequences). Supporting data for the Affected Environment and Environmental Consequences sections are contained in section E.3.

E.2 Methodologies and Models

E.2.1 Population and Employment

The description of socioeconomic conditions includes indicators such as population, labor force, employment, earnings, and income that provide a basis for comparison of regional socioeconomic conditions among the sites both with and without the Proposed Action and alternatives. The No Action alternative was considered equivalent to future baseline conditions without consolidation activities. The baseline for the No Action alternative was established from the total employment projected for each of the sites at the end of Fiscal Year 1994. These proposed Fiscal Year 1994 budget and employment estimates are believed to best reflect the staffing levels needed as a result of recent stockpile requirement reductions. (DOE, 1993c).

Region-of-Influence. The primary factor in determining the region-of-influence (ROI) was the distribution of residences for current Department of Energy (DOE) and contractor personnel working at each of the eight proposed sites. The ROIs were determined to be those areas in which approximately 90 percent of the current DOE and contractor employees reside. This residential distribution reflects existing commuting patterns and attractiveness of area communities for people employed at each site, and was used to estimate the future distribution of direct workers associated with the proposed consolidation.

As an example, table E3.6-1a displays the residential distribution by city and county for all personnel employed at Mound. Data on residential location for a large portion of facility employees were obtained from Mound personnel offices. Similar data were provided by the other locations in tables E3.1-1a through E3.8-1a.

Existing and Future Baseline. Historical and existing population, labor force, employment, and income data were obtained from the U.S. Bureau of Economic Analysis Regional Economic Information Systems (DOC, 1991). Historical personal income and per capita income values were converted to constant 1992 dollars using the current Department of Commerce National Income deflator index. Employment by place of work was converted to employment by place of residence on the basis of ratios derived from Bureau of Census, Bureau of Labor Statistics, and Bureau of Economic Analysis data.

Growth projections for population, labor force, employment, and income were based on Bureau of Economic Analysis Regional Projections to 2040 (DOC, 1990a and b) for Bureau of Economic Analysis economic regions and metropolitan statistical areas. Bureau of Economic Analysis projections are for multi-county economic regions or whole metropolitan statistical areas; therefore, projections for individual counties were made by applying the appropriate growth rates for each Bureau of Economic Analysis data series (population, employment, etc.) to each county in the identified ROI for each site. Data series forecasts for counties within a metropolitan statistical area were based on the higher Bureau of Economic

Analysis growth rates projected for metropolitan areas, while forecasts for other counties in the ROI were based on generally lower regional growth projections.

Potential Project Effects. Total output multipliers for each region were obtained from the U.S. Department of Commerce, Bureau of Economic Analysis Regional Inter-industry Multiplier System, and utilized in an economic model developed for evaluation of socioeconomic impacts of large-scale government programs.

The model includes four major components for the analysis:

- A regional inter-industry component that produced a regional input-output table and output multipliers for each specified sector of the economy for each ROI.
- A direct effects component that produced a matrix of final demands (estimated changes in industry and household spending due to project activities) on the basis of direct employment and procurement associated with the project.
- An employment impact component that calculated region-wide indirect output, earnings, and employment estimates.
- A macroeconomic impact component that calculated regional population impacts on the basis of assumptions concerning possible changes in unemployment, the share of the labor force with the necessary skills to take direct project jobs, and the portion of the direct employment that would in-migrate to the ROI.

These inter-industry multipliers were estimated using the U.S. input-output table in combination with the most recent region-specific information describing the relationship of the regional economy to the national economy.

The same methodology was used to develop quantitative projections of economic activity for No Action conditions, the Proposed Action, and the alternatives. Project-related changes in regional demand in each local industrial and household sector were first estimated as follows:

- Construction-phase demands were based on construction labor and cost data provided by Fluor-Daniel, Inc., engineers, and the DOE sites affected by the proposal from parameters developed in support of the description of Proposed Action and alternatives development.
- Operations-phase demands were estimated from DOE operations employment estimates, and procurement requirements from existing DOE facilities that provide similar manufacturing activities.

The direct effects component uses the construction and operations demand to determine the procurement in the specific industries and the personal consumption expenditures (household spending) due to the project activities, taking into consideration the disposable income of each type of direct employment category.

These primary or direct effects were then multiplied, using Regional Inter-industry Multiplier System coefficients specific to the regional economy, to provide estimated total spending associated with the Proposed Action and the alternatives. Input-output sectors were selected to reflect the anticipated spending profile associated with the Proposed Action and alternatives in order to capture the economic characteristics of each scenario within the ROI. The employment impact component thus estimates the indirect employment, earnings, and personal income due to the Proposed Action and alternatives. Table E2.1 presents the assumptions for direct and indirect employment that were used for the regional socioeconomic analysis.

The macroeconomic impact component uses the information regarding the direct and indirect employment from the direct effects and employment impact components, as well as the baseline information, to estimate the direct and indirect employment that would in-migrate into the region. Numbers of in-migrant workers associated with the Proposed Action and each alternative were estimated according to a set of assumptions concerning the availability of required labor skill levels within each regional labor force and the recognition that competitive bidding for both construction and operations activities would bring in a certain number of workers regardless of available labor. Since the labor demands for nonnuclear consolidation construction and operations activities are generally small in comparison to regional labor availability, in-migrant workers were primarily associated with contract award relocation assumptions. In addition to analyzing the population changes due to in-migrant workers, population changes due to out-migrations of workers from sites that would have work force reductions as a result of the Proposed Action or other alternatives were examined. These population projections are conservative because they are estimated under the assumption that all the jobs lost will occur in the single year 2000.

Average household sizes for in-migrant workers were assumed to correspond, for most categories, with the average size of state-to-state migrating families between 1980 and 1990.

The intra-regional allocation analysis accounts for the distribution of direct and indirect workers and their families among the various residential areas within each region. The direct portion of the effect allocation process accounts for the two main factors affecting the distribution of in-migrant direct workers: (1) the number of workers anticipated to be directly involved with each alternative; and, (2) the locations and relative attractiveness of residential opportunities within the region. Similar to the analysis for assessing the population increases due to in-migration of direct and indirect workers and their families, out-migration of direct and indirect workers and their families are measured.

Population changes associated with the Proposed Action and the alternatives are an important determinant of other socioeconomic and environmental impacts. These population changes have three key components: (1) baseline growth; (2) relocation of workers and their dependents; and, (3) natural increase of population (births minus deaths) over the long term. To evaluate anticipated population effects, potential future changes associated with the Proposed Action and the alternatives were compared to projected baseline conditions.

The computer output of the macroeconomic impact component for the Mound alternative at the Mound Plant (Mound) is presented in table E2.2. The first page of the table presents the employment and population parameter values used for this analysis and baseline and project information. The second page presents direct and indirect project impacts and a summary of effects for the year 1993. Similar output was created for all project years through 2000. Table E3.6-1b is a summary of the macroeconomic component results for Mound for selected years between 1970 and 2040. Population and economic data for all the sites are given in tables E3.1-1b through E3.8-1b.

E.2.2 Housing

Housing characteristics are presented in tables E3.1-2 through E3.8-2. Projected housing needs are based upon housing unit and population data obtained for 1990 for each ROI (Census, 1991b). Future housing units needed for cities and counties in each ROI were developed by estimating the household size from the current population and housing unit ratios. The household size-to-population ratios were then applied to the estimated future population trends to obtain the number of housing units needed to accommodate the projected population for a No Action alternative future baseline.

Projected housing needs for the Proposed Action and the alternatives were developed in the same manner as the estimates for a No Action baseline. These estimates, however, include projected in-migrating workforces (and their families) from outside the ROI. Future housing needs for the in-migrating populations, resulting from employment created directly or indirectly by the project, were estimated from the national average household size (Census, 1991b). Conversely, estimates of additional housing unit vacancies created directly and indirectly by a project alternative as a result of out-migrations were developed from current population and household size ratios.

E.2.3 Utilities

The primary water supply and wastewater treatment systems providing service to the counties and municipalities in each ROI were identified through available written information or through telephone interviews. Information was collected on current capacities, average demands, and, where available, peak demands, population served, and ongoing system modifications. These data are presented in tables E3.1-3 through E3.8-3.

All future demand projections were based upon the population estimates for those counties and municipalities established for a No Action alternative baseline in each ROI. However, water and wastewater system service areas are not usually defined by county or municipal boundaries. Large municipal systems often serve the municipality in which they are located, as well as other parts of the region. County systems often serve a portion of the population in the unincorporated areas of the county and may also provide service to municipalities within the county. Systems not operated by a municipality or county may also provide service in a region. Populations in rural areas often utilize wells and septic tanks or very small municipal systems.

Where several systems were identified in an ROI, only the systems that provided the majority of the service in the region were evaluated. Where a system, or a combination of systems, was found to serve only a portion of an area's total population, the percentage of that total population represented by that system's service population was estimated. Future projections were based on the general assumption that the future service population would remain a consistent percentage of the total future population in that area. If no service population information was available for a system, the service population was estimated from current average demands. Values of 200 gallons per capita day for water consumption and 100 gallons per capita day for wastewater generation were used as conservative estimates for all future demand projections.

E.2.4 Education

Education characteristics for each ROI are presented in tables E3.1-4 through E3.8-4. Statistics on kindergarten through 12th grade public school enrollments, school facility capacities, and the numbers of teachers were collected for all school districts in each ROI from state education departments and telephone interviews for the 1989-1990 school year. For the No Action alternative, future enrollment projections for counties in each ROI were developed by calculating the appropriate state percentage of school age children from the population (Census, 1991b) and then applying this percentage to future baseline population trends. Enrollment projections for in-migrating future populations under the Proposed Action and alternatives were developed using the national percentage of school-age children (Census, 1991b).

Estimates of additional teachers needed for the No Action alternative, the Proposed Action, and the other alternatives were based upon the 1989-1990 pupil-to-teacher ratios. Under the assumption that the current pupil-to-teacher ratios represent each community's standard for level of service (LOS), these standard ratios were applied to the projected student enrollments to obtain the number of additional teachers needed in the future to maintain the current LOS.

E.2.5 Health Care

The number of physicians, hospitals, hospital bed capacities, and occupancy rates were obtained for counties in each ROI for 1990 from the American Medical Association, the American Hospital Association, and telephone interviews. Future population estimates for the No Action alternative, the Proposed Action, and the other alternatives were applied to current hospital occupancy rates and capacities to determine the number of additional hospital beds in excess of capacity that would be needed to accommodate the projected population.

Under the assumption that the current ratio of doctors per 1,000 persons represented the counties" current LOS, population trends were applied to future population scenarios for the different alternatives to obtain the number of additional physicians that would be needed to maintain the counties' current LOS.

E.2.6 Public Safety

Statistics on sworn police officers and volunteer and professional firefighters for 1990 were obtained from the U.S. Department of Justice, American Fire Services, and telephone interviews for each of the ROI cities and counties. It was assumed that the current sworn police officer and firefighter per 1,000 persons ratios represented the communities' standards for LOS. Under this assumption, population trends were applied to future population scenarios for the Proposed Action and alternatives to derive the number of additional police officers and firefighters that would be needed to maintain current LOS.

E.2.7 Local Transportation

The ROI road segments for each site were selected for analysis based upon employee residence distribution. Traffic data for interstate, U.S., and state highway routes were provided by each state's transportation department. Traffic data for local roads were provided by city, county, or regional highway and planning departments. Accident data for each ROI county were provided by either state highway or police departments. Truck traffic information associated with commercial deliveries at each site were provided by each respective DOE facility. Impacts to local transportation were assessed using traffic level changes, incremental vehicle accidents, and fatalities in the ROI of each site. Modeling of consequences was conducted for the ROIs where the Proposed Action or alternatives could result in substantial workforce or population growth. Baseline estimates and project impacts were assessed for specific road segments within the ROI. Baseline traffic data are provided in tables E3.1-5 through E3.8-5.

The baseline analysis focuses on projected population changes in the study area. Projected ROI traffic conditions (average daily traffic, ADT) were derived by applying an average of trips generated by residential townhouses, condominiums, and single family detached housing units. Data represent trips per day per person and were obtained from the Institute of Transportation Engineer's Trip Generation Report (ITE, 1991), to the estimated changes in total population. Projected trips were distributed to the roadway network based on existing traffic conditions. These trips, when added to existing trips, were considered to be the baseline rate. Baseline analyses include 1995 (year of peak construction) and 2000 (typical year of operations).

Local transportation impacts of DOE facility consolidation were assessed in terms of the effects of direct and indirect employment changes on ADT and the LOS. Definitions and LOS ratings are provided in table E2.3. Direct employment trips were distributed on the roadway network based on existing employment trip distribution. Indirect employment trips were allocated to the roadway network based on existing ROI road segment traffic conditions. To determine the impacts of DOE consolidation activities, direct and indirect employment trips were added to the baseline and existing trips. Analyses for 1995 (year of peak construction) and for 2000 (typical year of operations) were presented to correspond with baseline analyses.

Incremental truck traffic associated with consolidation construction and operations activities was also assessed relative to baseline truck traffic at each DOE facility. In addition to ADT, peak hour volume (PHV) and roadway capacity were considered in deriving traffic impacts. Peak hour volumes are typically assumed to be 10 percent of the ADT. Segment capacity was calculated using standard definitions of roadway types, including non-interstate multi-lane roads, rural and urban interstates, and two-lane roads. Volume estimates were assessed relative to the design capacity of the route in order to determine the associated LOS.

PHV to capacity ratios correspond to a specific LOS for each of the three roadway types. The ranges of volume-to-capacity ratio for each LOS were obtained from the Transportation Research Board's 1985 Highway Capacity Manual (TRB, 1985).

Accident and fatality rates were based upon 1990 statistics of the number of accidents and fatalities per person in the ROI. These rates are assumed to be constant and were multiplied by the projected populations for both baseline and consolidation activities to estimate the number of accidents and fatalities in future years.

E.3 Supporting Data

Data and analyses used to support the assessments made for the socioeconomics and community services sections are presented in the following tables. The tables are organized by sites and resource areas. For example, table E.3.1-1a is the first site KCP and the first table for the resource area of population and employment.

APPENDIX F: EXPOSURES AND HEALTH EFFECTS METHODOLOGY

F.1 Summary

Normal Operations Impacts. The information contained in the site environmental reports and received in response to a project datacall was used to evaluate the No Action, Proposed Action, and other consolidation alternatives at host and donor sites. The air and water resources sections for each site in chapter 4 discuss potential releases and resulting concentrations of hazardous and radioactive materials and compare these data to applicable permit, regulatory, and Department of Energy (DOE) operational limits. These estimated air concentrations were compared to acceptable reference concentrations (for chronic exposures) and adjusted threshold limit values (TLV) or permissible exposure limits (PEL) (for daily worker exposures). The exposure concentrations for air were converted to doses in milligrams per kilogram (mg/kg) per day and multiplied by a cancer potency factor (slope factor) to calculate the cancer risk (see section F.3). Additionally, each operation was examined for the hazardous and radioactive materials used in the processes. When available, monitoring data were compared to DOE, Occupational Safety and Health Administration (OSHA), and National Institute for Occupational Safety and Health (NIOSH) limits for worker exposure. The results of these comparisons were used to assess human health effects.

Accident Impacts. The hazardous and radioactive materials associated with each activity proposed for transfer were assessed for their potential to affect human health in the event of an accident. These impacts are bounded by the atmospheric pathway as well as engineering barriers, catchments, and mitigation plans that would ameliorate the hydrologic pathway. Since the designs of the various activity transfers have not been finalized, a probabilistic risk assessment, which considers engineering mitigation and initiating events, was not possible. However, a preliminary identification of hazardous/toxic chemicals was conducted to generate a list of toxicants associated with the processes. In addition, quantitative hazard assessments and safety analyses and assessments that had been previously performed and documented were reviewed to determine the accidents that had been assessed or analyzed. Accidents at receiver sites involving hazardous and radioactive materials used in processes to be relocated to the receiver sites were used to make qualitative comparisons. In all cases, the hazardous and radioactive materials and processes assessed or analyzed at receiver sites were the same or very similar to those hazardous and radioactive materials and processes at donor sites. Additionally, the amount of hazardous and radioactive materials from donor sites was small compared to existing receiver site inventories. The hazards associated with the relocated functions are expected to be of the same kind and the consequences of the same magnitude as those previously reviewed and documented.

F.2 Approach to the Risk Assessment of the Workers (Onsite) and the General Public (Offsite) For Nonnuclear Materials

Objectives. This risk assessment achieved two objectives:

- Estimation of risk due to normal facility operations.
- Establishment of risk due to facility accidents or failure.

Definitions. Normal operations is a concept that assumes all process operations are in place and that all equipment, procedures, devices, and controls (including engineering, etc.) are in the best possible condition and functioning in accordance with design. If a process, by necessity, involves some level of exposure to humans, either onsite or offsite, of an identified hazardous/toxic substance, the process will be designed so the exposure is below the level that could cause adverse health effects.

Accident or upset condition is a concept that assumes a failure in some control or containment system (e.g., facility or engineering), or procedure that could potentially lead to human exposure to a hazardous/toxic substance at an unacceptable level. In some instances, this exposure may include a level or concentration above the normal condition, but still within a safe range. For example, in a complex control system designed for maximum protection, one of several safety controls may not perform as expected, leading to an exposure that still lies within a safe range.

Approach. For purposes of this Environmental Assessment (EA), information on hazardous chemicals was made available from the Kansas City Plant (KCP), the Pinellas Plant (Pinellas), the Sandia National Laboratories, New Mexico (SNL), the Los Alamos National Laboratory (LANL), the Y-12 Plant (Y-12), the Rocky Flats Plant (RFP), and the Mound Plant (Mound) facilities. Several steps were involved in the total process of establishing risk for purposes of the EA. These include the following:

- Process Identification.

This activity involves the identification of the processes and associated materials that go into (input) and come out of (output) each process.

- Screening for Hazardous Substances.

This activity involves development and implementation of a screening procedure for hazardous substances that are used or produced in the processes. It also involves selection of those substances with the potential to elicit adverse health effects.

- Selection of Significant Hazardous Substances.

This activity involves the selection of hazardous substances and associated processes for substances at sufficient volumes and toxicity to cause adverse health effects to workers (onsite) or the public (offsite) should a release occur.

- Hazard Identification.

This is the identification of chemicals, their location, quantities, and the nature of the hazard (within a process or module) they pose. This step was of sufficient depth to verify or validate that a potential hazard could exist. The chemical name(s) and properties associated with chemical or physical structure were defined; a toxicity profile was developed; the approximate level of concern or other concentration-effect parameters was defined; and maximum/average quantities stored or input into a process were assessed. At this stage, the selected chemicals are likely to be used extensively or associated with a previous history of adverse health effects, including cancer or other chronic or continuous exposure-related endpoints.

- Release Analysis.

The areas affected by the release (vulnerable zones) were determined from estimated quantities of extremely hazardous substances released to the air, the rate of release, dispersion, and the airborne concentrations causing death or adverse health effects. However, not all of the quantity of an extremely hazardous substance would actually be released, and of that amount released, not all would become airborne. Furthermore, certain variables may affect the vulnerable zones. Although these factors were recognized, the initial estimates of the vulnerable zones were made using conservative estimates. The essential information for these assumptions included:

  - Identification of the chemical(s).
  - Maximum potential quantity in a single vessel, interconnected vessel, or input into a process.
  - Location of the chemical source within the process or module.
  - Physical state under assumed sets of conditions.
  - Quantity of extremely hazardous substances likely to be released (past performances including facility toxic release inventories were used).
  - Site specific topographical considerations.

- Site specific meteorological conditions.
- Level of concern, TLV, PEL, Protection Action Guides, or other action/response parameters.

For guidance purposes, a level of concern is based upon the concentration shown in the NIOSH publication, Immediately Dangerous to Life and Health (IDLH).

Level of concern applies to concentrations that might cause serious irreversible health effects or death. The 0.1 IDLH level, derived from animal toxicity data, was also used for guidance because this level defines the maximum concentration from which a worker could escape within 30 minutes without irreversible health effects (EPA, FEMA, 1987; NIOSH, 1990).

OSHA's PELs are exposure standards set for the workplace and are listed in 29 CFR 1910, Subpart 2, General Industry Standards for Toxic and Hazardous Chemicals .

OSHA's PELs are regulatory limits legislated for worker protection. PELs refer to air concentrations and may be expressed as either a time-weighted average (TWA) or ceiling value, to which an employee can be exposed for a normal 8-hour day, 40-hour work week without ill effects (29 CFR 1910).

The American Conference of Governmental Industrial Hygienists, a recognized professional society, recommend their own exposure values or TLVs. TLVs may also be expressed as TWAs, a level to which workers can be exposed for a normal 8-hour day, 40-hour work week without ill effects. TLV ceiling limits indicate an exposure limit that must not be exceeded at any time during the work day. A TLV STEL is defined as a short-term exposure limit, usually a 15-minute TWA, which should not be exceeded (ACGIH, 1991; 29 CFR 1910).

NIOSH also recommends exposure limits for workers. Following an extensive review of the literature and analysis, recommended exposure levels are put forward by NIOSH to protect worker health (Lewis, 1992).

A Protective Action Guide is defined as an exposure or concentration that can trigger a protective response or action, i.e., the necessary action to avoid or reduce a projected harmful exposure. The Emergency Response Planning Guidelines, developed by the American Industrial Hygiene Association (AIHA, 1992) for airborne concentrations up to one hour, were the Protective Action Guides used when applicable. These effect levels are as follows:

- Emergency Response Planning Guidelines-1.

The subject experiences a mild transient adverse health effect, encounters an objectionable odor, or experiences lacrimation (e.g., excessive eye watering).

- Emergency Response Planning Guidelines-2.

Irreversible or other serious health effects occur which could impair the ability to take protective action. Treatment may be required, and this treatment may reverse some effects.

- Emergency Response Planning Guidelines-3.

Life threatening health effects occur; impairment of ability to take protective action also occurs.

Another Protective Action Guide is the Short-term Public Exposure Guidance Level that applies to exposures from 1 to 24 hours (National Research, 1986).

The PEL and TLV values were used for daily worker exposures because they represent typical exposure protections for workers that are both official and widely accepted.

Although the approach discussed above deals with air emissions, these principles are also broadly applicable to potential exposure through water.

- Exposure Assessment.

This process measured or estimated the intensity, frequency, and duration of human exposures to substances which could arise if chemicals were released into the environment.

Several critical components were characterized for this exposure assessment. These were as follows:

- Population and population distribution.
- Exposure pathway (e.g., inhalation, ingestion, dermal).
- Source of exposure and documentation of these sources (e.g., modeling of air dispersion, toxic release inventory data, National Pollutant Discharge Elimination System (NPDES) data, environmental monitoring).
- Duration of exposure (i.e., continuous, intermittent, sporadic).

From the above, uptake values were calculated, where uptake consists of concentration of the pollutant in water or air (converted from parts per billion (ppb), when required, to micrograms (æg) or micrograms per liter (æg/L) or micrograms per cubic meter (æg/m 3), respectively); ingestion or respiration rate (absorption in the case of dermal); and body weight of the exposed person.

- Risk Characterization.

In this process, the incidence of health effects under various conditions/scenarios of human exposure (developed in the exposure assessment) were estimated. This process used exposure assessment and dose-response data for an identified hazardous chemical and incorporated the uncertainties associated with the type and quality of the data used (e.g., human epidemiology vs. animal bioassay data or complete data vs. limited data). Both acute and chronic exposures were evaluated, as appropriate, for each chemical release. For chronic exposures, the risk was divided into non-carcinogenic health outcomes (threshold) and carcinogenic (probabilistic) outcomes. Health risks were characterized for the following:

ÄÄ Noncarcinogenic effects for single compounds by comparing reference levels (reference concentration or reference dose) to uptake levels.

ÄÄ Noncarcinogenic effects for exposure to multiple compounds by summation of single compound effects.

ÄÄ Cancer risk from individual compounds.

ÄÄ Cancer risk as summation of risk from all identified carcinogens.

Reference dose, reference concentration, and cancer unit risk were taken from the Integrated Risk Information System, Health Effects Assessment Summary Tables, and the Battelle Pacific Northwest Laboratories database (see table F-2).

F.3 Determination of Risks from Nonradioactive Materials

Carcinogens. The procedure for calculating risk of exposure to carcinogenic compounds is well documented (National Research, 1983; EPA, 1983; EPA, 1989a; Roderick, 1984; SR King, 1987). A non-threshold dose-related model was used to calculate a cancer potency factor (slope factor) for each carcinogenic chemical. Table F-2 gives a unit value of slope factors for selected constituents based on oral or inhalation reference values developed in the Environmental Protection Agency (EPA) Integrated Risk Information System. The cancer potency factor was multiplied by the estimated average daily lifetime dose experienced by the exposed population to the chemical of concern to derive an estimate of risk frequency as follows:

- R=DxSF

Where: D=average daily lifetime dose (milligrams per kilogram of body weight per day) derived from the exposed concentration of the chemical for the pathway of concern (ingestion or inhalation). The inhalation concentration is converted to the same units as the reference dose when used in the above equation, where 0.286xmg/m ^{3} =mg/kg-day.

SF=slope factor for this pathway of concern (milligrams per kilogram of body weight per day) $^{-1}$. The slope factor converts estimated daily intakes averaged over a lifetime of exposure to the incremental risk of an individual developing cancer. Slope factors are usually documented, i.e., in the Integrated Risk Information System for each individual toxic chemical according to the potential exposure pathway; however, the unit risk can be used to determine a slope factor. The following equation can be used to convert an air concentration to a slope factor:

- SF=Unit Risk(æg/m ^{3}) $^{-1}$ x70 kgx10 ^{3} (æg/mg)/20(m ^{3} /day)

Where: 70 kg is the assumed average weight of an adult, 10 ^{3} (æg/mg) converts micrograms to milligrams and 20(m ^{3} /day) is the estimated volume of air inhaled by an average adult.

For the purposes and scope of the proposed project, this method is adequate because it usually will overestimate the risk because between 50 and 100 percent uptake is assumed.

R is an explicit estimate of the upper limit of risk for the pathway of concern and would have a value between zero and one.

If the inhaled dose, D, is given in mg/m ^{3} , it can be converted to units of mg/kg-day by the following calculation:

- [x mg/m ^{3}]x[20m ^{3} /dayx70 kg]=0.286
  or 0.286xmg/m ^{3} =mg/kg-day

Noncarcinogens. The traditionally accepted practice of evaluating exposure to a noncarcinogenic compound has been to determine experimentally a no-observable-adverse-effect level and to divide this by an uncertainty factor to establish a reference dose (RfD) for ingestion and a reference concentration (RfC) for inhalation. The reference concentration values were compared to the exposure concentration according to the pathway of concern (ingestion or inhalation) to obtain a Hazard Quotient as follows:

- Hazard Quotient=C/RfC

Where: C=average daily lifetime concentration derived from the concentration level of the chemical for the pathway of concern at the point of potential exposure.

Human health effects resulting from multiple exposures are addressed by the Hazard Index.

- Hazard Index=$C_1/RfC_1 + C_2/RfC_2 + ... + C_i/RfC_i$ where C_i=average daily lifetime dose for i^{th} toxic chemical and RfC_i=reference concentration for the i^{th} toxic chemical.

Establishing acceptable exposure limits implies that the application of uncertainty factors to an experimentally derived no-observable-adverse-effect level would prevent an adverse health risk. The reference doses typically are derived by making assumptions about the nature of dose-response relationships at low doses and by drawing inferences based on the available data (National Research, 1983).

The Hazard Index value derived for noncarcinogens could vary from less than one to more than one. It is to be recognized that these values for noncarcinogens represent the potential for an adverse health effect at the assessed exposure level if the Hazard Index is greater than one. There is no effect risk if the Hazard Index is less than one since these values are very conservative. This Hazard Index is only a numerical indicator of the threshold between acceptable and unacceptable exposure levels and is not a mathematical prediction of incidence of effects or their severity.

F.4 Identification of Hazardous Materials and their Associated Processes

The toxic chemicals associated with processes proposed for transfer and others of major concern with ongoing plant processes were characterized according to their general properties and chemical toxicity (table F-1) and according to various exposure limits or standards (table F-2). By comparing these values to the concentrations occurring onsite (worker exposure) and to those offsite (public exposure), the potential for adverse health effects could be assessed. The values presented in these tables and exposure levels could then be used to determine risk for adverse health effects.

Activities to be Transferred. Processes were identified with associated materials required to operate the process (input) as well as the end products, releases, and wastes (output). The objective was to identify hazardous materials associated with each process and to assess/identify those having potential for causing adverse health effects, i.e., toxicants. The *NIOSH Pocket Guide to Chemical Hazards* provided the primary information to identify chemicals considered to be hazardous in the workplace. This information was supplemented by additional authoritative references cited in table F-1. The first review of the transferred processes produced the following list of toxicants:

Compounds Considered

- Lithium
- Thionyl chloride
- Isopropyl alcohol
- Sulfur Dioxide (SO_2) gas
- Methylene chloride
- Methylene diisocyanate
- Trichloroethylene (TCE)
- 4,4-methylene dianiline (from epoxy mixture)
- Nickel compounds
- 1,1,1-trichloroethane (TCA)
- Chromium trioxide
- Hydrogen fluoride
- Toluene diisocyanate, free state
- Lead titanate

- Beryllium compounds
- Volatile organic compounds (VOC)
- Polycyclicaromatic hydrocarbons

From this list, compounds were selected if they were considered hazardous and of concern for a potential exposure generated as a consequence of conducting work which involved nonnuclear manufacturing processes. This selection was based upon compound toxicity, concentrations used, frequency of use, and on the fact that the process(es) was selected for transfer to a consolidation site. The industrial hygiene criteria, such as health rating, frequency of use, and permissible exposure level discussed in the next section, and the actual use of chemicals in the processes being transferred (section 3.3) were used to reduce this list. The compounds and processes identified for further analysis because of their hazard potential are identified in table F-3.

F.5 Evaluation of Potential Offsite (Public) and Onsite (Worker/Occupational) Risks for Hazardous Chemicals

Although the endpoint health effects of onsite and offsite releases can be similar, it is not valid to assume that this would be the case. Distance, exposure and pathways, and the hazardous materials that are candidates for onsite or offsite exposures may differ, and even the effects from the same material may differ according to concentration level and route of exposure (e.g., inhalation vs. ingestion and low-chronic vs. high-acute exposures). The initiating events for onsite and offsite exposures are also likely to differ, and the mitigation and control procedures can be entirely different. Therefore, different approaches were chosen to identify the hazardous chemicals likely to cause health effects, should they be released.

Offsite (Public) Impacts. The screening of hazardous chemicals for the potential to cause offsite effects involves assessing the emission or discharge potential to the public. The physiochemical properties, especially the physical state (e.g., vapor pressure, boiling point, solubility, and mobility characteristics) were considered in assessing container and control failures. The hazard potential (e.g., toxic dose and potential health effects at various concentration levels) was assessed. The quantities stored, transported, or used during a given process were determined. A limited number of major source terms (i.e., quantities released or potentially released over a given period) were identified. The most likely release and dispersion media for source terms were also considered; air and water were the major candidates for planned and unplanned releases that could result in either acute or chronic adverse health effects offsite. A third medium, soil, was also considered, although it was not of major importance for a plant (production) operation due to the flow route, containment barriers, and other engineering controls that are in place (e.g., spill tanks and troughs). However, it was recognized that hazardous chemical plumes have developed in soil and underground water from large accidental releases or waste management practices in the past. Solid substances, because of their relatively low mobility and complexity, were generally given low priority unless a scenario involved a release associated with fire or explosion.

For source term selection with a potential offsite effect, extremely hazardous materials exceeding the Superfund Amendment and Reauthorization Act (SARA) Title III Tier Two threshold were identified. Less hazardous chemicals whose plant site storages were identified in design documents as being stored in bulk quantities (chemicals with release of less than 100 pounds were excluded) were also considered. Tier Two threshold is based on physical and health hazards, i.e., fire, sudden release of pressure, acute health hazard, chronic health hazard, and reactivity with the environment or other chemicals within the site.

Offsite chemical effects were evaluated relative to the RfC and RfD values and other standard parameters in table F-2 for protection of the public against adverse health effects. In addition, the dose from exposure to carcinogens was needed to calculate the cancer risk at the site boundary as a conservative estimate of public risk.

The methodology used for modeling normal releases is described in appendix D. The concentrations of chemicals developed using this methodology are presented in tables F-4 though F-11; these values were used to calculate Hazard Quotients for individual chemicals and the Hazard Indexes (chemicals summed) at individual sites which are presented in tables F-12 through F-19.

Onsite (Occupational/Worker) Impacts. The chemical hazards involving onsite workers may be significantly different from those that may cause offsite (public) adverse effects. Depending on several factors, some onsite worker exposures can trigger a Protection Action Guideline (e.g., exceeding the PEL), whereas the quantity/toxicity offsite would fall far below a measurable concentration or observable effect. In addition, onsite workers are more likely to encounter more chemicals than offsite (i.e. the public). The controls to prevent occupational exposure may include engineering and mechanical barriers and special protective devices (e.g., respirators, goggles, and chemical-impermeable outerwear). However, it is possible to apply a scoring system based on the experience with industrial hygiene. The industrial hygiene assessment matrix developed for AlliedSignal at KCP was used for this purpose, and includes a score based on the criteria which follow:

- Health Rating.

This rating is based on the toxicological properties associated with a given hazardous chemical (e.g., the Diamond Label established by the National Fire Protection Association, which uses a range of 0 to 4 with 4 being the most hazardous), and both acute and chronic toxicity should be considered.

- Frequency of Use.

The frequency is based on length of exposure per month; the matrix uses a range of 0 to 3 with 3 being the highest frequency.

0 - on inventory list, but not in use

1 - low (_ 4 hours/month)

2 - medium (4 to 39 hours/month)

3 - high (> 39 hours/month)

- Permissible Exposure Level.

The PEL established by OSHA for each toxicant serves as the standard for this com-ponent of the matrix score.

0 - Evaluated within 1 year and detected in work area or in personnel

1 - Evaluated within 1 year and determined as < 25 percent of PEL

2 - Evaluated within 2 years and determined as < 50 percent of PEL

3 - Evaluated within 2 years and determined as 50 percent of PEL

Based on a maximum possible score of ten as a sum of the three criteria, all candidate chemicals were considered and those with a combined score of six or more were further evaluated.

The approach for deciding which chemicals to model for occupational exposure and the potential for adverse health effects is process-dependent. Each process (independent of site designation) to be included in the DOE's Nonnuclear Consolidation Plan (NCP) was studied and evaluated for potential exposures that the worker might encounter. The hazardous materials used as input into each process were identified, along with the quantity and frequency of use. This process permitted application of a scoring matrix to hazardous materials that might create a concern rather than random selection from an inventory. Where actual monitoring data were available or there was sufficient evidence that a process operates safely under normal conditions, scenarios for upset conditions were considered along with engineering and procedural controls and the ability to mitigate.

By modeling the toxic air pollutant emission rates for each site (appendix D), the current and proposed toxic air pollutant concentrations onsite and at the site boundary were calculated. Tables F-4 to F-11 present the toxic air pollutant concentrations for the No Action alternatives (current operations) and for the proposed consolidation alternatives relative to each site. The exposure limits, i.e., lifetime reference concentration (reference dose or reference concentration), 8-hr PEL, 8-hr TLV, and slope factor (unit risk for carcinogenic compounds) are also presented in these tables to permit the reader to evaluate the potential for adverse health effects. If the concentrations of hazardous chemicals presented in this table fall below the exposure limits, no adverse health effects can be expected. If the limits are exceeded, there is a possibility for adverse health effects to occur, such as those presented in table F-2. However, it is cautioned that exposure limits are usually very conservative to ensure that both workers and the public are protected. The difference in the exposure concentration and the appropriate reference concentration, PEL, TLV, etc., therefore, represents the margin of safety; the Hazard Index, as discussed in section F.3, is the ratio of the exposed level to its established reference.

Using the information in tables F-4 through F-11, the Hazard Quotients (values for single hazardous chemicals) and the Hazard Indexes (summation of quotients for all chemicals) were consolidated for the workers and the public at each site. The RfC, PEL, and TLV values for each toxic chemical appearing in tables F-4 through F-11 (according to site) are those listed in table F-3 (official sources appear in the table footnotes). The RfCs represent lifetime exposure limits, which were compared to the annual exposure concentrations for a conservative estimate of the potential for chronic adverse health effects. The PEL (regulatory standard) and TLV (guideline) values were compared to eight-hour exposures to estimate the possibility for adverse health effects induced by daily worker exposures. In the event that the PEL and TLV values differed, the lower of the two was chosen so that calculations would be as conservative as possible.

By way of example, the RfC value for acetone is 10.5 mg/m^3 and the cumulative annual onsite level at KCP is 0.002 mg/m^3 (see table F-4), so dividing the onsite concentration by the RfC gives a Hazard Quotient of 0.0002 for cumulative onsite acetone (see table F-12a). The PEL (8-hr) for acetone is 1,800 mg/m^6 and the onsite 8-hr concentration is 0.030 mg/m^3, so dividing the onsite concentration by the PEL gives a Hazard Quotient value of $1.67x10^{-5}$ for eight hours. Since this value is very small compared to an acceptable value of 1.0, i.e. less than 10^{-4}, it was recorded as 0.0000 in the table. The sums of all Hazard Quotients for all chemicals gives the Hazard Indexes at each site.

In addition, the cancer risk to workers and to the public were determined for those chemicals where a cancer potency (slope factor) was available. The calculation methods are presented in section F.3 of this appendix; the results for these calculations are presented in tables F-12 through F-19. By way of example, the No Action onsite cancer risk for methylene chloride at KCP was calculated using a methylene chloride concentration of 0.00077 mg/m^3. This concentration was converted to a dose (mg/kg-day) using the multiplier of 0.286 (section F.3) to give an average daily lifetime dose (D) of $1.22x10^{-4}$ mg/kg-day. When this dose was multiplied by the slope factor for methylene chloride, i.e., $2.6x10^{-3}$ $(mg/kg/day)^{-1}$, an individual cancer risk of $5.72x10^{-7}$ at this level of exposure was obtained (see table F-12b). The total risk was the sum of all cancer risks. The chemicals identified in table F-1 were assessed separately and used to assess the baseline.

F.6 Evaluation of Potential Offsite (Public) and Onsite (Worker/Occupational) Risks for Radioactive Materials

Releases of radioactive materials at the sites from normal operations and associated doses were taken from the sites' Annual Environmental Reports. Increases in releases as a result of the Proposed Action were also taken from the sites' reports and the associated doses were reflected in ratios. The radiological risks were calculated using the following methodology.

Health impacts from radiation exposure, whether from sources external or internal to the body, generally are identified as "somatic" (affecting the individual exposed) or "genetic" (affecting descendants of the exposed individual). Radiation is more likely to produce somatic effects rather than genetic effects and if the former are acceptable, the latter are not generally estimated. Therefore, for this EA, only the somatic risks are evaluated. The somatic risks of most importance are the induction of cancers.

The fatal cancer risk estimators presented in this appendix technically apply only to low-Linear Energy Transfer radiation (gamma rays and beta particles). However, on a per rem basis, the fatal risk estimators are higher for this type radiation than for high-Linear Energy Transfers radiation (alpha particles). In this EA, the low-Linear Energy Transfer risk estimators are conservatively assumed to apply to all radiation exposures.

The National Research Council's Committee on the Biological Effects of Ionizing Radiation (BEIR) has prepared a series of reports to advise the U.S. Government on the health consequences of radiation exposures. The latest of these reports, Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V (NAS, 1990), provides the most current estimates for excess mortality from leukemia and cancers other than leukemia expected to result from exposure to ionizing radiation. The BEIR V report updates the models and risk estimates provided in the earlier report of the BEIR III Committee published in 1980 (NAS, 1980). BIER V models were developed for application to the U.S. population. Thus, consideration of the recent report of the BEIR V Committee is especially important.

BEIR V provides risk estimates that are consistently higher than those in BEIR III. This is attributed to several factors including the use of a linear dose response model for cancers other than leukemia, revised dosimetry for the Japanese Atomic bomb survivors, and additional follow-up of the Atomic bomb survivors and cohorts. BEIR III employs constant relative and absolute risk models, with separate coefficients for each of several sex- and age-at-exposure groups, while BEIR V develops models where the excess relative risk is expressed as a function of age at exposure, time after exposure, and sex for each of several cancer categories. BEIR III models were based on the assumption that absolute risks are comparable between the Atomic bomb survivors and the U.S. population, while BEIR V models were based on the assumption that relative risks are comparable. For a disease such as lung cancer, where baseline risks in the U.S. are much larger than those in Japan, the BEIR V approach leads to larger risk estimates than the BEIR III approach.

The models and risk coefficients in BEIR V were derived through analysis of relevant epidemiologic data including the Japanese A-bomb survivors, ankylosis spondylitis patients, Canadian and Massachusetts fluoroscopy patients (breast cancer), New York postpartum mastitis patients (breast cancer), Israel Tinea Capitis (thyroid cancer), and Rochester thymus patients (thymus cancer). Models for leukemia, respiratory cancer, digestive cancer, and other cancer used only the A-bomb survivor data, although results of analyses of the ankylosis spondylitis patients were considered. A-bomb survivor analyses were based on revised DS86 dosimetry with an assumed Radio Biological Effectiveness of 20 for neutrons, and were restricted to doses less than 400 rads. Estimates of risks of fatal cancers other than leukemia were obtained by totaling the estimates for breast cancer, respiratory cancer, digestive cancer, and other cancer.

Risk Estimates for Doses Received During An Accident. BEIR V includes risk estimates for a single exposure of 10 rem to a population of 100,000 people (10 6 person-rem). In this case, mortality estimates for leukemia, breast cancer, respiratory cancer, digestive cancer, and other cancers are given for both sexes and nine age-at-exposure groups. These estimates are summarized in table F-20. The average risk estimate for all ages and both sexes is 885 excess cancer mortalities per million person-rem. This is the risk value used in this EA for accident situations.

Risk Estimates for Doses Received During Normal Operations. For low dose rates, a linear-quadratic model was found to provide a significantly better fit to the data for leukemia than a linear one, and leukemia risks were based on a linear-quadratic function. This reduces effects by a factor of two over estimates that are obtained from the linear model. For other cancers, linear models were found to provide an adequate fit to the data, and were used for extrapolation to low doses. However, the BEIR V Committee recommended reducing these linear estimates by a factor between 2 and 10 for doses received at low dose rates. For this EA, a risk radiation factor of two was adopted. The resulting risk estimate would then be equal to half the value observed for accident situations or approximately 445 excess cancer mortalities per million person-rem. This is the risk value used in this EA for normal operations.

APPENDIX G: FEDERAL AGENCIES, STATES, AND NATIVE AMERICAN COMMENTS AND RESPONSES

G.1 Introduction

The Department of Energy (DOE), has complied with the National Environmental Policy Act (NEPA) mandate of public participation in the Environmental Assessment (EA) analysis process (40 CFR 1506.6) and DOE NEPA regulations 57 FR 1522 section 1021.301 (d) April 24, 1992, to be codified at 10 CFR 1021. Copies of the Preapproval Review Copy of the Nonnuclear Consolidation Environmental Assessment were distributed on December 22, 1992 to various Federal agencies, states, elected officials, and Native American groups for review and comment. The comment period was open until January 29, 1993; however, comments were accepted as late as March 1993.

During the comment review period, a total of 19 documents were received from government agencies and officials, as well as from one Native American group.

G.2 Organization

This appendix has been organized into the following sections:

- A list of issue categories, index of commenters, and tables cross referencing comments, responses and documents.
- Comment summaries and responses by category.
- Documents received during the review and comment process.
- Distribution list by Federal agencies, states, and Native American groups.

As each of the 19 documents were received, comments were identified, summarized, and numbered sequentially within one of each of 21 Issue Categories (see table G-1). No comments were received on Issue Categories 3, 5, 17, 18, 19, and 20. For each comment summary, the number of comments covered by the summary and the document numbers where the comments originated are indicated with the response. For example, Comment Summary 1.3 refers to comment number 3 in Issue Category 1, "Proposed Action and Alternatives." A reader who wishes to read the entire document submitted by a commenter may turn to the photocopy of the document included in this appendix.

Table G-2 includes the name of the commenters, the document numbers that have been assigned to each document, and the page number where the photocopy of the document is presented.

Two tables, G-3 and G-4, are provided to aid the reader in tracking comments and responses with the documents and issue categories. Table G-3 is organized by document and G-4 by Issue Category. Detailed instructions for use precede each table.

Nonnuclear Consolidation

Environmental Assessment

DOE/EA-0792

Table 3.1-1.-Proposed Alternatives for Nonnuclear Manufacturing Consolidation Environmental Assessment

	Alternatives				
Nonnuclear Manufacturing Functions to be Moved	No Action	Proposed Action	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative
Electrical/Mechanical	KCP, Mound, Pinellas, RFP	KCP	Mound	Pinellas	RFP
Tritium Handling at Mound	Mound	SRS	Mound	SRS	SRS
Tritium Handling at Pinellas	Pinellas	LANL	LANL	Pinellas	LANL
Detonators	Mound	LANL	Mound	LANL	LANL
Beryllium Technology and Pit Support	RFP	LANL (Option Y-12)	LANL	LANL	RFP
Neutron Generators, Cap Assemblies, and Batteries	Pinellas	SNL and KCP (LAMB)	SNL and Mound (LAMB)	Pinellas	SNL and RFP (LAMB)
Special Products at RFP	RFP	KCP	Mound	Pinellas	RFP
Special Products at Mound	Mound	LANL (Calorimeters) and SNL (MWHS)	Mound	LANL (Calorimeters) and SNL (MWHS)	LANL (Calorimeters) and SNL (MWHS)

E4 3171
LAMB Lithium Ambient Batteries MWHS Milliwatt Heat Source Surveillance

Table ES-1.-Proposed Action and Alternatives

	Alternatives				
Nonnuclear Manufacturing Functions to be Moved	No Action	Proposed Action	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative
Electrical/Mechanical	KCP, Mound, Pinellas, RFP	KCP	Mound	Pinellas	RFP
Tritium Handling at Mound	Mound	SRS	Mound	SRS	SRS
Tritium Handling at Pinellas	Pinellas	LANL	LANL	Pinellas	LANL
Detonators	Mound	LANL	Mound	LANL	LANL
Beryllium Technology and Pit Support	RFP	LANL (Option Y-12)	LANL	LANL	RFP
Neutron Generators, Cap Assemblies, and Batteries	Pinellas	SNL and KCP (LAMB)	SNL and Mound (LAMB)	Pinellas	SNL and RFP (LAMB)
Special Products at RFP	RFP	KCP	Mound	Pinellas	RFP
Special Products at Mound	Mound	LANL (Calorimeters) and SNL (MWHS)	Mound	LANL (Calorimeters) and SNL (MWHS)	LANL (Calorimeters) and SNL (MWHS)

E4 3171
Notes: LAMB - Lithium Ambient Batteries MWHS - Milliwatt Heat Source Surveillance

Table A1-4.-Kansas City Plant: Waste Processing Facilities

Facility	Operation
Scrap Dock	Nonhazardous metal scrap segregation
Papermill and Solid Waste Building	Glass and metal container crushing, plant refuse compacting
Oil Skimmer	Separation of oil/water mixtures before discharge of water to municipal sewer system
Container Rinse Area	Rinsing of hazardous material containers
Solvent Distillation Unit	Reclaim various solvents for reuse in-plant
Precious Metal Recovery	Silver Recovery
Thermal Emulsion Breaker	Thermally separates water-based coolants and water for volume reduction
Oil/Water Separator and Carbon Filter	Separates oil with trace amounts of PCBs and removes VOCs from water
	E4 3187
Source: KC DOE, 1991b.	

Table A1-2.-Kansas City Plant: Hazardous/Toxic Waste Streams and Offsite Disposal Methods

Waste	Disposal Method
Acid	Incineration
Adhesive	Incineration
Alkaline	Incineration
Asbestos	Landfill
Cyanide	Incineration
Oil/Solvent Solid	Incineration

Debris	
Infectious Waste	Incineration
Oil/Coolant	Incineration
Paint	Incineration
PCB Liquids	Incineration
PCB Solid	Landfill
Resin	Incineration
Rubber Compounds	Incineration
Solvents	Incineration

E4 3190
Source: KC DOE, 1991b.

Table A1-1.-Kansas City Plant: Hazardous/Toxic Waste Streams

		Quantities (ft3) a		
Waste Stream	Process	Actual (1990)	Actual (1991)	Actual (1992)
Acid	Plating Operations	475	363	336
Acid b	Precious Metal Recovery	30	40	45
Alkaline	Plating Operations	1,297	1,323	968
Alkaline b	Precious Metal Recovery	2	6	6
Oil/Coolants	Machining & Lubrication Services	6,062	1,697	750
Halogenated & Non-Halogenated Solvents	Degreasing Operations	7,312	3,756	1,506
PCB Liquid & Debris	Oil Heat Transfer System Electrical Units & Debris	3,466 238,840 lb	81 118,100 lb	1,144 298,900 lb
PCB Soil & Debris	Miscellaneous on-site	243	27 tons	348

	Remediation	tons		tons
Cyanide Saltsb	Precious Metal Recovery	1	115	4
Resin, Paint, Curing Agents Adhesive & Rubber	Potting and Manufacturing Operations	1,934	1,213	1,806
Infectious Waste	Medical Lab Operations	447	582	1,111
Mercury Contaminated Debris	Manufacturing Operations	58	15	15
Solvent/Oil Contaminated Filters & Debris	Manufacturing, Potting, Cleaning & Degreasing Operations	10,301	5,895	7,763
F006, F019 Sludge	Wastewater Treatment	7,722	5,346	4,158
Batteries b, Lead-acid Sold for Lead Reclamation b	Lead-acid Batteries from Vehicle Maintenance	83,600 lb	49,960 lb	57,740 lb
Batteries, Thermal Lithium, Gel-Cell and Miscellaneous	Manufacturing Operations	110	88	103
Toluene Diisocyanate	Molding and Encapsulation	111	68	369
Classified Hazardous Material	Manufacturing Operations	15	9	9
Cyanide, Liquid	Precious Metals Recovery	60	115	41
MDA Contaminated Debris	Potting & Encapsulation Operations	3,060	48	368
Acid/Chromate Contaminated Debris	Metal Finishing, Spill Clean-up, Filtration	27	60	266
Cyanide/Alkaline Contaminated Debris	Spill Clean-up, Lab Trash, Filtration	20	32	160
Miscellaneous Lab Reagents, Off-spec. Commercial Product	Facility Clean-out of Discarded Chemicals	78	60	70
Non-empty Aerosol Cans	Use of Items With Aerosol Propellants	0	0	588

Compressed Gas Cylinders	Miscellaneous Manufacturing Operations	0	0	29
Trichloroethylene Contaminated Soil	Miscellaneous Site Soil Assessments	0	15,525	1,147

E4 3191

a Quantities are in cubic feet unless otherwise stated.
b Recycled.

Source: KC ASAC, 1993b.

Table A3-4.-Pinellas Plant: Radioactive Solid Waste Volumes

Tritium Waste Type	1990 Actual Volume (ft3)	1991 Actual Volume (ft3)	1992 Actual Volume (ft3)
Contaminated Equipment	700	665	640
Contaminated Dry Solids	3,900	1,758	787
Contaminated Product	330	298	242
LLW Total	4,930	2,717	1,669
			E4 3196

Source: PI DOE, 1992d.

Table A3-3.-Pinellas Plant: Hazardous Waste Drum and Tank Storage

Storage Location/ Storage Capacity	Waste Description	Waste Defined by EPA Waste Code Number
Building 1040, Bay 1 Drum Storage—forty 55-gallon drums; 24 lab-pack drums	Waste halogenated solvents, spent plating bath solutions, stripping compounds. Waste methylene chloride/resin, waste epoxy resin	F001-F003, F005-F009, D001, D002, D004, D007, D008, D009, D011, D018, D019, D022, D023, D024, D025, D026, D027, D028, D029, D030, D036, D037, D040, D041, D042, U032, U223 (will contain free liquids)

Building 1040, Bay 2 Drum Storage—thirty-six 55-gallon drums; 18 lab-pack drums	Calcium chromate contaminated solid waste, thermal batteries (calcium chromate and lithium silicon)	D001-D004, D007-D009, U032, U223 (does not contain free liquids)
Building 1040, Bay 3 Drum Storage—three 55-gallon drums	Miscellaneous laboratory chemicals stored until properly identified and classified for packaging, shipping, and disposal	D002, D004, D008, D009 (does not contain free liquids)
Building 1000, Center Bay Drum Storage—thirty-eight 55-gallon drums	Mixed waste storage when necessary	D008 mixed with low-level radioactive waste (does not contain free liquids)
Tank No. 1—5,000 gallons	—	Standby—any of below
Tank No. 2—2,000 gallons	Mixtures of methylene chloride, 1,1,1-trichloroethane, trichloroethylene, and chlorofluorocarbons	F001, F002
Tank No. 5—5,000 gallons	Mixture of alcohol, toluene, acetone, amyl acetate and liquids with ignitable characteristics	F003, F005, D001

	E4 3197
Source: PI DOE, 1991c and 1992d.	

Table A3-2.-Pinellas Plant: Offsite Disposition of Hazardous Wastes

Waste	Disposal Method
Laboratory Packs	Incineration
Asbestos	Landfill
Calcium Chromate	Landfill
Halogenated and Nonhalogenated Solvents	Recycling
Lead (Contaminated)	Treatment
Thermal Batteries and Reactive Metals	Incineration and hydrolysis

Still Bottoms from Recycling	Landfill
Ashes from Incineration	Landfill
	E4 3198
Source: PI DOE, 1991c.	

Table A3-1.-Pinellas Plant: Hazardous Waste Quantities Shipped Offsite in 1992

Waste	EPA Waste Code Number	Quantity (yd3)
Calcium Chromate (Solid) a	D007, U032	4.63
Calcium Chromate Batteries	D003	0.54
Lithium Silicon Batteries	D003	1.09
Lithium Silicon	D003	0.00
Flammable Liquids b	F003, F005, D001, & TCLP	13.62
Halogenated Hydrocarbons c	F001, F002, & TCLP	1.36
Methylene Chloride Resin	F001, F002	5.17
Trim Cutting Coolants d	òò	51.73
Laboratory Wastes e	òò	47.60
New Waste Streams (Contingency)	òò	4.08
Waste Cyanide	D002, D003, F007	0.03
Waste Oxidizer	D001, D007	0.54
Electroplating Waste Sludge	F006	116,760 (gal)
Lead Oxide	D008	0.84
Chlorofluorocarbons	F001, F002	0.84
Corrosive Liquid	D002, D007, D008	1.09
Plating Waste	D002, D007, D008	5.00
Photodeveloping Waste	F002, F003	0.54
Waste Paint	D006, D002, D011, D001	0.54

E4 3199
a High rate of generation due to elimination of this product line. b Consists of acetone, ethanol, alcohol, amylacetate, toluene, and mineral spirits. c Consists of 1,1,2-trichlorofluoroethane, methylene chloride, 1,1,1-trichloroethane, and trichloroethylene. d Treated onsite using a wastewater treatment unit. e Based on a total of 240 drums (5-gal, 20-gal, 30-gal, and 55-gal drums).

Source: PI DOE, 1992d.		

Table 3.3.1-1.-Kansas City Plant: Proposed Action

Activity	Space Req.	Location	Donor Site
Support Pads	460	MMB	Pinellas
Optoelectronics Assemblies	2,500	MMB & MSB	Pinellas
Neutron Detectors	700	MMB	Pinellas
Lightning Arrestor Connectors	4,000	MMB & EPMB	Pinellas
Transducers	500	MMB	Pinellas
Lithium Ambient Batteries	1,200	MMB	Pinellas
Flat Cable Products	8,800	MMB	Mound
Mechanical Assemblies	2,200	MMB	Mound
Round Wire Detonator Cables and	1,000	MMB	Mound
Plastic Headers			
Reservoirs and Nonnuclear Acorn	31,600	MMB & MSB	Mound & RFP
Nuclear Grade Steels/Oxnard	8,800	MMB	RFP
Safe Secure Trailers	29,400	MMB	RFP
Weapon Trainer Shop	6,800	MMB	RFP
Metrology Services	0	MMB	RFP
Total	97,960		

E4 3200

MMB	Main Manufacturing Building
MSB	Manufacturing Support Building
EPMB	Electrical Products Manufacturing Building
Source:	KC ASAC, 1992a.

Table A1-5.-Kansas City Plant: Hazardous/Toxic Waste Disposal-
Annual Summary (1991)

Waste Material	Amount (lb)	Number Of Shipments
Alkaline Liquid, Bulk	63,400	2
Alkaline Liquid MacDermid	25,915	1
Chromium/Cyanide Contaminated Demolition Debris	9,220	1
Flammable Liquids (Overpacks-Adhesives, Resins, Curing Agents, Paint, and Rubber)	48,820	2
Combined Misc. Isocyanates	10,780	1
Industrial Waste Processing Facility F006/F019 Sludge	192,320	7
Lab Reagents (Misc.) & Off-Spec Commercial Product	3,565	1
Oil, Bulk	45,000	1
Oil/Solvent Debris	127,700	6
Oil/Solvent Debris (Step Can Waste)	40,340	2
PCB Liquid, Bulk	1,805	6
PCB Solid Debris	171,300	28
Precious Metals	11,786	2
Solvent, CHL	201,780	5
Trichloroethlylene Contaminated Soil	733,580	23
Total	1,692,311	88

E4 3224
Source: KC ASAC, 1993a.

Table A2-2.-Mound Plant: Low-Level Mixed Waste Types and Quantities in Storage

Waste Type	Quantity
Liquid Scintillation (vials)	189 drums (1,418 ft3) containing closed vials
Lead Residue and Bricks	One 30-gal drum of residue, two 30-gal drum bricks; one 55-gal drum of lead scrap, two 5-gal 37-A can of bricks and scrap, two 55-gal drums of RCRA corrosive TRU waste, two plywood boxes (strong, tight) containing waste batteries, one steel box (U.S. DOT 7A) containing lead waste; total volume waste lead - 185 ft3
PCBs	21 drums of solid, 10 drums of liquid,1 box of solid (equipment-machine press); total volume PCBs - 250 ft3
Contaminated Mercury	Four containers totalling less than 3 liters

E4 3243
Source: MD DOE, 1991b.

Table A2-1.-Mound Plant: Hazardous/ToxicWaste Nature and Handling Procedures

Waste Stream	Nature of Waste	Handling of Waste	Location
Organic Solvents	Flammable liquids	Picked up weekly, consolidated at staging area, and stored in steel drums in Bldg. 72 prior to offsite disposal	B-Bldg., E-Bldg., R-Bldg., COS Bldg.
Waste Oils	Flammable or combustible liquids	Consolidated in 55-gal drums at operating area, and stored in Bldg. 72 for offsite disposal	PM-Bldg., M-Bldg., garage
Discarded Excess Paints and Thinners	Flammable or combustible liquids	Consolidated in 55-gal drums at operating area, and stored in Bldg. 72 for offsite disposal	Paint shop
Waste Corrosive Solutions	Mostly caustic and acid solutions	Consolidated in 55-gal or other size drums at operating area, and stored in Bldg. 72 for offsite disposal	Plating shop, DS Bldg., garage
Spent Plating-Bath Solution	Toxic liquid containing heavy metals	Consolidated in 55-gal or other size drums at operating area, and stored in Bldg. 72 for offsite disposal	Plating shop
Waste PCBs	Toxic liquid	Stored in marked cans or drums labeled and placed in diked area and covered vaults or controlled storage facility near P-Bldg.	Various transformers and capacitors throughout the plant

Toxicity Characteristic Waste	Various liquid and solid wastes	Consolidated in 55-gal or other size drums at operating area, and stored in Bldg. 72 for offsite disposal	Approx. 10 locations throughout the plant
Photoprocessing Waste	Waste containing precious metals, caustic solution, and acetic acid	Picked up weekly, consolidated into polyethylene-lined 55-gal drums and stored in Bldg. 72 for potential silver recovery (fixer) or offsite disposal (nonfixer)	OSW Bldg., OSE Bldg., Bldg. 2
Explosive Solid Waste	Containing small amounts of explosives/ pyrotechnics	Stored in magazine; small quantities are treated by open burning, retorting, or òincinerationò in controlled-access area	Approx. 15 locations throughout the plant
Solvent-Water Wastes Containing Trace Amounts of Explosives	Ignitable and possibly reactive	Filtered and containerized in polyethylene-lined 55-gal drums and staged near Bldg. 27 prior to offsite shipment for treatment/disposal	Bldg. 27
Laboratory Wastes	Solvents; flammable, reactive, toxic liquids in small quantities	Packed in steel containers with vermiculite for incineration or land-filling	Various labs throughout the plant

E4 3245

Source: MD DOE, 1991b.

Table A4-3.-Rocky Flats Plant: Types of
Low-Level/Low-Level Mixed Waste Generated in 1990

Waste Stream	Percentage
Combustibles	49
Saltcrete	19
Metals	14
Mixed Item Description Codes (Residues)	8
Aqueous Sludge	3
Filters	2
Blacktop, Concrete,	2

Dirt & Sand	
Other	2
Pondcrete	1
Total	100
	E4 3247
Source: RF DOE, 1991b.	

Table 3.3.4-1.-Oak Ridge Reservation, Y-12 Plant-Proposed Action

Activity	Space Req. (ft2)	Location	Donor Site
Beryllium Technology	8,890	Bldg. 9201-5	Rocky Flats
Pit Support Functions	730	Bldg. 9204-4	Rocky Flats
Total	9,620		

E4 3256
Source: Y-12 MMES, 1992b.

Table 3.3.2-1.-Savannah River Site: Proposed Action

Activity	Space Req.	Location	Donor
Commercial Sales/Inertial Confinement Fusion (ICF) Target Loading	1,000	Bldgs. 232-H, 233-H, 234-H, and 236-H	Mound
Gas Transfer Systems	4,300	Bldgs. 232-H, 233-H, 234-H and 735-11A	Mound
Reservoir Surveillance Operations	5,000	Bldgs. 232-H, 233-H, 234-H, 236-H, and 249-H	Mound
Total	10,300		

E4 3285
Source: SR DOE, 1992a.

Table 4.1.1.3-1.-Summary of Surface Water Quality Monitoring, Kansas City Plant

Receiving Water: Big Blue River-1990

	Unit of	Water Quality	Existing Water Body Concentrationa	
Parameter	Measure	Criteria	Average	Maximum
Aluminumf	mg/L	0.05-0.2d	0.87	3.11
Ammoniae	mg/L	0.9b	0.53	3.97
Arsenic	mg/L	0.02b	< 0.001	0.003
Barium	mg/L	1c	0.093	0.138
Beryllium	mg/L	0.004b	< 0.001	0.001
Biochemical Oxygen Demand	mg/L	NA	8	21
Boron	mg/L	NA	0.115	0.2460
Cadmiume	mg/L	0.013b	0.004	0.019
Chemical Oxygen Demand	mg/L	NA	21	40
Chloride	mg/L	250d	82	201
Chromium, total	mg/L	0.042b	0.007	0.032
Coppere	mg/L	0.029b	0.009	0.039
Cyanidee	mg/L	0.005b	0.001	0.021
Iron	mg/L	1b	0.858	3.33
Leade	mg/L	0.02b	0.018	0.032
Nickel	mg/L	0.1b	0.004	0.029
Nitratef	mg/L	10c	20.68	154
Oil & Grease	mg/L	NA	1.1	8.2
pH	pH units	6.5-8.5d	8.1	
Phenol	mg/L	0.1b	0.007	0.018
Phosphorus	mg/L	NA	2.17	9.2
Silverf	mg/L	0.00012b	0.002	0.003

Sulfate	mg/L	250d	102	183
Strontium	mg/L	NA	0.291	0.388
Tantalum	mg/L	NA	0.012	0.067
Temperature	Fahrenheit	NA	59	
Thalliumf	mg/L	0.002c	0.015	0.075
Titanium	mg/L	NA	0.003	0.015
Total Dissolved Solidsf	mg/L	500d	531	787
Total Suspended Solids	mg/L	NA	38	133
Tungsten	mg/L	NA	0.013	0.107
Zinc	mg/L	0.345b	0.019	0.053

E4 3337-1

a Average values are taken from the monitoring station on the Big Blue River, downstream of all KCP outfalls. Maximum value used is the highest value from all monitoring stations downstream of the confluence of the Big Blue River and Indian Creek. More parameters than are listed were sampled for; less than symbol (<) indicates concentration below the analysis detection limit. However, only those parameters having average or maximum concentrations greater than the instrument detection level are presented.

b Specific state standards for Indian Creek and Big Blue River. If both chronic and acute standards apply, chronic is listed.

c Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).

d Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143).

e Although chronic standards are listed for comparison with average concentrations, the State of Missouri has acute standards which apply to maximum concentrations. The maximum concentration for the following parameters did not exceed the acute listed standards: ammonia, 4.4 mg/L; cadmium, 0.052 mg/L; copper, 0.045 mg/L; cyanide, 0.022 mg/L; lead, 0.13 mg/L.

f Average concentration exceeded water quality criteria; however, these criteria are listed for comparison only. Water quality standards do not affect plant activities until they are translated into end-of-pipe effluent limitations imposed on discharges through the NPDES permitting process. Similarly, drinking water standards are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards-they do not constitute an enforceable limit.

NA None Applicable

Source:KC ASAC, 1991a.

Table 4.1.6.3-1.-Summary of Surface Water Quality Monitoring, Mound Plant

Receiving Water: Great Miami River-1990

	Unit of	Water Quality	Existing Water Body Concentration	
Parameter	Measure	Criteriac	Average	Maximum
Plutonium-238	pCi/L	1.6b	0.00081	0.00563
Tritium	pCi/L	20,000a	40	220
Uranium-233, 234	pCi/L	20b	0.07	0.22
Uranium-238	pCi/L	24b	0.09	0.18

E4 3341

a Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
b U.S. Department of Energy Derived Concentration Guides (DCG) for Water. DCG values are based (DOE Order 5400.5) on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
c Drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards' they do not constitute an enforceable limit.

Source: MD DOE, 1991a.

Table 4.1.8.3-1.-Summary of Surface Water Quality Monitoring at Rocky Flats Plant

	Unit of	Water Quality	Existing Water Body Concentrationf	
Parameter	Measure	Criteria	Average	Maximum
Receiving Water: Walnut Creek-1989/90				
Americium-241	pCi/L	0.05a	0.0015	0.003

Berylliume	mg/L	0.004b	0.005	0.005
Copper	mg/L	1c	0.019	0.025
Gross Alpha	pCi/L	11a	4.1	5.3
Gross Beta	pCi/L	19a	6.4	9.2
Lead	mg/L	0.015b	0.005	0.005
Plutonium-239	pCi/L	1.2d	0.005	0.01
Tritium	pCi/L	500a	30	50
Uranium-233, 234	pCi/L	10a	1.89	3.4
Uranium-235	pCi/L	10a	0.15	0.3
Uranium-238	pCi/L	10a	2.02	2.86
Total Dissolved Solids	mg/L	500c	270	270

Receiving Water: Woman Creek-1989/90

Americium-241	pCi/L	0.05a	0.0	0.0
Berylliume	mg/L	0.004b	0.0046	0.005
Copper	mg/L	1c	0.0266	0.0363
Gross Alpha	pCi/L	7a	<1	<1
Gross Beta	pCi/L	5a	4	4
Leade	mg/L	0.015b	0.007	0.025
Plutonium-239	pCi/L	1.2d	0.0	0.0
Tritium	pCi/L	500a	<20	<20
Uranium-233, 234	pCi/L	5a	1.1	1.1
Uranium-235	pCi/L	5a	0.0	0.0
Uranium-238	pCi/L	5a	0.6	0.6
Total Dissolved Solids	mg/L	500c	287	300

E4 3343
a Colorado state water quality standards, specific for Walnut and Woman Creeks.

b Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
c Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143).
d U.S. Department of Energy Derived Concentration Guides (DCG) for Water (DOE Order 5400.5). DCG values are based on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
e Concentration exceeded water quality criteria; however, these criteria are listed for comparison only. Water quality standards do not affect plant activities until they are translated into end-of-pipe effluent limitations imposed on discharges through the NPDES permitting process. Similarly, drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards-they do not constitute enforceable limits.
f Less than symbol (<) indicates concentration below analysis detection limit.

Source: RF EG&G, 1990a. (Radiological data from table 9-1; nonradiological data from table 9-18.)

Table 4.1.2.3-1.-Summary of Surface Water Quality, Savannah River Site

Receiving Water: Savannah River-1990

	Unit of	Water Quality	Existing Water Body Concentrationa	
Parameter	Measure	Criteria	Average	Maximum
Aluminumg	mg/L	0.05-0.2d	NC	1.1
Ammonia	mg/L	NA	0.1	0.2
Cadmium	mg/L	0.005c	NC	<0.01
Calcium	mg/L	NA	NC	4.4
Cesium-137	pCi/L	120e	0.028	0.037
Chemical Oxygen Demand	mg/L	NA	9.8	14
Chloride	mg/L	250d	8	10
Chromium	mg/L	0.1b	NC	<0.02
Copper	mg/L	1.0b	NC	<0.01
Dissolved Oxygen	mg/L	NA	7.7	9.5

Fecal Coliform	Colonies Per 100/ml	1,000c	54	197
Gross Alpha	pCi/L	15c	0.08	1.48
Irong	mg/L	0.3d	NC	1.5
Lead	mg/L	0.015c	NC	0.01
Magnesium	mg/L	NA	NC	1.3
Manganeseg	mg/L	0.05d	NC	0.1
Mercury	mg/L	0.002b	NC	<0.0002
Nickel	mg/L	0.1c	NC	<0.05
Nitrite/Nitrate	mg/L	10c	0.28	0.43
Non Volatile Beta (dissolved)	pCi/L	50c	2.1	5.1
pH	pH Units	6.5-8.5d	(not reported)	8.2
Phosphate	mg/L	NA	0.1	0.16
Plutonium-238	pCi/L	1.6e	0.0006	0.0029
Plutonium-239	pCi/L	1.2e	0.0014	0.0079
Sodium	mg/L	NA	NC	11
Strontium-89	pCi/L	800e	0.25	0.98
Strontium-90	pCi/L	8c	0.13	0.30
Sulfate	mg/L	250d	8.5	12
Suspended Solids	mg/L	NA	12	19
Temperature	Degrees Celsius	32.2f	18.0	27
Total Dissolved Solids	mg/L	500d	63	71
Tritium	pCi/L	20,000c	900	6,810
Zinc	mg/L	5d	NC	0.02

E4 3346

a Average concentration of all samples taken at the downstream monitoring station. Maximum taken as the highest sampled concentration along the reach of the river potentially affected by site activities. Less than symbol (<) indicates concentration below the analysis detection limit.

b Maximum Contaminant Level (MCL), South Carolina State Water Quality Standards.

c Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).

d Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143).

e   U.S. Department of Energy Derived Concentration Guides (DCGs) for Water (DOE Order 5400.5). DCG values are based on a committed effective does of 100 millirem per year; however, because the drinking water MCL is based on 4 millirem per year, the number listed is 4 percent of the DCG.
f   Shall not exceed weekly average of 32.2 degrees Celsius after mixing nor rise more than 2.8 degrees Celsius in one week unless appropriate temperature criterion mixing zone has been established.
g   Concentration exceeded water quality criteria; however, these criteria are listed for comparison only. Water quality standards do not affect plant activities until they are translated into end-of-pipe effluent limitations imposed on discharges through the NPDES permitting process. Similarly, drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standardsòthey do not constitute enforceable limits.
NA   None Applicable.
NC   Not calculated due to insufficient number of samples.

Source: SR DOE, 1991b.

Table 4.1.5.3-1.-Summary of Surface Water Quality Monitoring at SNL

Receiving Water: Rio Grande-1990

Parameter	Unit of Measure	Water Quality Criteriad	Average Existing Water Body Concentrationa
Cesium-137	pCi/L	120c	<10.0
Gross alpha	pCi/L	15b	12.8
Gross beta	pCi/L	50b	10.0
Tritium	pCi/L	20,000b	<450.0
Uranium, total	mg/L	NA	0.00000389

E4 3348

a Only yearly average radionuclide concentrations were provided for all monitoring locations. Less than symbol (<) indicates concentration below analysis detection limit.
b Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
c U.S. Department of Energy Derived Concentration Guides (DCG) for Water (DOE Order 5400.5). DCG values are based on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
d Drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standards-they do not constitute enforceable limits.

NA None Applicable
Source:SNL, 1991.

Table 4.1.1.3-2.-Summary of Groundwater Quality Monitoring, Kansas City Plant

			1991-Existing Conditions			
Parameter	Unit of Measure	Water Quality Criteria	TCE Still Areac	Northeast Aread	Tank Farm Areae	TCE Still RFI Areaf
Vinyl Chloride	mg/L	0.002a	0.049	0.39	0.10	0.052
1,1-Dichloroethylene	mg/L	0.007a	0.061	0.029	0.016	g
1,1-Dichloroethane	mg/L	h	0.012	0.080	0.011	g
1,2-Dichloroethylene (total)	mg/L	0.007b	11	2	2.1	0.016
Trichloroethylene	mg/L	0.005a	g	g	0.64	g
Tetrachloroethylene	mg/L	0.005a	g	g	0.065	g

E4 3359
a Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations (40 CFR 141).
b Missouri Division 60-Public Drinking Water Program.
c Well KC-87-G9L.
d Well KC-84-18L.
e Well KC-89-97L.
f Well KC-89-125U.
g Below detection level.
h No specified limit.
Source: KC DOE, 1991a.

Table 4.1.2.3-2.-Summary of Groundwater Quality Monitoring,
Savannah River Site

		Water	1990-Existing Conditionse		
Parameter	Unit of Measure	Quality Criteria	Well No. RAC 3	Well No. RDB-2D	Well No. YSC 2D
1,1,1-Trichloroethane	mg/L	0.2b	<0.001	a	a
Barium	mg/L	1b	0.045	0.021-0.036	0.011-0.016
Carbon Tetrachloride	mg/L	0.005b	<0.001	a	a
Chloride	mg/L	250d	2.2	1.3-1.8	1.2
Chloroform	mg/L	0.10b	<0.001	a	a
Copper	mg/L	1d	0.012	a	a
Gross alpha	pCi/L	15b	3	2-3	3.80-11.3
Iron	mg/L	0.3d	0.025-0.055	0.84-2.78	0.006-0.014
Lead	mg/L	0.015b	0.01-0.018	<0.003-0.011	<0.002-0.005
Manganese	mg/L	0.05d	0.021-0.03	0.062-0.146	0.012-0.032
Nitrate	mg/L	10b	1.07	0.05-0.09	1.18-1.44
Nonvolatile beta	pCi/L	50b	<2	4-10.7	2.70-3.2
Organic Halogens (total)	mg/L	c	<0.005-0.011	0.005	<0.005
pH	pH units	6.5-8.5d	4.4-4.9	6.2-6.6	6.1-7.6
Phenols	mg/L	c	<0.005	<0.005	<0.005
Phosphates (total)	mg/L	c	<0.05	0.05-0.49	0.23-1
Radium (total)	pCi/L	5b	94	<1-5.4	1-21d
Sulfate	mg/L	250d	5	3.7-13.1	<1
Tetrachloroethylene	mg/L	0.005b	<0.001	a	a
Total Dissolved Solids	mg/L	500d	a	59-154	43-81
Trichloroethylene	mg/L	0.005b	<0.001	a	a
Tritium	pCi/L	20,000b	a	57,900-119,000	5,800-6,100

a Did not analyze for this constituent.
b Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations (40 CFR 141).
c No limit specified.
d Secondary Maximum Contaminant Level (SMCL), National Secondary Drinking Water Regulations (40 CFR 143). e Data comes from wells located in the area of the facilities receiving relocated functions. Less than symbol (<) indicates concentration below analysis detection limit.
Source: SR DOE, 1990c.

Table 4.1.4.3-2.-Summary of Groundwater Quality Monitoring, Y-12

Parameter	Unit of Measure	Water Quality Criteria	1991 Existing Conditionsa
Alkalinity - HC03	mg/L	NA	35-245
Aluminum	mg/L	0.05-0.2d	0.062-2.4
Barium	mg/L	1c	0.083-0.21
Boron	mg/L	NA	0.016-0.063
Calcium	mg/L	NA	4.5-71
Chloride	mg/L	250b	<1-6.2
Chromium	mg/L	0.05b	<0.01-0.034
Copper	mg/L	1d	<0.004-0.012
Fluoride	mg/L	2c	0.2
Gross Alpha	pCi/L	15c	1.35-12.60
Gross Beta	pCi/L	15c	1.59-27.40
Iron	mg/L	0.3b	0.26-4.6
Lead	mg/L	0.015c	<0.004-0.0096
Magnesium	mg/L	NA	6.4-20
Manganese	mg/L	0.05c	0.011-0.086

Nickel	mg/L	0.1c	<0.01
Nitrate-N	mg/L	10c	<0.2-2.74
pH	pH units	6.5-8.5d	7.13-7.9
Potassium	mg/L	NA	1.9-2
Sodium	mg/L	NA	4.4-18
Strontium	mg/L	NA	0.022-0.099
Sulfate	mg/L	250c	9.2-20
Total Dissolved Solids	mg/L	500d	94-350
Uranium	pCi/L	20c	<0.001-0.032
Vanadium	mg/L	NA	<0.005
Zinc	mg/L	5d	0.0077-0.027

E4 3363
a All data are from wells GW-655, 683, and 685 near the Y-12 site. Less than symbol (<) indicates concentration below analysis detection limit. b Tennessee state water quality standards. c Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141). d Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143). NA: No specified limit Source: Y-12 HSW, 1992.

Table A1-3.-Kansas City Plant:
Hazardous/Toxic and Radioactive Waste Storage Facilities

Facility	Contents	Capacity
Above-Ground Tanks	Waste Oil/Coolant (Bulk)	16,000 gal
Above-Ground Tanks (2)	Nonchlorinated and Chlorinated Solvents	16,000 gal
Above-Ground Tanks (2)	Acidic and Alkaline Solutions (Bulk)	12,000 gal
Tank Farm Container Area	PCB, Solvent, Oil, and Acid Alkaline (Container)	3,677 ft3

Red-X Lot	Rubber, Paint, Adhesive, Epoxy, and Misc. Ignitable(Container)	8,824 ft3
L-Lot	Acid, Alkaline, Lead-Acid Batteries, and Oil (Container)	26,737 ft3
Demolition Lot	PCB Infectious Wastes	23,561 ft3
Waste Storage Test Cells (4)	Cyanide, PCB, and Lab-Pack(Container)	11,648 ft3
Mixed Waste Storage Area	LLW and LL-Mixed Waste With Toxic Metal and/or OrganicConcentration	705 ft3
Acid Pad	Acid, Alkaline Cyanide (Carboys)	6,353 ft3
Reclamation Area	Cyanide, Acid, and	552 ft3

E4 3375
Source: KC ASAC, 1992a.

Table A2-4.-Mound Plant: Radioactive Waste Management Facilities

Facility	Waste Managed	Facility Description
Waste Disposal Solidification(WD Bldg.)	Liquid alpha waste (Pu-238)	Equipment for coprecipitation/flocculation of waste, solidification of sludge, and adsorption/filtration ofsupernatant liquid
Staging Area (Bldg. 23)	Tritiated waste; TRU waste; non-TRU alpha waste; mixed waste	One-story concrete block building, 14 ft high x 30 ft wide x 117 ft long, having a gross area of 3,500 ft2
Compactor (WD Bldg.)	Alpha waste	Hydraulic-ram compactor
Staging Area (Bldg. 31)	Tritiated waste; TRU waste; non-TRU alpha waste	One-story sheet metal building, 12 ft high x 60 ft wide x 102 ft long having a gross area of 6,100 ft2
Waste Solidification Facility (SW-149)	Tritiated waste	Tritiated liquid solidification and packaging for off-site shipment and burial
Effluent Removal System (SW)	Tritiated waste	Air detritiation system removes tritium from process effluent streams before they are released to the atmosphere

Compactor (T-Bldg.)	Low Specific Activity (beta)	Hydraulic-ram compactor
Glass Melter (WDA)	(alpha, beta, gamma)	Development refractory chamber containing molten glass over which waste is burned, wet off-gas treatment system, and high-efficiency filter used for line-generated wastes (Mound expects to permit the unit for use with radioactive mixed and hazardous waste)
Compactor (SW Bldg.)	Low Specific Activity (beta)	Hydraulic-ram compactor
Equipment at Various Waste Generating Areas	Low-level alpha solid waste	Where practical, compactors are used to reduce waste volume in drums prior to shipment

E4 3391
Source:MD DOE, 1991b.

Table A2-3.-Mound Plant: Hazardous Waste Storage and Treatment Facilities

Facility	Use	Approximate Dimensions
Hazardous Waste Storage Facility (Bldg. 72)	Principal hazardous waste storage area	40 ft x 60 ft; 10 ft high
Explosive Waste Storage Magazine 53	Explosive waste storage bunker	10 ft x 15.5 ft; 10 ft high
Pyro Shed Storage	Storage area for pyrotechnic materials	9 ft x 15 ft; 7 ft high
Glass Melter Thermal Treatment	System in Waste Disposal Annex to be used for burning hazardous and radioactive mixed waste	Melter, with internal dimensions 87 in long, 30.5 in high, 27.5 in wide, is located at 24 ft x 57 ft area
Thermal Treatment of Explosive	Drum unit for burning explosives-contaminated materials	55-gallon drum in 10 ft x 10 ft x 10 ft structure

Open Burning of Explosive Waste	Apparatus for burning solid explosives-contaminated materials/scrap	Located in same structure with drum unit (above)
Retort	Unit for burning fabricated components/assemblies containing/explosives	3 ft diameter, 10 ft long
Pyro Waste Conversion Unit	Apparatus for treatment of pyrotechnic cleanup solutions	1 ft diameter, 2 ft high cylinder in a 30 in x 30 in x 6 in tray

E4 3392
Source: MD DOE, 1991b.

Table 4.1.1.2-1.-KCP Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline Level(μg/m3)	Maximum Background Concentration (μg/m3)d	No Action Concentration (μg/m3)	Baseline Concentration (μg/m3)e
Carbon Monoxide (CO)	8-hour 1-hour	10,000a 40,000a	5.2b 81.3b	73.8 148.8	78.9 230.1
Lead (Pb)	Calendar Quarter	1.5a	j	c	h
Nitrogen Dioxide (NO2)	Annual	100a	24.9b	43.5	68.4
Ozone (O3)	1-hour	235a	263.1	c	263.1
Particulate Matter (PM10)	Annual 24-hour	50a 150a	27.8b 54.7b	6.9 73.6	34.7 128.3
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	80a 365a 1,300a	3.8b 18.8b 63.7b	24.7 286.3 949.8	28.5 305.1 1,013.5
Hazardous Air Pollutants and Other Toxic Compoundsf					
1,1,1-Trichloroethane	24-hour	1,040g	h	20.3	_20.3
1,4-Dioxane	24-hour	24.5g	h	0.6	_0.6
Acetic Acid	8-hour	i	h	0.7	_0.7

Acetone	24-hour	161g	h	6.3	_6.3
Chlorodifluoroethane	8-hour	i	h	0.7	_0.7
Chlorodifluoromethane	8-hour	i	h	0.4	_0.4
Dichlorodifluoromethane	8-hour	i	h	9.0	_9.0
Dimethyl Formamide	24-hour	8.13g	h	0.2	_0.2
Ethyl Alcohol	8-hour	i	h	0.4	_0.4
Ethyl Benzene	24-hour	118g	h	0.4	_0.4
Fluoboric Acid	8-hour	i	h	0.7	_0.7
Fluorine End-capped Homopolymers	8-hour	i	h	6.1	_6.1
Fluoroaliphatic Polymeric Esters	8-hour	i	h	0.4	_0.4
Fluorobenzene	8-hour	i	h	4.3	_4.3
Fluorotelomer	8-hour	i	h	0.4	_0.4
Glycol Ethers	8-hour	i	h	26.0	_26.0
Hexane	8-hour	2,400g	h	1.1	_1.1
Hydrogen Chloride	24-hour	2.03g	h	2.6	_2.6
Isopropyl Alcohol	8-hour	13,066.7g	h	22.0	_22.0
Methyl Alcohol	24-hour	7.13g	h	0.2	_0.2
Methyl Ethyl Ketone	24-hour	32.1g	h	0.6	_0.6
Methyl Isobutyl Ketone	24-hour	55.7g	h	1.2	_1.2
Methylene Chloride	8-hour	i	h	5.8	_5.8

E4 3397-1
Footnotes at end of table.

Table 4.1.1.2-1.-KCP Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines-Continued [Page 2 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline Level (µg/m3)	Maximum Background Concentration (µg/m3)d	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3)e

Hazardous Air Pollutants and Other Toxic Compoundsf					
Naphtha/Mineral Spirits	8-hour	i	h	5.4	_5.4
Nitric Acid	8-hour	66.7g	h	13.7	_13.7
Phosporic Acid	24-hour	0.27g	h	0.6	_0.6
Sulfuric Acid	24-hour	2.72g	h	4.7	_4.7
Tetrachloroethylene	24-hour	922g	h	0.4	_0.4
Toluene	24-hour	10.2g	h	3.3	_3.3
Trichloroethylene	24-hour	36.5g	h	34.9	_34.9
Trichlorotrifluoroethane	8-hour	101,333g	h	40.9	_40.9
Xylene	8-hour	5,800g	h	4.0	_4.0

E4 3397-2

a Federal standard (40 CFR 50).
b Ambient air quality monitoring data for 1990 (KC ASAC, 1991e).
c Not estimated because the potential release is less than 100 lb/yr (0.01 lb/hr).
d The maximum of the concentrations as measured from the Bannister Federal Complex ambient air monitoring stations.
e The Baseline Concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location.
f The compounds listed are the major pollutants of concern (FDI, 1993).
g State guideline (MO DNR, 1992).
h Data unavailable.
i No standard or guideline.
j Concentration is too low to be detected.

Table 4.1.6.2-1.-Mound: Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3)f	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3)g
Carbon Monoxide (CO)	8-hour 1-hour	10,000a 40,000a	4,466c 13,971c	1.0 2.0	4,467 13,973
Lead (Pb)	Calendar Quarter	1.5a	h	e	h
Nitrogen Dioxide (NO2)	Annual	100a	h	0.4	_ 0.4
Ozone (O3)	1-hour	235a	h	e	h
Particulate Matter (PM10)	Annual 24-hour	50a 150a	29c 93c	0.6 5.5	29.6 98.5
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	80a 365a 1,300a	15.7c 70.7c 120.4c	0.002 0.01 0.02	15.7 70.7 120.4
Hazardous Air Pollutants and Other Toxic Compoundsd					
1,1,1-Trichloroethane	1-hour	1,310b	h	42.5	_ 42.5
Acetone	1-hour	42,380b	h	56.6	_ 56.6
Ammonia	1-hour	405b	h	25.9	_25.9
Hydrogen Chloride	1-hour	179b	h	16.5	_16.5
Isopropyl Alcohol	1-hour	23,405b	h	20.9	>20.9
Trichlorotrifluoroethane	1-hour	182,619b	h	17.5	_17.5

E4 3398

a Federal standard (40 CFR 50). b State standard (Ohio EPA, 1991). c Ambient air quality monitoring data (MD RAPCA, 1987-1991). d The compounds listed are the major pollutants of concern. e Not estimated because the potential release is negligible. f The maximum of the concentrations as measured from the area ambient monitoring stations. g The Baseline Concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location. h Data unavailable.

Table 4.1.7.2-1.-Pinellas Plant Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines [Page 1 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3) f	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3) g
Carbon Monoxide (CO)	8-hour 1-hour	10,000b 40,000b	8,016c 13,742c	e e	8,016 13,742
Lead (Pb)	Calendar Quarter	1.5b	i	e	i
Nitrogen Dioxide (NO2)	Annual	100b	i	e	i
Ozone (O3)	1-hour	235b	243c	e	243
Particulate Matter (PM10)	Annual 24-hour	50b 150b	i i	e e	i i
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	60a 260a 1,300b	23c 118c 526c	e 15 e	23 133 526
Total Suspended Particulates	Annual 24-hour	50 150	i i	e e	i i
Hazardous Air Pollutants and Other Toxic Compoundsh					
1,1,1-Trichloroethane	24-hour 8-hour	9,168a 38,200a	i i	26.0 40.0	_26.0 _40.0
1,4 Dioxane	24-hour	216a	i	16.0	_16.0
	8-hour	900a	i	30.0	_30.0
Acetic Acid	24-hour	60	i	12.2	_12.2

	8-hour	250	i	21.4	_21.4
Acetone	24-hour	8,544a	i	194.7	_194.7
	8-hour	35,600a	i	340.8	_340.8
Chlorodifluoroethane	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Chlorodifluoromethane	24-hour	16,992	i	12.0	_12.0
	8-hour	70,800	i	21.0	_21.0
D'Limonene	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Dichlorodifluoromethane	Annual	200a	i	2.4	_2.4
	24-hour	23,760a	i	9.8	_9.8
	8-hour	99,000a	i	16.8	_16.8
Dimethyl Formamide	Annual	30a	i	0	0
	24-hour	72a	i	0.01	_0.01
	8-hour	300a	i	0.01	_0.01
Ethyl Alcohol	24-hour	9,024	i	e	i
	8-hour	37,600	i	e	i
Ethyl Benzene	Annual	1,000a	i	e	i
	24-hour	1,041.6a	i	e	i
	8-hour	4,340c	i	e	i
Fluoboric Acid	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i

EA 3399-1
Footnotes at end of table.

Table 4.1.7.2-1.-Pinellas Plant Ambient and No Action Concentrations Comparison with Applicable Regulations and

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3)f	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3)g
Hazardous Air Pollutants and Other Toxic Compoundsh (continued)					
Fluorine End-Capped Homopolymers	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Fluoroaliphatic Polymeric Esters	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Fluorobenzene	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Fluorotelomer	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Glycol Ethers	24-hour	46.20a	i	0.02	_0.02
	8-hour	180a	i	0.03	_0.03
Hexane	24-hour	422.4a	i	0.6	_0.6
	8-hour	1,760a	i	1.1	_1.1
Hydrochloric Acid	Annual	7	i	1.1	_1.1
	24-hour	18	i	5.0	_5.0
	8-hour	75	i	11.0	_11.0
Isopropyl Alcohol	24-hour	2,359.2	i	49.0	_49.0
	8-hour	9,830	i	85.7	_85.7
Lead Compound	Annual	0.09a	i	0.01	_0.01

	24-hour	0.12	i	0.07	_0.07
	8-hour	0.5	i	0.1	_0.1
Methyl Alcohol	24-hour	628.8	i	40.4	_40.4
	8-hour	2,620	i	70.7	_70.7
Methyl Ethyl Ketone	Annual	80a	i	e	i
	24-hour	1,416a	i	e	i
	8-hour	5,900a	i	e	i
Methyl Isobutyl Ketone	Annual	492a	i	e	i
	8-hour	2,050a	i	e	i
Methylene Chloride	Annual	2.1a	i	2.0	_2.0
	24-hour	417.6a	i	30.0	_30.0
	8-hour	1,740a	i	60.0	_60.0
Naptha/Mineral Spirits	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i

EA 3399-2
Footnotes at end of table.

Table 4.1.7.2-1.òPinellas Plant Ambient and No Action Concentrations Comparison with Applicable Regulations and GuidelinesòContinued [Page 3 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3) f	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3) g
Hazardous Air Pollutants and Other Toxic Compoundsh (continued)					
Nickel Chloride	24-hour	0.24a	i	0.1	_0.1
	8-hour	1c	i	0.3	_0.3
Nitric Acid	24-hour	12.48	i	3.0	_3.0

	8-hour	52	i	5.0	_5.0
Phosophoric Acid	24-hour	2.4	i	0.9	_0.9
	8-hour	10	i	2.5	_2.5
Sulfuric Acid	Annual	d	i	e	i
	24-hour	d	i	e	i
	8-hour	d	i	e	i
Tetrachloroethylene	24-hour	813.6a	i	0.3	_0.3
	8-hour	3,390a	i	0.5	_0.5
Toluene	Annual	300a	i	6.6	_6.6
	24-hour	898a	i	26.3	_26.3
	8-hour	3,770a	i	46.0	_46.0
Trichloroethylene	24-hour	645.6a	i	8.0	_8.0
	8-hour	2,690a	i	14.0	_14.0
Trichlorotrifluoroethane	24-hour	36,816	i	642.3	_642.3
	8-hour	153,400a	i	1,124.1	_1,124.1
Xylene	Annual	300a	i	e	i
	24-hour	1,041.6a	i	e	i
	8-hour	4,340a	i	e	i

EA 3399-3

a State standard (FL DER, 1992).
b Federal standard (40 CFR 50).
c Ambient air quality monitoring data for year 1990 (PI DOE, 1991d).
d No state standard or guideline.
e Not estimated because the potential release is negligible.
f The maximum of the concentrations as measured from the area ambient monitoring stations.
g The Baseline Concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location.
h The compounds listed are the major pollutants of concern (PI DOE, 1992d).
i Data unavailable.

Table 4.1.8.2-1.-RFP Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3)	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3)
Carbon Monoxide (CO)	8-hour 1-hour	10,000b 40,000b	4,437 11,108	7.1 13.8	4,444 11,122
Hydrogen Sulfide (H2S)	1-hour	142	d	18.8	> 18.8
Lead (Pb)	Calendar Quarter 30-day	1.5b 1.5c	0.1 d	e e	0.1 d
Nitrogen Dioxide (NO2)	Annual	100b	20.7	0.3	21
Ozone (O3)	1-hour	160c	561.5	e	561.5
Particulate Matter (PM10)	Annual 24-hour	50b 150b	21.2 43.4	0.7g 40.4g	21.9 83.8
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	80b 365b 700c	13.1 86.4 120.4	0.2 7.8 13.5	13.3 94.2 133.9

Hazardous Air Pollutants and Other Toxic Compoundsa

1,1,1-Trichloroethane	30-day	h	d	0.4f	_0.4
Acetone	Annual	h	d	0.003	_0.003
Ammonia	Annual	h	d	0.2	_0.2
Carbon Tetrachloride	Annual	h	d	0.8	_0.8
Cyclohexane	Annual	h	d	0.002	_0.002
Dioctyl Phthalate	Annual	h	d	0.004	_0.004
Ethyl Alcohol	Annual	h	d	0.003	_0.003
Ethylene Glycol	Annual	h	d	0.005	_0.005
Hydrogen Chloride	Annual	h	d	0.04	_0.04
Hydrogen Fluoride	Annual	h	d	0.1	_0.1
Isopropyl Alcohol	Annual	h	d	0.003	_0.003
Lead	Annual	h	d	0.004	_0.004
Methylene Chloride	Annual	h	d	0.07	_0.07

Nitric Acid	Annual	h	d	0.05	_0.05
Trichlorotrifluoro-ethane	30-day	h	d	0.4f	_0.4

E4 3400
a Compounds listed are the major pollutants of concern (RF DOE, 1992a). b Federal standard (40 CFR 50). c State standard (CO DOH, 1989). d Data unavailable. e Not estimated because the potential release is negligible. f Annual average concentration. g It is assumed that all PM10 concentrations are TSP concentrations. h No state standards.

Table 4.1.5.2-1.-SNL Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3)g	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3)h
Carbon Monoxide (CO)	8-hour 1-hour	10,000b 15,000b	7,557c 13,740c	5.8 12.2	7,762.8 13,752.2
Hydrogen Sulfide (H2S)	1-hour	14b	j	f	j
Lead (Pb)	Calendar Quarter	1.5a	j	f	j
Nitrogen Dioxide (NO2)	Annual 24-hour	94b 188b	k j	1.8 20.3	_1.8 _ 20.3
Ozone (O3)	1-hour	118b	192.3c	f	192.3
Particulate Matter (PM10)d	Annual 24-hour	50a 150a	35.8c 104c	0.03 0.3	35.8 104.3
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	52b 262b 1,300a	j j j	0.004 0.04 0.1	_ 0.004 _ 0.04 _ 0.1
Total Reduced Sulfur	1-hour	4b	j	f	j
Total Suspended Particulates (TSP)	Annual 30-day 7-day 24-hour	60b 90b 110b 150b	j j j j	f f f f	j j j j

Hazardous Air Pollutants and Other Toxic Compoundsi

1,1,1-Trichloroethane	8-hour	l	j	0.7	_ 0.7
Acetone	8-hour	5,900e	j	0.3	_ 0.3
Amyl Acetate	8-hour	5,300e	j	f	j
Hydrogen Chloride	8-hour	70e	j	0.04	_ 0.04
Isopropyl Acetate	8-hour	9,500e	j	f	j
Isopropyl Alcohol	8-hour	9,800e	j	0.1	_ 0.1
Methyl Alcohol	8-hour	2,600e	j	0.1	_ 0.1
Methylene Chloride	8-hour	2,610e	j	0.04	_ 0.04
Toluene	8-hour	3,750e	j	0.6	_ 0.6
Trichloroethylene	8-hour	250e	j	0.1	_ 0.1
Trichlorotrifluoroethane	8-hour	l	j	0.1	_ 0.1
Xylene	8-hour	4,350e	j	0.6	_ 0.6

E4 3401

a Federal standard (40 CFR 50).
b State standard (NM EIB, 1981).
c Ambient air quality monitoring data for 1991 (SNL, 1991).
d Particulate matter less than 10 microns in diameter.
e State standard (NM EIB, 1991a).
f Not estimated because the potential release is negligible.
g The maximum of the concentrations as provided from the ambient air quality network.
h The Baseline Concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location.
i The compounds listed are the major pollutants of concern (SN DOE, 1991b).
j Data unavailable.
k Data not representative.
l No state standard.

Table 4.1.2.2-1.-SRS Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3)	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3) f
Carbon Monoxide (CO)	8-hour	10,000a	h	38	_ 38

	1-hour	40,000a	h	195	_ 195
Hydrogen Fluoride (HF)	30-day 7-day 24-hour 12-hour	0.8b 1.6b 2.9b 3.7b	h h h h	e e e e	h h h h
Lead (Pb)	Calendar Quarter	1.5a	h	e	h
Nitrogen Dioxide (NO2)	Annual	100a	6c	16	22
Ozone (O3)	1-hour	235a	224d	e	224
Particulate Matter (PM10)	Annual 24-hour	50a 150a	27c 47c	1 17	28 64
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	80a 365a 1,300a	5c 34c 48c	11 232 1,074	16 266 1,122
Total Suspended Particulates (TSP)	Annual	75b	27c	1	28

Hazardous Air Pollutants and Other Toxic Compoundsg

1,1,1-Trichloroethane	24-hour	9,550b	h	1.3	_1.3
Nitric Acid	24-hour	125b	h	1.1	_1.1
Trichlorotrifluoroethane	24-hour	i	h	23.3	_23.3

E4 3402

a Federal standard (40 CFR 50).
b State standard (SC DHEC, 1991).
c Ambient air quality monitoring data for calendar year 1985 (DOE, 1991c).
d Ambient air quality monitoring data for calendar year 1989 and 1990 (SR DOE, 1990a and 1991b).
e Not estimated because the potential release is negligible.
f The total concentration represents a conservative assessment of potential impacts since the contributions from individual sources do not necessarily occur at the same location.
g The compounds listed are the major pollutants of concern (SR DOE, 1991a).
h Data unavailable.
i No standard or guideline.

Table 4.1.4.2-1.-ORR Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3)c	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3)d
Carbon Monoxide (CO)	8-hour 1-hour	10,000a 40,000a	f f	7.5 15.4	_7.5 _15.4
Hydrogen Fluoride (HF) (asfluorides)	30-day 7-day 24-hour 12-hour 8-hour	1.2b 1.6b 2.9b 3.7b 250b	0.2 0.3 f f f	e e e e 9.5	0.2 0.3 f f _9.5
Lead (Pb)	Calendar Quarter	1.5a	f	e	f
Nitrogen Dioxide (NO2)	Annual	100a	f	9.0	_9.0
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	80a 365a 1,300a	35.1 165.6 322.0	27.8 399.6 1,269.6	62.9 565.2 1,591.6
Total Suspended Particulates (TSP)	Annual 24-hour	60b 150b	76.0 385.6	1.2 17.0	77.2 402.6
Hazardous Air Pollutants and Other Toxic Compoundsg					
1,1,1-Trichloroethane	8-hour	19,000b	f	92.6	_92.6
Acetonitrile	8-hour	6,700b	f	7.9	_7.9
Chlorine	8-hour	150b	f	2.1	_2.1
Hydrogen Chloride	8-hour	700b	f	62.6	_62.6
Methyl Alcohol	8-hour	26,000b	f	266.8	_266.8
Nitric Acid	8-hour	500b	f	175.8	_175.8
Tetrachloroethylene	8-hour	17,000b	f	49.9	_49.9
Trichlorotrifluoroethane	8-hour	562,000b	f	174.9	_174.9

E4 3404

a Federal standard (40 CFR 50).
b State standard (TN DH&E, 1991a and b).
c Ambient air quality data (Y-12 MMES, 1990, 1991b).
d The Baseline Concentration represents a conservative assessment of potential impacts since the concentration contributions from individual sources do not necessarily occur at the same

location.
e Not estimated because the potential release is negligible.
f Data unavailable.
g The compounds listed are the major pollutants of concern (Y-12 MMES, 1990, 1991b).

Table A4-4.-Rocky Flats Plant: Principal Treatment Facilities

Location	Waste Description	Treatment Description
Building 774	TRU and TRU-mixed caustic waste, acidic waste, and organic waste-370,000 gallons of aqueous waste processed annually.	Concentration and solidification of TRU and low-level liquid radioactive materials; TRU caustic waste and TRU acidic waste-two stage precipitation process. TRU organic waste- neutralized, then solidified with gypsumcement. Transfer of remaining water forevaporation in Bldg. 374.
Building 374	Radioactive and nonradioactive liquid wastes-11.2 million gallons of aqueous waste processed in 1990-a total of 2,700 boxes of saltcrete and 8,100 drums of filtered sludge should be produced.	Precipitation, filtration, scrubbing, chemical preparation and drying of radioactive and nonradioactive liquid wastes. TRU waste streams treated in a precipitation process, and the resultantsludge is solidified. Low-level wastestreams treated in evaporation process,resultant salts are immobilized with cement. Waste acids are neutralized, then treated in the precipitation process. Produces distilled product water for utility reuse.
Building 776	TRU, TRU-mixed, low-level, low-levelmixed waste and hazardous wastescombustibles, metal, glass, large HEPA filters, waste filter media, insulation, glove box filters.	Waste volume reduction activities, repackaging, and adding cement for neutralization.

	E4 3455
Source: RF DOE, 1991b.	

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and Alternatives [Page 1 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Land Resources				
òNew construction is limited to interior modification or small additions to existing buildings at KCP, SRS, SNL, and LANL.	ò New construction would require 62 acres at Mound. New buildings and parking areas would permanentlyoccupy 32 acres of onsite highly developed and undeveloped land. An additional 30 acres disturbed to support construction activitieswould be revegetatedfollowing construction.	ò New construction would require 63 acres at Pinellas. New buildings and parking areas would permanently occupy approximately 21 acres of onsite previously disturbed undeveloped and developed land. An additional 42 acres would berequired to support construction activities; however, sufficient onsite land is not available. The potential use of offsiteland, project design modification, or other measures to accommodate construction would be identified in the design phase. Impacts to visual resources would occur from new 3- and 5-story high-rise structures. _òNew construction would require 72 acres at RFP. New buildings and parking areas would permanently occupy 44 acres of onsite undeveloped land. An additional 28 acres disturbed to support construction activities would be revegetated following construction.	ò No impact to land use, recreation, or visual resources at any sites from continued operations.	

ò Impacts from building renovations, or operations to land use, recreation, or visual resources at KCP, SRS, LANL, and SNL are not expected.	ò Impacts from building renovations or operation to land use, recreation, or visual resources at Mound, SNL, and LANL are not expected.	ò Impacts to recreation resources at Pinellas are not expected. Impacts from building renovations or operation to land use, recreation, or visual resources at SRS, SNL and LANL are not expected.	ò Impacts from building renovations or operation to land use, recreation, or visual resources at RFP, SRS, SNL, and LANL are not expected.	
				E4 3465-1

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 2 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Air Quality and Acoustics				
òIncreases in emissions and air quality impacts from operations and building renovations at KCP, SRS, SNL, and LANL.	ò Increases in emissions and air quality impacts from construction or operations would be negligible at all sites.	òIncreases in emissions and air quality impacts from construction would be negligible at all sites.	òIncreases in emissions and air quality impacts from construction or operations would be negligible at all sites.	òEmissions and air quality impacts from routine building renovations would be negligible at all sites.

ò No exceedance of applicable Federal and state ambient air quality standards or guidelines associated with this action.	ò No exceedance of applicable Federal and state ambient air quality standards or guidelines associated with this action.	òExcept for Pinellas where the 24-hour standard for glycol ethers and nitric acid, and the annual standard for methylene chloride, nickel chloride, and TCE would be exceeded at the site boundary, no exceedance of applicable Federal and state ambient air quality standards or guidelines would be associated with this action. Potential mitigation measures could include substituting solvents or modifying processes.	òNo exceedance of applicable Federal and state ambient air quality standards or guidelines would be associated with this action.	òNo exceedance of applicable Federal and state ambient air quality standards or guidelines at any site except for Pinellas where nickel chloride, TCE, and methylene chloride exceeded state air quality criteria. Gradual reduction in air emissions in response to reduced workloads.
				E4 3465-2

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 3 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Air Quality and Acoustics (continued)				
òCloseout of Complex missions at Mound and Pinellas, and Complex nonnuclear missions at RFP would reduce emissions of criteria and hazardous/toxic air	ò Closeout of Complex missions at KCP and Pinellas, and Complex nonnuclear missions at RFP would reduce emissions of	òCloseout of Complex missions at KCP and Mound, and Complex nonnuclear missions at RFP would reduce emissions of criteria and hazardous/toxic air pollutants.	òCloseout of Complex missions at KCP, Mound, and Pinellas would reduce emissions of criteria and hazardous/toxic air pollutants. Emissions of	òLocal air quality should improve due to reduced emissions of criteria and hazardous/toxic pollutants from lower production levels.

pollutants. Emissions of tritium at Mound and Pinellas would be eliminated. Air quality in the vicinity of these plants should improve.	criteria and hazardous/toxic air pollutants. Emissions of tritium at Pinellas would be eliminated. Air quality in the vicinity of these plants should improve.	Emissions of tritium at Mound would be eliminated. Air quality in the vicinity of these plants should improve.	tritium at Mound and Pinellas would be eliminated. Air quality in the vicinity of these plants should improve.	
òTraffic-related noise during operation would increase less than 2 dB at KCP and LANL, and less than 1 dB at SRS and SNL.	ò Traffic-related noise during operation would increase 6 dB along Mound Road. At LANL, traffic noise levels would increase less than 2 dB; at SNL less than 1 dB.	òTraffic-related noise during operation would increase less than 1 dB along Belcher Road. No increase is expected along Bryan Dairy Road. At LANL, traffic noise levels would increase less than 2 dB; at SRS and SNL less than 1 dB.	òTraffic-related noise during operation would increase less than 2 dB along State Highways 72 and 78, and Indiana Street. At LANL, traffic noise levels would increase less than 2 dB; at SRS and SNL less than 1 dB.	òNo increase in noise levels at any site.
				E4 3465-3

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 4 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Water Resources				

òAt KCP, SRS, and LANL, increases in water usage would be less than 1 percent of current usage. At SNL the increase would be less than 4 percent. Water supplies are adequate to meet demand at all sites.	ò Groundwater use at Mound would increase twofold from current use. At LANL, increase in water usage would be less than 1 percent of current usage. At SNL, the increase would be less than 4 percent. Water supplies are adequate to meet demand at all sites.	òWater use at Pinellas would increase seven-fold over current annual water use. Potential restrictions imposed by the Pinellas County Water System could impact operations during drought years. Impact on operations could be offset by using closed loop water reserve systems, using treated water from environmental restoration projects, and other water conservation measures which are planned at Pinellas. At SRS, SNL, and LANL, increases in water usage would be less than 1 percent. Water supplies are adequate to meet demand at all sites.	òWater use at RFP would increase threefold over current annual water use. At SRS, SNL, and LANL, increases in water usage would be less than 1 percent. Water supplies are adequate to meet demand at all sites.	òNo increase in water use at any site.
				E4 3465-4

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 5 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Water Resources (continued)				

òPotential adverse impacts from operations and building renovations at KCP, SRS, SNL, and LANL, to surface water quantities or quality or groundwater quantity or quality are not expected. All new and modified existing facilities would be designed to meet a zero-degradation of groundwater standards.	ò Potential impacts from erosion and increased nonpoint source drainage during construction and operations could occur to surface water quantities or quality. Erosion control measures such as berms and silt fences would be used during construction. Measures to reduce potential impacts of nonpoint source contaminants could involve collection and/or treatment of stormwater runoff. All new and modified existing facilities would be designed to meet a zero-degradation of groundwater standards.	òPotential impacts from erosion and increased nonpoint source drainage during operations are not expected since stormwater runoff is collected in onsite retention ponds. All new and modified existing facilities would be designed to meet a zero-degradation of groundwater standards.	òPotential impacts from erosion would be controlled with berms and silt fences. Potential impacts from increased nonpoint source drainage would be controlled by existing onsite runoff-control holding ponds. All new and modified existing facilities would be designed to meet a zero-degradation of groundwater standards.	òNo increase in degradation of surface water and groundwater quality at any sites. Current groundwater remediation activities would continue. All effluents would meet applicable regulatory permits and standards.

òWater use would decrease due to closeout of Complex missions at Mound and Pinellas, and Complex nonnuclear missions at RFP.	ò Water use would decrease due to closeout of Complex missions at KCP and Pinellas, and Complex nonnuclear missions at RFP.	òWater use would decrease due to closeout of Complex missions at KCP and Mound, and Complex nonnuclear missions at RFP.	òWater use would decrease due to closeout of Complex missions at KCP, Mound, and Pinellas.	ò Potential decrease in water use at KCP, Mound, Pinellas, and RFP due to reduced production levels.
				E4 3465-5

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 6 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Geology and Soils				
òNo impacts to geological resources. No impacts to soils at KCP, SRS, SNL, or LANL during building renovations.	ò No impacts to geological resources. Potential impacts to soils at Mound from erosion and sediment transport during construction would be controlled by berms, silt fences, and watering.	òNo impacts to geological resources. Potential impacts to soils at Pinellas from erosion and sediment transport during construction would be controlled by berms, silt fences, and watering.	òNo impacts to geological resources. Potential impacts to soils at RFP from erosion and sediment transport during construction would be controlled by berms, silt fences, and watering.	òNo impact.
Biotic Resources				
òNo permanent disturbance ofany biotic resources is anticipated from building	ò Approximately 62 acres of natural habitats at	ò Approximately 63 acres would be affected by	ò Approximately 72 acres of mostly short-grass	ò No impact.

renovations or operation at KCP.	Mound would be disturbed by new construction. After construction, 30 acres would be revegetated with native species, resulting in a net habitat loss of 32 acres. Thiswould represent a localreduction of terrestrial habitat within Mound.	construction. Most of the remaining vegetation, approximately 21acres, at the Pinellas site,consisting of mowed fields with clusters of scattered trees,would be disturbed by newconstruction. The affectedhabitat is currently in a highly disturbed condition and not unique.	prairievegetation would be disturbed by new construction. Following construction, 28acres would be revegetatedwith native species, resulting in a net loss of 44 acres of prairie vegetation.	
òNo adverse impacts to wetlands or threatened and endangeredspecies are expected. òNo permanent disturbance ofany historic resource is anticipated at SRS, SNL, or LANL.	ò No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands could occurdue to new construction. òNo permanent disturbance of biotic resources is anticipated at SNL or LANL.	ò No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands could occur due to new construction. òNo permanent disturbance ofbiotic resources is anticipated at SRS, SNL, or LANL.	ò No adverse impacts to threatened and endangered species are expected. Potential adverse impacts to wetlands could occur due to new construction. òNo permanent disturbance of biotic resources is anticipated at SRS, SNL, or LANL.	
				E4 3465-6

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Cultural Resources				
òThere would be no disturbance of Native American resources at KCP, SRS, LANL or SNL.	ò Impacts to cultural resources with regard to 62- acre ground disturbance at Mound cannot be determined until the absence of Native American resources can be confirmed. There would be	òImpacts to cultural resources with regard to 63- acre ground disturbance at Pinellas cannot be determined until the absence of Native American resources can be confirmed. There would be no disturbance of prehistoric resources at SRS, SNL, or LANL.	òImpacts to cultural resources with regard to 72- acre ground disturbance at RFP cannot be determined until the absence of Native American resources can be confirmed. There would be no disturbance of prehistoric resources at	òNo impact.

	no disturbance of prehistoric resources at SNL and LANL.		SRS, SNL, or LANL.	
òThere would be no effect on prehistoric or historic resources at KCP, SRS, LANL, or SNL.	ò There would be no effect on prehistoric or historic resources at Mound, LANL, or SNL.	òThere would be no effect on prehistoric or historic resources at Pinellas, SRS, LANL, or SNL.	òThere would be no effect on prehistoric or historic resources at RFP, SRS, LANL, or SNL.	òNo impact.
Socioeconomics and Community Services				
òChanges to socioeconomics and community services are expected during the renovation and operation phases at KCP, SRS, LANL, and SNL.	ò Changes to socioeconomics and community services are expected during the construction and operation phases at Mound, LANL, and SNL.	òChanges to socioeconomics and community services are expected during the construction and operation phases at Pinellas, SRS, LANL, and SNL.	òChanges to socioeconomics and community services are expected during the construction and operation phases at RFP, SRS, LANL, and SNL.	òSocioeconomic changes at all sites. Increases and reductions in staff levels at all sites may cause economic changes in the vicinity of each site.
At KCP - 1,095 Total jobs created - 425 Direct jobs - 670 Indirect jobs - 558 in-migration - population <1-percent increase - housing <1-percent increase	At Mound - 8,298 Total jobs created - 3,120 Direct jobs - 5,178 Indirect jobs - 4,143 in-migration - population <1 percent increase - housing <1 percent increase	At Pinellas - 11,559 Total jobs created - 3,995 Direct jobs - 7,564 Indirect jobs - 5,261 in-migration - population <1 percent increase - housing <1 percent increase	At RFP - 9,558 Total jobs created - 3,740 Direct jobs - 5,818 Indirect jobs - 5,594 in-migration - population <1 percent increase - housing <1 percent increase	At KCP - 198 Direct jobs lost At Mound - 29 Direct jobs lost At Pinellas -475 Direct jobs lost At RFP - 156 Direct jobs created

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Socioeconomics and Community Services (continued)				
At SRS - 103 Total jobs created - 45 Direct jobs - 58 Indirect jobs - 60 in-migration - population <1-percent increase - housing <1-percent increase	At SRS - No change from No Action	At SRS - 45 Direct jobs created	At SRS - 45 Direct jobs created	At SRS - 2,978 Direct jobs lost
At LANL - 294 Total jobs created - 115 Direct jobs - 179 Indirect jobs - 154 in-migration - population <1 percent increase - housing <1 percent increase	At LANL - 50 Direct jobs created	At LANL - 105 Direct jobs created	At LANL - 75 Direct jobs created	At LANL - 150 Direct jobs created

At Y-12 (Option) - 23 Total jobs created - 10 Direct jobs - 13 Indirect jobs - 13 in-migration - population <1-percent increase - housing <1-percent increase	At Y-12 - No change from No Action	At Y-12 - No change from No Action	At Y-12 - No change from No Action	At Y-12 - 214 Direct jobs lost
				E4 3465-8

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Socioeconomics and Community Services (continued)				
At SNL - 940 Total jobs created - 385 Direct jobs created - 555 Indirect jobs created - 515 in-migration - population <1 percent	At SNL - 385 Direct jobs created	At SNL - 0 Direct jobs created	At SNL - 385 Direct jobs created	At SNL -73 Direct jobs lost

increase - housing <1 percent increase				
òBenefits to local economies would occur at receiving sites. At most of these sites, including KCP, creation of new jobs would partially offset recent staff reductions.	ò Benefits to local economies would occur at receiving sites. At most of these sites, including Mound, creation of new jobs would partially offset recent staff reductions.	òBenefits to local economies would occur at receiving sites. At most of these sites, including Pinellas, creation of new jobs would partially offset recent staff reductions.	òBenefits to local economies would occur at receiving sites. At most of these sites, including RFP, creation of new jobs would partially offset recent staff reductions.	òAdditional benefits to local economies would not occur.
òAt Mound, Pinellas, and RFP, where Complex missions would be closed out, there would be economic consequences as follows:	ò At KCP, Pinellas, and RFP, where Complex missions would be closed out, there would be economic consequences as follows:	òAt KCP, Mound, and RFP, where Complex missions would be closed out, there would be economic consequences as follows:	òAt KCP, Mound, and Pinellas, where Complex missions would be closed out, there would be economic consequences as follows:	òSocioeconomic changes at all potential Complex mission closeout sites.
				E4 3465-9

Table 4.3ò1.òSummary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Socioeconomics and Community Services (continued)				

At Mound -2,846 Total jobs lost -1,070 Direct jobs -1,776 Indirect jobs -$93.1M loss in earnings -$119.3M loss in income -Population <1-percent decrease -Out-migration of 1,400 -600 vacant housing units added	At KCP -9,800 Total jobs lost -3,793 Direct jobs -5,982 Indirect jobs -$345.5M loss in earnings -$429.6M loss in income -Population <1-percent decrease -Out-migration of 5,000 -1,900 vacant housing units added	At KCP -9,800 Total jobs lost -3,793 Direct jobs -5,982 Indirect jobs -$345.5M loss in earnings -$429.6M loss in income -Population <1-percent decrease -Out-migration of 5,000 -1,900 vacant housing units added	At KCP -9,800 Total jobs lost -3,793 Direct jobs -5,982 Indirect jobs -$345.5M loss in earnings -$429.6M loss in income -Population <1-percent decrease -Out-migration of 5,000 -1,900 vacant housing units added	At Mound -29 Direct jobs lost At KCP -198 Direct jobs lost
At Pinellas -3,038 Total jobs lost -1,050 Direct jobs -1,988 Indirect jobs -$103.1M loss in earnings -$148.2M loss in income -Population <1-percent decrease -Out-migration of 1,400 -700 vacant housing units added	At Pinellas -3,038 Total jobs lost -1,050 Direct jobs -1,988 Indirect jobs -$103.1M loss in earnings -$148.2M loss in income -Population <1-percent decrease -Out-migration of 1,400 -700 vacant housing units added	At Mound -2,846 Total jobs lost -1,070 Direct jobs -1,776 Indirect jobs -$93.1M loss in earnings -$119.3M loss in income -Population <1-percent decrease -Out-migration of 1,400 -600 vacant housing units added	At Mound -2,846 Total jobs lost -1,070 Direct jobs -1,776 Indirect jobs -$93.1M loss in earnings -$119.3M loss in income -Population <1-percent decrease -Out-migration of 1,400 -600 vacant housing units added	At Pinellas -475 Direct jobs lost At Mound -29 Direct jobs lost
				E4 3465-10

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 11 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Socioeconomics and Community Services (continued)				
At RFP - 2,917 Total jobs lost -750 Direct jobs -1,167 Indirect jobs - $68.5M loss in earnings - $82.2M loss in income - Population <1-percent decrease - Out-migration of 1,000 - 400 vacant housing units added. Potential mitigation at Complex missions closeout sites could include worker retraining, redeployment, out-placement and counseling services, or assistance to local communities.	At RFP - 2,917 Total jobs lost - 750 Direct jobs - 1,167 Indirect jobs - $68.5M loss in earnings - $82.2M loss in income - Population <1-percent decrease - Out-migration of 1,000 - 400 vacant housing units added. Potential mitigation at Complex missions closeout sites could include worker retraining, redeployment, out-placement and counseling services, or assistance to local communities.	At RFP - 2,917 Total jobs lost -750 Direct jobs -1,167 Indirect jobs - $68.5M loss in earnings - $82.2M loss in income - Population <1-percent decrease - Out-migration of 1,000 - 400 vacant housing units added. Potential mitigation at Complex missions closeout sites could include worker retraining, redeployment, out-placement and counseling services, or assistance to local communities.	At Pinellas - 3,038 Total jobs lost -1,050 Direct jobs -1,988 Indirect jobs - $103.1M loss in earnings - $148.2M loss in income - Population percent decrease - Out-migration of 1,000 - 700 vacant housing units added. Potential mitigation at Complex missions closeout sites could include worker retraining, redeployment, out-placement and counseling services, or assistance to local communities.	At RFP - 156 Direct jobs created At Pinellas - 475 Direct jobs lost

òLocal transportation systems would not be affected.	ò Local transportation systems near Mound would be affected. Mound Road between Main Street and Benner Road would deteriorate from free flow conditions to a stable flow condition. Potential mitigation could include staggering work hours, carpooling, or modification of the road segments.	òLocal transportation systems near Pinellas would be affected. Bekler and Bryan Dairy Roads would deteriorate from heavy to extreme congestion conditions. Potential mitigation could include staggering work hours, carpooling, or modification of the road segments.	òLocal transportation systems near RFP would be affected. Colorado State Route 128 and Indiana Street would deteriorate from stable flow conditions to congested flow conditions. Potential mitigation could include staggering work hours, carpooling, or modification of the road segments.	òNo change.
				E4 3465-11

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
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Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Waste Management				
o Waste management requirements during renovations and operations at all sites would be consistent with current waste management activities.	o No waste management impacts are expected during the construction phase at any site.	o No waste management impacts are expected during the construction phase at any site.	o No waste management impacts are expected during the construction phase at any site.	o At all sites increases in annual waste volumes are not expected. Lower production levels would decrease waste management activities at all sites.
Waste Management (continued)òLiquid Hazardous Waste				

o Only small increases in hazardous waste volumes over No Action:	o Hazardous waste volumes from operations would increase over No Action:	o Hazardous waste volumes from operations would increase over No Action:	o Hazardous waste volumes from operations would increase over No Action:	o 1991 hazardous waste volumes from operations:
- At KCP:8,132 gal/yr	-At Mound: 7,600 gal/yr	-At Pinellas: 51,500 gal/yr	- At RFP: 43,300 gal/yr	-At KCP: 183,000 gal/yr
				-At Mound:19,000 gal/yr
				-At Pinellas:49,555 gal/yr
				At RFP:5,005 gal/yr
- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	-At SRS: 0 gal/yr
- At SNL: 1,252 gal/yr	- At SNL:1,250 gal/yr	- At SNL:2 gal/yr	- At SNL: 1,252 gal/yr	-At SNL: 198,450 gal/yr
- At LANL: 7,508 gal/yr	- At LANL:508 gal/yr	- At LANL:7,508 gal/yr	- At LANL: 7,000 gal/yr	-At LANL: 72,000 gal/yr
- At Y-12: 4,370 gal/yr	- At Y-12:no increase	- At Y-12:no increase	- At Y-12: no increase	-At Y-12: 273,670 gal/yr

Waste Management (continued)òSolid Hazardous Waste

o Only small increases in hazardous waste volumes over No Action:	o Hazardous waste volumes from operations would increase over No Action:	o Hazardous waste volumes from operations would increase over No Action:	o Hazardous waste volumes from operations would increase over No Action:	o 1991 hazardous waste volumes from operations:
- At KCP:108 ft3/yr	- At Mound:12,300 ft3/yr	-At Pinellas: 12,300 ft3/yr	- At RFP: 12,300 ft3/yr	-At KCP: 46,000 ft3/yr
				-At Mound: 2,825 ft3/yr
				-At Pinellas: 110 ft3/yr
				-At RFP: 1,090 ft3/yr
- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	-At SRS: 3,100 ft3/yr
- At SNL: 209 ft3/yr	- At SNL:197 ft3/yr	- At SNL:12 ft3/yr	- At SNL:209 ft3/yr	-At SNL: 4,500 ft3/yr
- At LANL: 305 ft3/yr	- At LANL:100 ft3/yr	- At LANL:305 ft3/yr	- At LANL:205 ft3/yr	- At LANL:11,000 ft3/yr
- At Y-12:950 ft3/yr	- At Y-12: no increase	- At Y-12: no increase	- At Y-12:no increase	- At Y-12:37,295 ft3/yr
				E4 3465-12

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action

Waste Management (continued)òLiquid Low-Level Waste

o Only small increases in waste low-level waste volumes over No Action:	o Low-level waste volumes from operations would increase over No Action:	o Low-level waste volumes from operations would increase over No Action:	o Low-level waste volumes from operations would increase over No Action:	o 1991 low-level volumes from operations:
-At KCP: no increase	- At Mound: no increase	- At Pinellas: no increase	- At RFP: no increase	-At KCP: <1 gal/yr
				-At Mound: 0 gal/yr
				-At Pinellas: 0 gal/yr
				-At RFP: 1,430 gal/yr
- At SRS: 0 gal/yr	- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	-At SRS: 20,092,080 gal/yr
- At SNL: 100 gal/yr	- At SNL:100 gal/yr	- At SNL: no increase	- At SNL:100 gal/yr	-At SNL: 4,160 gal/yr
-At LANL: 30 gal/yr	- At LANL:30 gal/yr	- At LANL: no increase	- At LANL:30 gal/yr	-At LANL: 5,787,430 gal/yr
-At Y-12: 0 gal/yr	-At Y-12: no increase	- At Y-12:no increase	-At Y-12: no increase	-At Y-12: 247,495 gal/yr

Waste Management (continued)òSolid Low-Level Waste

o Only small increases in waste low-level waste volumes over No Action:	o Low-level waste volumes from operations would increase over No	o Low-level waste volumes from operations would increase over No Action:	o Low-level waste volumes from operations would increase over No Action:	o 1991 low-level volumes from operations:

	Action:			
- At KCP: no increase	- At Mound: no increase	- At Pinellas: no increase	- At RFP: no increase	-At KCP: 15 ft3/yr
				-At Mound: 176,678 ft3/yr
				-At Pinellas: 2,090 ft3/yr
				-At RFP: 38,880 ft3/yr
- At SRS: 500 ft3/yr	- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	-At SRS: 763,732 ft3/yr
- At SNL: 294 ft3/yr	- At SNL:294 ft3/yr	- At SNL: no increase	- At SNL:294 ft3/yr	-At SNL: 2,355 ft3/yr
- At LANL: 200 ft3/yr	- At LANL:200 ft3/yr	- At LANL: no increase	- At LANL:200 ft3/yr	-At LANL: 203,600 ft3/yr
- At Y-12: 22 ft3/yr	- At Y-12:no increase	- At Y-12:no increase	- At Y-12:no increase	-At Y-12: 210,230 ft3/yr
				E4 3465-13

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 14 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Waste Management (continued)òLiquid Mixed Waste				
o Only small increases from	o Mixed waste	o Mixed waste volumes	o Mixed waste volumes	ò1991 mixed waste volumes

in mixed waste volumes over No Action:	volumes from operations would increase over No Action:	from operations would increase over No Action:	from operations would increase over No Action:	operations:
- At KCP: no increase	- At Mound: no increase	- At Pinellas: no increase	- At RFP: no increase	- At KCP: 0 ft3/yr
				- At Mound: 79 gal/yr
				- At Pinellas: 0 gal/yr
gal/yr				- At RFP: 13,859,700
- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	- At SRS: 47,427 gal/yr
- At SNL:0 gal/yr	- At SNL:0 gal/yr	- At SNL: no increase	- At SNL:0 gal/yr	- At SNL: 480 gal/yr
- At LANL:0 gal/yr	- At LANL:0 gal/yr	- At LANL: no increase	- At LANL:0 gal/yr	- At LANL: 9,000 gal/yr
- At Y-12: no increase	- At Y-12:no increase	- At Y-12:no increase	- At Y-12:no increase	- At Y-12: 778,190 gal/yr

Waste Management (continued)òSolid Mixed Waste

o Only small increases in from mixed waste volumes over No Action:	o Mixed waste volumes from operations would increase over No Action:	o Mixed waste volumes from operations would increase over No Action:	o Mixed waste volumes from operations would increase over No Action:	ò1991 mixed waste volumes operations:
- At KCP: no increase	- At Mound: no increase	- At Pinellas: no increase	- At RFP: no increase	-At KCP: 0 ft3/yr

				-At Mound: 4.5 ft3/yr
				-At Pinellas: 0 ft3/yr
				-At RFP: 19,170 ft3/yr
- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	- At SRS: no increase	-At SRS: 1,169 ft3/yr
- At SNL: 0.005 ft3/yr	- At SNL: 0.005 ft3/yr	- At SNL: no increase	- At SNL: 0.005 ft3/yr	-At SNL: 115 ft3/yr
- At LANL: 20 ft3/yr	- At LANL:20 ft3/yr	- At LANL: no increase	- At LANL:20 ft3/yr	-At LANL: 4,000 ft3/yr
- At Y-12: no increase	- At Y-12:no increase	- At Y-12:no increase	- At Y-12:no increase	-At Y-12: 42,705 ft3/yr
				E4 3465-14

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 15 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Waste Management (continued)òLiquid Nonhazardous Waste				
o Only small increases in mixed nonhazardous waste volumes over No Action: operations:	o Liquid nonhazardous waste volumes from operations would increase over No Action:	o Liquid nonhazardous waste volumes from operations would increase over No Action:	o Liquid nonhazardous waste volumes from operations would increase over No Action:	o 1991 liquid waste volumes from
- At KCP: 1.7 MGY	- At Mound: 132 MGY	- At Pinellas: 153 MGY	- At RFP: 148 MGY	- At KCP:200 MGY

				- At Mound:47.4 MGY
MGY				- At Pinellas: 65.8
				- At RFP:55.2 MGY
- At SRS: 0.3 MGY	- At SRS: no increase	- At SRS: 0.3 MGY	- At SRS: 0.3 MGY	- At SRS:185 MGY
- At SNL: 3.2 MGY	- At SNL: 3.2 MGY	- At SNL: no increase	- At SNL: 3.2 MGY	- At SNL:200 MGY
- At LANL: 0.4 MGY	- At LANL:0.1 MGY	- At LANL:0.4 MGY	- At LANL:0.4 MGY	- At LANL:183 MGY
- At Y-12: 0.004 MGY	- At Y-12:no increase	- At Y-12:no increase	- At Y-12:no increase	- At Y-12:12.4 MGY

Waste Management (continued)òSolid Nonhazardous Waste

o Only small increases in mixed nonhazardous waste waste volumes over No Action: operations over No	o Solid nonhazardous waste volumes from operations would increase over No Action:	o Solid nonhazardous waste volumes from operations would increase over No Action:	o Solid nonhazardous waste volumes from operations would increase over No Action:	o 1991 solid volumes from Action:
- At KCP: 282 ft3/yr ft3/yr	- At Mound:359,000 ft3/yr	- At Pinellas:473,000 ft3/yr	- At RFP: 430,000 ft3/yr	- At KCP:494,935
ft3/yr				- At Mound:140,130
ft3/yr				- At Pinellas:3,942

ft3/yr				- At RFP:268,000
- At SRS:1,000 ft3/yr ft3/yr	- At SRS: no increase	- At SRS:1,000 ft3/yr	- At SRS:1,000 ft3/yr	- At SRS:753,000
- At SNL:9,340 ft3/yr ft3/yr	- At SNL:9,300 ft3/yr	- At SNL:40 ft3/yr	- At SNL:9,340 ft3/yr	- At SNL:800,000
- At LANL:10,680 ft3/yr ft3/yr	- At LANL:6,680 ft3/yr	- At LANL:8,680 ft3/yr	- At LANL:6,000 ft3/yr	- At LANL:302,200
- At Y-12:<1 ft3/yr ft3/yr	- At Y-12:no increase	- At Y-12:no increase	- At Y-12:no increase	- At Y-12:289,110
				E4 3465-15

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 16 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Human Health				
ò No adverse health effects to workers and the public have been identified as a result of relocated activities associated with the Proposed Action at KCP, SRS, or LANL. Activities relocated to SNL would result in cancer risks to workers due to the introduction of small	ò No adverse health effects to workers and the public have been identified as a result of operations activities associated with the Mound alternative at LANL. Activities relocated to Mound and SNL would result in cancer risks to	ò At Pinellas, adverse health effects to workers (cancer risk of 4.2x10-5) and the public (cancer risk of 3.1x10-6) have been identified as a result of operations activities associated with the Pinellas alternative. No adverse health effects to workers and the public have been	ò At RFP, adverse health effects to workers (cancer risk of 5.3x10-4) and the public (cancer risk of 1.2x10-5) have been identified as a result of operations activities associated with the RFP alternative. Activities relocated to SNL would result in cancer risks to	ò At RFP, there are toxic effects of chemicals to workers; and cancer risk to workers (5.3x10-4) and the public (1.2x10-5). At Pinellas, there is a cancer risk to workers of 4x10-5 and the public of about 1.5x10-6. At KCP, there is a cancer risk of 1.2x10-5 to

amounts of chemical solvents, but these risks would be within acceptable guidelines. Measures to minimize risks such as substituting less toxic solvents or modifying production processes would be implemented.	workers but these risks would be within acceptable guidelines. Measures such as substituting less toxic solvents or modifying production processes would be implemented to minimize cancer risks.	identified at SRS or LANL with this alternative. Measures such as substituting less toxic solvents or modifying production processes would be required to reduce the cancer risks at Pinellas to within acceptable guidelines.	workers but these risks would be within acceptable guidelines. Measures such as substituting less toxic solvents or modifying production processes would be implemented to reduce the cancer risks at RFP and minimize worker cancer risks at SNL.	workers and 4.7x10-6 to the public. There are no significant human health effects expected at any of the sites as a result of continuing operations. Waste minimization and solvent reduction and substitution programs are being implemented at all sites to reduce and minimize adverse health effects to workers and the public.
ò Radiological doses remain within all applicable regulatory limits.	ò Radiological doses remain within all applicable regulatory limits.	ò Radiological doses remain within all applicable regulatory limits.	ò Radiological doses remain within all applicable regulatory limits.	ò The radiological doses at all sites fall within applicable regulatory limits.
ò Consequences of potential accidents would not increase appreciably at any site.	ò Consequences of potential accidents would not increase appreciably at any site.	ò Consequences of potential accidents would not increase appreciably at any site.	ò Consequences of potential accidents would not increase appreciably at any site.	ò Consequences of potential accidents would not increase at any site.
				E4 3465-16

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 17 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action

Cumulative Impacts				
ò No cumulative impacts on land resources, noise, water resources, geology and soils, or cultural resources at KCP, SRS, LANL, or SNL.	ò No cumulative impacts on land resources, noise, water resources, geology and soils, or cultural resources at LANL or SNL. Potential for minor cumulative noise impacts at Mound due to operation related traffic noise.	ò No cumulative impacts on land resources, noise, water resources, geology and soils, or cultural resources at Pinellas, SRS, LANL, or SNL.	ò No cumulative impacts on land resources, noise, water resources, geology and soils, or cultural resources at RFP, SRS, LANL, or SNL.	ò No cumulative environmental impacts are expected.
ò Minor cumulative air quality impacts at KCP, SRS, LANL, and SNL due to increased emissions from relocated activities.	ò Minor cumulative air quality impacts at Mound, LANL, and SNL due to increased emissions from relocated activities.	ò Minor cumulative air quality impacts at Pinellas, SRS, LANL, and SNL due to increased emissions from relocated activities.	ò Minor cumulative air quality impacts at RFP, SRS, LANL, and SNL due to increased emissions from relocated activities.	ò No cumulative air quality impacts are expected.
ò Minor beneficial cumulative direct and indirect economic impacts at KCP, SRS, LANL, and SNL due to increased workforce. Minor adverse direct and indirect impacts at Mound, Pinellas, and RFP due to closeout of Complex nonnuclear missions and reduction in	ò Minor beneficial cumulative direct and indirect economic impacts at Mound, LANL, and SNL due to increased workforce. Minor adverse direct and indirect impacts at KCP, Pinellas, and RFP due to closeout of Complex	ò Minor beneficial cumulative direct and indirect economic impacts at Pinellas, SRS, LANL, and SNL due to increased workforce. Minor adverse direct and indirect impacts at KCP, Mound, and RFP due to closeout of Complex nonnuclear missions and reduction in workforce.	ò Minor beneficial cumulative direct and indirect economic impacts at RFP, SRS, LANL, and SNL due to increased workforce. Minor adverse direct and indirect cumulative economic impacts at KCP, Mound, and Pinellas due to closeout of Complex nonnuclear missions and	ò Reduced workforce numbers due to lower production levels at KCP, Mound, Pinellas, SRS, and SNL. Minor adverse cumulative direct and indirect economic effects would be expected. At RFP and LANL, increased workforce numbers would have minor beneficial cumulative

workforce. economic	nonnuclear missions and reduction in workforce.		reduction in workforce.	direct and indirect effects.
				D7 3465-17

Table 4.3-1.-Summary Comparison of Environmental Consequences of the Proposed Action and AlternativesòContinued
[Page 18 of 18]

Proposed Action Kansas City Plant	Mound Plant Alternative	Pinellas Plant Alternative	Rocky Flats Plant Alternative	No Action
Cumulative Impacts (continued)				
ò Cumulative worker health health impacts are expected at KCP, SRS, LANL, and SNL due to relocated processes and hazardous materials. Cumulative health impacts would be within acceptable limits and guidelines. Measures to reduce workersò health effects would be implemented at all sites.	ò Cumulative worker health impacts would be expected at Mound, LANL, and SNL. Cumulative health impacts would be within acceptable limits and guidelines. Measures to reduce workersò health effects would be implemented at all sites.	ò Cumulative worker health impacts would be expected at Pinellas, LANL, and SNL. Cumulative health impacts would be within acceptable limits and guidelines. Measures to reduce workersò health effects would be implemented at all sites.	ò Cumulative worker health impacts would be expected at RFP, SRS, LANL, and SNL. Cumulative health impacts would be within acceptable limits and guidelines. Measures to reduce workersò health effects would be implemented at all sites.	ò No cumulative workersò impacts are expected.
ò No cumulative environmental effects are expected at Mound, Pinellas, or RFP with the Proposed Action.	ò No cumulative environmental effects would be expected at KCP, Pinellas, or RFP with the	ò No cumulative environmental effects would be expected at KCP, Mound, or RFP with the Pinellas alternative.	ò No cumulative environmental effects would be expected at KCP, Mound, or Pinellas with the RFP alternative.	

	Mound alternative.			
				E4 3465-18

Table 3.3.1-3.-Kansas City Plant: Estimated Construction Material/Resource RequirementsòProposed Action

Materials/Resources	Requirement
Utilities:	
Electricity	40 kWha
Water	2,330
Solids:	
Concrete	1,000
Steel (structural, rebar, ductwork, and piping)	180 tons
Otherb	90,000
Liquid Fuels	0 gal
Gases	0 ft3

E4 3469

a Average daily consumption.

b Includes 65,000 ft2 of wall materials and 24,000 ft2 of floor tile

Source: KC ASAC, 1993b.

Table 3.3.1-5.-Kansas City Plant: Estimated Additional Operations Resource RequirementsòProposed Action

Utility Resources	Average Daily	Peak Demand

	Consumption	
Electricity	19,000 kWh	5,800 kW
Natural Gas	8,000 ft3	8,000 ft3/hr
Water	1,200 gal	60 gpm

Chemical Resources	Annual Consumption
Nitrogen	2,400 gal
Argon	2,000,000 ft3
Helium	800,000 ft3
Hydrogen	7,500 ft3
Oxygen & Acetylene	56,000 ft3

E4 3471
Table assumes KCP operates 365 days per year.
Source: KC ASAC, 1993b.

Table 3.3.2-3.-Savannah River Site: Estimated Construction Material/Resource RequirementsòProposed Action

Materials/Resources	Requirement
Utilities:	
Electricity	1,000
Water	600 gala
Solids:	
Concrete	230 yd3
Steel (structural, rebar, ductwork, and piping)	154 tons
Other (electrical cable)	75,000 ft
Liquid Fuels	0 gal

Gases	0 ft3

E4 3472
a Average daily consumption.
Source: SR DOE, 1992a.

Table 3.3.2-5.-Savannah River Site: Estimated Additional Operations Resource RequirementsòProposed Action

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	2,700 kWh	650 kW
Natural Gas	NA	NA
Water	144,000 gal	100 gpm

Chemical Resources	Annual Consumption
Nitrogen	10,000 gal
Argon	500,000 ft3
Helium	400 ft3
Hydrogen	400 ft3
Deuterium	450 ft3

E4 3474
Source: SR DOE, 1992a.

Table 3.3.4-3.-Oak Ridge Reservation Y-12 Plant: Estimated Construction Material/Resource RequirementsòProposed Action

Materials/Resources	Requirement
Utilities:	
Electricity	5,600 kWha
Water	200 gala
Solids:	

Concrete	NA
Steel (structural, rebar, ductwork, and piping)	16.8 tons
Liquid Fuels	0 gal
Gases	0 ft3

E4 3478
aAverage daily consumption Source: Y-12 MMES, 1992b.

Table 3.3.4-5.-Oak Ridge Reservation Y-12 Plant: Estimated Additional Operations Resource RequirementsòProposed Action

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	3,960 kWh	500 kW
Natural Gas	0 ft3	0 ft3/hr
Water	1,000 gal	40 gpm

Chemical Resources	Annual Consumption
Nitrogen	0 gal
Argon	10,000 ft3
Helium	2,160 ft3
Hydrogen	0 ft3
Deionized Water	1,000 gal

E4 3480
Source:Y-12 DOE, 1992b.

Table 3.3.5-3.-Sandia National Laboratories, New Mexico: Estimated Construction Material/Resource RequirementsòProposed Action

Materials/Resources	Requirement
Utilities:	
Electricity	692 kWh[a]
Water	3,928 gal[a]
Solids:	
Concrete	2,820 yd3
Steel (structural, rebar, ductwork, and piping)	702 tons
Liquid Fuels	54,000 gal
Gases	155,000 ft3

E4 3481

a Average daily consumption.

Source:SN DOE, 1992d.

Table 3.3.5-5.-Sandia National Laboratories, New Mexico: Estimated Additional Operations Resource RequirementsòProposed Action

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	90 kWh	5,000 kW
Natural Gas	30,000 ft3	4,000 ft3/hr
Water	25,000 gal	150 gpm

Chemical Resources	Annual Consumption
Nitrogen	167,500 gal
Argon	65,000 gal

Helium	5,000 ft3
Hydrogen	1,152,000 ft3
Oxygen	40,000 ft3

E4 3483
Source: SN DOE, 1992d.

Table 3.2.1-1.-Kansas City Plant: Nonnuclear Manufacturing Activities Considered for Consolidation [Page 1 of 2]

Electrical/Mechanical Products	
Squib Valve Assembly	Manufacture of valve bodies for pyrotechnically-driven (explosively activated) devices.
Hybrid Microcircuit Assembly	Assembly of hybrid microcircuits resistor/conductor networks for radars, programmers, timers and firesets.
Hybrid Microcircuit Assembly for Joint Test Assemblies	Assembly of hybrid microcircuit networks interconnected with active (transistors and integrated circuits) and passive (resistors and capacitors) components for Joint Test Assemblies which are weapons with the nuclear components removed so that they can be tested in their intended delivery mode.
Microminiature Electrical Assembly	Manufacture of hybrid microcircuits that perform multiple electronic functions in weapons systems such as switches, radars, programmers, firesets, clocks, and telemetry.
Telemetry Assembly	Manufacture of telemetry assemblies and neutron detectors for Joint Test Assemblies, and test component firing systems that provide data on warhead performance in flight tests and high energy transfer systems for use in underground testing at the Nevada Test Site (NTS).
Radar Assembly	Manufacture of radars used in weapons fuzing systems for bombs and warheads.

Timers, Programmers, & Trajectory Sensing Signal Generators	Manufacture of electronic assemblies which accept environmental data, verify correctness of that data, and produce predetermined and sequenced output functions for the weapon.
Test Equipment Design & Fabrication	Manufacture of test equipment capable of performing electrical and mechanical test equipment design and fabrication.
Cellular Silicone & Filled Elastomers	Manufacture of cellular silicone pads that are used to cushion components.
Foam Molding	Manufacture of structural urethane foam component supports.
Syntactic Foam Molding & Plastic Machining	Manufacture of foam supports which are capable of withstanding higher operating temperatures than conventional foam molding supports.
Laminates & Desiccants	Manufacture of desiccant powders and resins used to provide a dry environment in sealed nuclear assemblies, and the production of plastic laminates.
Noncryptographic Coded Switch Assembly	Manufacture of electronic devices that permit the controlled use of nuclear weapons upon proper authorization and to prevent unauthorized use under all conditions.
Strong Link Switch Assembly	Manufacture of complex electromechanical safety devices used in all modern weapons programs.
Fire Set Assembly	Manufacture of high voltage circuitry firing systems capable of supplying the energy required to initiate a weapon system.
Composite Structures	Manufacture of fiber reinforced composite assemblies.
Stockpile Support	Evaluation of components and subsystems removed from stockpile for reuse, systems testing, or component cycle testing.

E4 3487-1

Table 3.2.1-1.-Kansas City Plant: Nonnuclear Manufacturing Activities Considered for Consolidation-Continued [Page 2 of 2]

Electrical/Mechanical Products

Category F Permissive Action Link Electronics Assembly	Manufacture of electronic assemblies that are part of the weapon-s nuclear surety (safety, security, and survivability) system.
Special Products - Special Electronics Assembly	Electronic products requiring special area exclusion.
Cryptographic-Coded Switch Assembly	Assembly of Permissive Action Link Switch Adapters, an electronic device designed to provide an 'electrical block' to the arming switch of the weapon.
T-Gear Containing Cryptographic Keying Material	Manufacture of keying material used to code and recode Permissive Action Link devices in weapons. The presence of these codes prevents unauthorized access to weapons.
MK 5 Arming, Fuzing, and Firing Set Assembly	Manufacture of arming, fuzing, and firing set assemblies.
B83 Weapon Subassembly	Assembly of electronic and mechanical structures into a case structure that provides distance, timing, velocity sensing, velocity control, and electrical power for weapon assemblies.
Machining Technology	Activity providing a variety of traditional and non-traditional metal removing processes.
Other Mechanical Technology	Activity providing support for mechanical product manufacturing.
Plastics Technology	Manufacture of a wide range of polyurethane foam components, epoxy encapsulants, and modified commercial products for the Complex.
Electrical/Electronic Fabrication & Assembly Technology	Manufacture of printed wiring assemblies which are used in weapon timers, programmers, trajectory sensing devices, and various other electrical/electronic components.
Secondary Support Areas	Activity providing support functions that service nearly all production lines, some of which are uniquely tailored to meet special weapon requirements.

E4 3487-2
Source:KC ASAC, 1993b.

Table 3.2.1-2.-Kansas City Plant:Waste Management (1991)

	Quantity	Storage	Treatment	Disposal

Waste Type	Generated	Capacity	Capacity	Method
Hazardous/Toxic				
Liquid	183,000 gal	44,000 gal	None	Offsite
Solid	46,000 ft3	83,000 ft3	None	Offsite
Nonhazardous				
Liquida	200,000,000 gal	None	474.5 MGY	Offsite-Sewer System Outfall
Solid	494,935	None	None	Offsite
LLW				
Liquid	<1 galb	5,280 galc	None	Not Applicable
Solid	15 ft3	705 ft3c	None	Offsite-DOE
Mixed				
Liquid	None	c	None	None
Solid	Noned	c	None	None

E4 3488

a Industrial wastewater.
b Any liquid LLW is periodically solidified into concrete or plaster of paris and handled and disposed as solid LLW.
c KCP has a 250 ft2 storage area that can store LLW and/or mixed waste. This translates into 5,280 gallons, or 705 ft3.
d Although no mixed waste was generated, the potential exists for generation of mixed waste.

Source: KC ASAC, 1993b.

Table 3.2.1-3.-Kansas City Plant: Existing Resource Requirements

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	521,000 kWh	35,000 kW	100,000 kW
Natural Gas	1,847,000 ft3	195,000 ft3/hr	1,800,000 ft3/hr

Water	1,443,000 gal	3,000 gpm	22,000 gpm

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	2,393,000 gal	40,800 gal
Argon	871,000 ft3	a
Helium	162 ft3	0 ft3
Hydrogen	200 ft3	0 ft3
Carbon Dioxide	5,912,000 ft3	494,000 ft3

E4 3490

Table assumes that KCP operates 365 days per year. Numbers in this table represent
1991 baseline utilities and 1991 emissions inventory.

a Procured from commercial sources. No onsite bulk storage.

Source:KC ASAC, 1993b.

Table 3.4.3-3.-Rocky Flats Plant Alternative: Estimated Additional Annual Waste Generation at Rocky Flats

Waste Type	Quantity
Hazardous/Toxic Liquid Solid	 43,300 gal 12,300 ft3
Nonhazardous Liquid Solid	 148 million gal 430,000 ft3
LLW Liquid Solid	 None 15 ft3
Mixed Liquid Solid	 None None

E4 3491

Source: FDI, 1993.

Table 3.4.3-4.-Rocky Flats Plant: Estimated Additional Operations Resource Requirements at Rocky Flats

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	260,000 kWh	24,000 kW
Natural Gas	1,639,000 ft3	220,000 ft3/hr
Water	972,000 gal	1,200 gpm

Chemical Resources	Annual Consumption
Nitrogen	2,425,000 gal
Argon	1,198,000 ft3
Helium	10,000 ft3
Hydrogen	11,000 ft3
Carbon Dioxide	5,912,000 ft3

E4 3492
Table assumes that Rocky Flats operates 365 days per year.
Source:FDI, 1993.

Table 3.4.1-2.-Mound Plant Alternative:
Estimated Construction Materials/Resource Requirements at Mound

Materials/Resources	Requirement
Utilities:	
Electricity	2,800 kWha
Water	18,000
Solids:	
Concrete	96,500 yd3
Steel (structural, rebar, ductwork, and piping)	14,000 tons

Other (paving)	12,600
Liquid Fuels	484,000 gal
Gases	2,030,000 ft3

E4 3493
a Average daily consumption. Source: FDI, 1993.

Table 3.4.1-3.-Mound Plant Alternative: Estimated Additional Annual Waste Generation at Mound

Waste Type	Quantity
Hazardous/Toxic Liquid Solid	 47,600 gal 12,300 ft3
Nonhazardous Liquid Solid	 132 million gal 359,000 ft3
LLW Liquid Solid	 None 15 ft3
Mixed Liquid Solid	 None None

E4 3494
Source: FDI, 1993.

Table 3.4.1-4.-Mound Plant Alternative: Estimated Additional Operations Resource Requirements at Mound

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	272,000 kWh	28,000 kW

Natural Gas	988,000 ft3	133,000 ft3/hr
Water	909,000 gal	1,120 gpm

Chemical Resources	Annual Consumption
Nitrogen	2,431,000 gal
Argon	26,800 gal
Helium	761,000 ft3
Hydrogen	10,000 ft3
Carbon Dioxide	5,912,000 ft3

E4 3495
Table assumes Mound operates 365 days per year.
Source: FDI, 1993.

Table 3.4.2-2.-Pinellas Plant Alternative:
Estimated Construction Material/Resource Requirements at Pinellas

Materials/Resources	Requirement
Utilities:	
Electricity	3,900 kWha
Water	22,000
Solids:	
Concrete	131,300
Steel (structural, rebar,ductwork, and	21,800 tons
Other	
Liquid Fuels	1,018,000 gal
Gases	2,926,000 ft3

E4 3496

a Average daily consumption. Source: FDI, 1993.

Table 3.4.2-4.-Pinellas Plant Alternative: Estimated Additional Operations Resource Requirements at Pinellas

Utility Resources	Average Daily Consumption	Peak Demand
Electricity	273,000 kWh	29,000 kW
Natural Gas	1,519,000 ft3	203,000 ft3/hr
Water	980,000 gal	1,200 gpm

Chemical Resources	Annual Consumption
Nitrogen	2,423,000 gal
Argon	26,000 gal
Helium	762,000 ft3
Hydrogen	3 gal
Carbon Dioxide	5,912,000 ft3

E4 3498

Note: Table assumes Pinellas operates 365 days per year.
Source: FDI, 1993.

Table 3.4.3-2.-Rocky Flats Plant Alternative: Estimated Construction Material/Resource Requirements at Rocky Flats

Materials/Resources	Requirement
Utilities:	
Electricity	3,400 kWha
Water	22,000

Solids:	
Concrete	93,300 yd3
Steel (structural, rebar,ductwork, and	22,200 tons
Other (paving)	10,500 tons
Liquid Fuels	848,000 gal
Gases	2,438,000 ft3

E4 3499
a Average daily consumption. Source:FDI, 1993.

Table 3.2.2-1.- Mound Plant: Nonnuclear Manufacturing Activities Considered for Consolidation

Electrical/Mechanical Products	
Flat Cable Products	Manufacture of cables used to detonate the main explosive charge of the weapon.
Round Wire Detonator Cables	Manufacture of detonator cables used to ignite various explosive devices used in weapons systems.
Mechanical Assemblies	Manufacture of electromechanical devices used as detonator safing stronglink mechanisms.
Nonnuclear Acorn	Manufacture of nonnuclear components of reservoirs.
Plastic Headers	Manufacture of molded plastic devices having imbedded electrode wires, to which bridgewires (very thin wires designed to explode upon application of current) are ultimately attached.
Special Products	
Milliwatt Heat Source Surveillance	Environmental storage and testing of inert, nonradioactive heat source containers.
Calorimeters	Activity providing calibration, manufacture,

	assembly, and development of calorimeters.

Tritium Handling

Gas Transfer Systems	Activity providing the development of processes and components for the manufacture of gas transfer systems.
Reservoir Surveillance Operations	Activity providing assessment of quality, reliability, and safety of gas transfer systems, including pre-production evaluations, gas transfer system functions, material testing, and product acceptance testing.
Commercial Sales/Inertial Confinement Fusion (ICF) Target Loading	Activity providing the commercial sale and filling of tritium containers for use in private industry and the loading of targets for fusion research.

Detonators

High Power Detonators	Manufacture detonator assemblies used in explosive devices. This action includes the processing of organic explosive crystal powders, destructive testing of explosive components, and surveillance of explosive components including stockpile, shelf life, and accelerated aging evaluations.

E4 3500
Source: KC ASAC, 1993b; SNL, 1992; SR DOE, 1992a; LA FDI, 1992.

Table 3.2.2-3.-Mound Plant: Existing Resource Requirements

Utility Resources	Average Daily Consumption	Peak Demand	System
Electricity	179,000 kWh	11,700 kW	18,800 kW
Natural Gas	8,000 ft3	332 ft3/hr	339 ft3/hr
Water	475,000 gal	600 gpm	1,600 gpm

Chemical Resources	Total Annual Consumption	Storage Capacity

Nitrogen	20,900 gal	36,500 gal
Argon	139,000 gal	8,400 gal
Helium	47,000 ft3	60,000 ft3
Hydrogen	3,300 ft3	0 ft3

E4 3503
Table assumes that Mound operates 365 days per year.
Source:MD DOE, 1992.

Table 3.2.3-1.-Pinellas Plant: Nonnuclear Manufacturing Activities Considered for Consolidation

Neutron Generators, Cap Assemblies, & Batteries	
Thermal Batteries	Development and backup production capabilities for the manufacture of thermal batteries, a long shelf life battery that uses an exothermic (heat generating) chemical reaction to produce electricity.
Lithium Ambient Batteries	Activities involve procuring lithium anode cells commercially and then building them into battery assemblies.
Neutron Generators	Manufacture of neutron generators which provide a controlled source of neutrons.
Cap Assemblies	Manufacture of a weapons component used with gas transfer systems.
Electrical/Mechanical Products	
Neutron Detectors	Manufacture of electronic detectors used to verify the output of neutron generators in joint test assemblies.
Optoelectronics Assemblies	Manufacture of electrical devices using light rather than electrical conductivity to transfer information, perform switching functions, and act as sensors.
Lightning Arrestor Connectors	Manufacture and testing of electrical connectors for weapons cables that are designed to short circuit lightning strike

	pulses to ground.
Support Pads	Manufacture of molded pads that are used to protect weapons components within the weapon assembly.
Transducers	Manufacture of mechanical shock sensing devices used in weapons testing sequences.

Tritium Handling

Neutron Tube Target Loading	Activities involve tritium loading (exposing materials to gaseous tritium) of targets for neutron generator tubes.

E4 3504
Source:KC ASAC, 1993b; SN DOE, 1992d.; LA FDI, 1992.

Table 3.2.3-2.-Pinellas Plant: Waste Management (1991)

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	49,555 gal	24,500 gal	b	Offsite
Solid	110 ft3	a	c	Offsite
Nonhazardous				
Liquid	65,800,000 gal	None	110 MGY	Offsite-Sewer System Outfall
Solid	3,942 ft3	None	None	Offsite
LLW				
Liquid	0 gal	30,000 gal	None	None
Solid	2,090 ft3a	a	None	Offsite-DOE
Mixed	None	a		
Liquid			None	None
Solid			None	None

E4 3505
a Additional storage capacity can be made available depending on existing storage requirements, storage capacity, and permit conditions. b Chemical treatment of water reactive metals (14 ft3 of calcium materials or 4 ft3 of lithium-contaminated solids in separative batch operations). c Thermal treatment facility for explosives, maximum quantities treated at any one time are 2 pounds of heat powder and 1/8 pound of heat powder in the steel pan, and 10 squib charges in the cast iron vessel.
Source:PI DOE, 1992d.

Table 3.2.4-2.-Rocky Flats Plant: Waste Management (1991)

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	5,005 gal	e,f	None	Offsite
Solid	1,090 ft3	9,280 f,g	None	Offsite
Nonhazardous				
Liquid	55,200,000 galb	f	150 MGY	Onsite
Solid	268,000 ft3 c,d	None	None	Onsite
LLW				
Liquid	1,430 gal	27,674	h	None
Solid	38,880 ft3	160,272 ft3 f	None	Offsite-DOE
Mixed				
Liquida	13,859,700 gal	e	13,700,000 gal/yri	None

Solid	19,170 ft3	728,776 ft3 g	None	None

E4 3507

a Liquid wastes are stored and/or treated at RFP. òStoredò liquid wastes are placed in drums, or other containers, and held for later disposal. "Treated" liquid wastes are aqueous wastes which are piped or trucked to treatment facilities (Buildings 374 and 774) for treatment. Treated liquid wastes are considered low-level mixed wastes and may be comprised of many waste types (e.g., LLW, low-level mixed waste, hazardous, and/or nonhazardous) collected from several locations on the plant site (i.e., laundry, production, utilities, and solar ponds).
b This is the quantity of water processed by the wastewater treatment plant.
c There are no validated data showing the amount of waste that was disposed of in the landfill during 1991. This quantity is a back estimate based on quantities generated during November 1992 to January 1993. It is believed by the operators of the landfill that this is a reasonable estimate of nonhazardous solid waste disposed of in 1991.
d In addition, approximately 465,000 pounds (approximately to 2,280 ft3) of paper was recycled during this year.
e This capacity included with storage capacity for Hazardous/Toxic solids.
f Additional storage capacity can be made available depending on existing storage requirements, storage capacity, and permit conditions.
g This capacity represents 1991 end-of-year quantity in storage.
h This capacity is included with Treatment Capacity for Mixed Liquid.
i Treatment of process wastewater is based on the operating capability of the evaporator which is 2,100 gallons per hour.

Source:RF DOE, 1992a.

Table 3.2.4-1.-Rocky Flats Plant: Nonnuclear Manufacturing Activities Considered for Consolidation

Electrical/Mechanical Products	
Reservoirs	Manufacture, assembly, and shipping of weapon gas stainless steel reservoir assemblies.
Special Products	
Safe Secure Trailers	Manufacture, repair, and refurbishment of safe and secure highway semi-tractor trailers used to transport weapon components and material.

Weapon Trainer Shop	Activity providing weapon component and assembly illustrations as well as display and instructional models for use within the Complex and the Department of Defense (DOD).
Metrology Services	Activity involving the calibration of dimensional standards such as thread gauges, height blocks, comparator charts, special design gauges, surface plates, and optical flats.
Nuclear Grade Steels/Oxnard	Activity involving the procurement, certification, and storage of bulk stock for a variety of metals for the Complex.

Beryllium Technology & Pit Support

Beryllium Technology	Activity involving the machining, melting, atomizing, and forming of beryllium metal.
Pit Support Functions	Activity involving the machining and joining of various pit components.

E4 3509
Source:KC ASAC, 1993b; LA FDI, 1992.

Table 3.2.4-3.-Rocky Flats Plant: Existing Resource Requirements

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	504,000 kWh	26,000 kW	38,000 kW
Natural Gas	1,900,000 ft3	117,000 ft3/hr	188,000
Water	318,000 gal	400 gpm	1,000 gpm

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	12,230,000 gal	120,000 gal
Argon	17,500,000 ft3	20,800 ft3

Helium	1,700,000 ft3	122,000 ft3
Hydrogen	0 ft3	0 ft3

E4 3510
Table assumes that RFP operates 365 days per year.
Source: RF DOE, 1992a.

Table 3.2.3-3.-Pinellas Plant: Existing Resource Requirements

Utility Resources	Average Daily Consumption	Peak Demand	System
Electricity	150,000 kWh	8,700 kW	17,200 kW
Natural Gas	1,500 ft3	9,200 ft3/hr	9,220 ft3/hr
Water	135,000 gal	200 gpm	900 gpm

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	1,500,000 gal	48,000 gal
Argon	225,000 gal	12,200 gal
Helium	unknown	unknown
Hydrogen	78,000 gal	20,000 gal
Oxygen	1,200 gal	600 gal

E4 3511
Table assumes that Pinellas operates 365 days per year.
Source:PI DOE, 1992d.

Table D2.1.5-3.-Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at SRS

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)c	Maximum 24-hour Source Contributions at Site Boundary (µg/m3)	South Carolina State Standard (µg/m3)a
1,1,1-Trichloroethane	2.44	1.3	9,550

Nitric Acid	2.17	1.1	125
Trichlorotrifluoroethane	1.26	23.3	b

	E4 3514

a 24-hour average concentration.
b No standard.
c Only those emitted at rates greater than or equal to 100 lb/yr (0.01 lb/hr) are listed.

Source: DOE 1991c; SC DHEC, 1991.

Table D2.1.5-1.-Existing Ambient Air Quality Data for SRS (μg/m3)

		Sulfur Dioxide			Nitrogen Dioxide	PM10a		TSPb
Monitoring Station	Time Period	Annual	Max. 24-hour	Max. 3-hour	Annual	Annual	Max. 24-hour	Annual
36 G, 38 G, 39 G, 40 G, and 41 G	1985	5	34	48	6	27	47	27

E4 3515

a Particulate matter less than 10 microns in diameter.
b Total suspended particulates.

Source: DOE, 1991c.

Table D2.1.5-2.-Source Emission Inventory for SRS-Criteria Pollutants [Page 1 of 3]

		Emission Rate	
Pollutant	Source	Stack (lb/hr)	Area (lb/hr/ft2)
Carbon Monoxide (CO)	784-A Boiler 1	14.0	
	784-A Boiler 2	14.0	
	484-D Boiler 1	9.6	
	484-D Boiler 2	9.6	
	484-D Boiler 3	9.6	

	484-D Boiler 4	9.6	
	284-H Boiler 1	14.0	
	284-H Boiler 2	14.0	
	284-H Boiler 3	14.0	
	184-K Boiler 1	37.9	
	184-K Boiler 2	37.9	
	184-P Boiler 1	37.9	
	184-P Boiler 2	37.9	
	H Diesel Gen(2)	0.794	
	F Diesel Gen(2)	0.714	
	K Diesel Gen(2)	0.873	
	L Diesel Gen(2)	0.873	
	P Diesel Gen(2)	0.873	
	CIF	0.033	
	K Source		1.0x10-6
	L Source		1.0x10-6
	P Source		1.0x10-6
	S Source		1.0x10-6
	Z Source		1.0x10-5
	B source		1.0x10-6
	TNX Source		4.0x10-6
	C Source		1.0x10-6
	CS Source		1.0x10-6
Nitrogen Dioxide (NO2)	784-A Boiler 1	39.13	
	784-A Boiler 2	39.13	
	484-D Boiler 1	544.9	
	484-D Boiler 2	544.9	
	484-D Boiler 3	544.9	
	383-D Boiler 4	544.9	

	284-H Boiler 1	39.13	
	284-H Boiler 2	39.13	
	284-H Boiler 3	39.13	
	184-K Boiler 1	106.4	
	184-K Boiler 2	106.4	
	184-P Boiler 1	106.4	
	184-P Boiler 2	106.4	
	H Diesel Gen(2)	12.3	
	F Diesel Gen(2)	9.603	
	K Diesel Gen(2)	13.49	
	L Diesel Gen(2)	13.49	

E4 3517-1
Footnotes at end of table.

Table D2.1.5-2.-Source Emission Inventory for SRS-Criteria Pollutants -Continued [Page 2 of 3]

		Emission Rate	
Pollutant	Source	Stack (lb/hr)	Area (lb/hr/ft2)
Nitrogen Dioxide (NO2)	P Diesel Gen(2)	13.49	
(continued)	CIF	8.651	
	A Source		7.0x10-6
	D Source		9.0x10-6
	H Source		7.0x10-6
	F Source		7.0x10-6
	K Source		1.4x10-5
	L Source		1.5x10-5
	P Source		1.5x10-5

	S Source		2.9x10-5
	Z Source		2.4x10-4
	B source		2.6x10-5
	TNX Source		8.8x10-5
	C Source		1.3x10-5
	CS Source		1.3x10-5
	F Pu Separation	137.0	
	H H3 Separation	6.826	
	M Air Stripper	2.302	
	DWPF Nitrate PR	8.413	
Particulate Matter (PM10)	784-A Boiler 1	10.16	
	784-A Boiler 2	10.16	
	484-D Boiler 1	21.67	
	484-D Boiler 2	21.67	
	484-D Boiler 3	21.67	
	484-D Boiler 4	21.67	
	284-H Boiler 1	10.16	
	284-H Boiler 2	10.16	
	284-H Boiler 3	10.16	
	184-K Boiler 1	27.78	
	184-K Boiler 2	27.78	
	184-P Boiler 1	27.78	
	184-P Boiler 2	27.78	
	H Diesel Gen(2)	0.794	
	F Diesel Gen(2)	0.714	
	K Diesel Gen(2)	0.873	
	L Diesel Gen(2)	0.873	
	P Diesel Gen(2)	0.873	

	CIF	5.0 x 10-4	
	K Source		1.0x10-6
	L Source		1.0x10-6
	P Source		1.0x10-6
	S Source		1.0x10-6
	Z Source		7.0x10-6
	B Source		1.0x10-6
	TNX Source		3.0x10-6

E4 3517-2
Footnotes at end of table.

Table D2.1.5-2.-Source Emission Inventory for SRS-Criteria Pollutants [Page 3 of 3]

		Emission Rate	
Pollutant	Source	Stack (lb/hr)	Area (lb/hr/ft2)
Particulate Matter (PM10)	C Source		1.0x10-6
(continued)	S Concrete Batch	45.40	
	D Coal Pile Top		1.0x10-6
	D Coal Pile Bottom		4.0x10-6
	P Coal Pile		1.0x10-6
	K Coal Pile		2.0x10-6
	F Coal Pile		1.0x10-6
	H Coal Pile		1.0x10-6
	A Coal Pile		3.0x10-6
	D Area Coal Crush		8.7x10-4
Sulfur Dioxide (SO2)	784-A Boiler 1	106.8	
	784-A Boiler 2	106.8	
	484-D Boiler 1	743.0	

	484-D Boiler 2	743.0	
	484-D Boiler 3	743.0	
	383-D Boiler 4	743.0	
	284-H Boiler 1	106.8	
	284-H Boiler 2	106.8	
	284-H Boiler 3	106.8	
	184-K Boiler 1	289.7	
	184-K Boiler 2	289.7	
	184-P Boiler 1	289.7	
	184-P Boiler 2	289.7	
	H Diesel Gen(2)	0.794	
	F Diesel Gen(2)	0.714	
	K Diesel Gen(2)	0.873	
	L Diesel Gen(2)	0.873	
	P Diesel Gen(2)	0.873	
	CIF	0.079	
	A Source		1.0x10-6
	D Source		3.0x10-6
	H Source		2.0x10-6
	F Source		1.0x10-6
	K Source		4.0x10-6
	L Source		4.0x10-6
	P Source		4.0x10-6
	S Source		9.0x10-6
	Z Source		7.2x10-5
	B source		7.0x10-6
	TNX Source		2.7x10-6
	C Source		4.x10-6
	CS Source		4.0x10-6

E4 3517-3
Source: SR DOE, 1991a.

Table D2.1.8-3.-Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at SNL

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)b	Maximum 8-hour Average Concentration (µg/m3)	New Mexico State Standard (ug/m3)a
1,1,1-Trichloroethane	0.18	0.73	c
Acetone	0.07	0.27	5,900
Hydrogen Chloride	0.01	0.04	70
Isopropyl Alcohol	0.03	0.12	9,800
Methyl Alcohol	0.03	0.12	2600
Methylene Chloride	0.01	0.04	2610
Toluene	0.14	0.57	3,750
Trichloroethylene	0.03	0.11	250
Trichlorotrifluoroethan	0.02	0.09	c
Xylene	0.15	0.61	4,350

E4 3522
a One one-hundredth of the OEL. b Only those emitted rates greater than or equal to approximately 100 lb/yr (0.01 lb/hr) are listed. c No standard.
Source:SN DOE, 1991b.

Table D2.1.4-1.-Existing Ambient Air Quality Data for Rocky Flats Plant

	Ambient Concentration (µg/m3)

			Nitrogen		

Monitoring Station	Ozone Max. 1-hour	Sulfur Dioxide Annual	Sulfur Dioxide Max. 24-hour	Sulfur Dioxide Max. 3-hour	Carbon Monoxide Max. 8-hour	Carbon Monoxide Max. 1-hour	Oxides Annual	TSPb Annual	TSPb Max. 24-hour	PM10c Annual	PM10c Max. 24-hour	Lead Max. Calendar Quarter
RFP East Entrance	561.5d	13.1d	86.4d	120.4d	4,437d	11,108d	20.7d	47.7e	156.4e	20.9f	42.5f	0.119d
Collocated duplicate	a	a	a	a	a	a	a	51.7e	145.5e	21.2g	43.4g	a

E43524

a Not monitored.
b Total suspended particulates.
c Particulate matter less than 10 microns in diameter.
d 1985 - 1988 data.
e 1985 - 1990 data.
f 1989 - 1990 data.
g 1985, 1989, and 1990 data.

Source: RF Rockwell, 1986b, 1987, 1988, 1989; RF EG&G, 1990a, 1991e.

Table D2.1.4-3.-Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at RFP

Hazardous/Toxic Air	Emission Rate (lb/hr)a	Maximum Annual Average Concentration (µg/m3)	Colorado State Standard or Guideline (µg/m3)
1,1,1-Trichloroethane	4.70	0.42	b
Acetone	0.03	0.003	b
Ammonia	1.87	0.2	b
Carbon Tetrachloride	8.45	0.76	b

Cyclohexane	0.02	0.002	b
Dioctyl Phthalate	0.05	0.004	b
Ethyl Alcohol	0.02	0.003	b
Ethylene Glycol	0.07	0.005	b
Hydrogen Chloride	0.46	0.04	b
Hydrogen Fluoride	1.29	0.12	b
Isopropyl Alcohol	0.03	0.003	b
Lead	0.05	0.004	b
Methylene Chloride	0.81	0.07	b
Nitric Acid	0.56	0.05	b
Trichlorotrifluoroethane	4.82	0.43	b

E4 3526
a Only those emitted at rates greater than or equal to approximately 100 lb/yr (0.01 lb/hr) are listed.
b No state standard.
Source RF DOE, 1992a.

Table D2.1.6-3.-Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at LANL

Hazardous/Toxic Air Pollutant	Emission Ratea (lb/hr)	Maximum 8-hour Average Concentration (µg/m3)	New Mexico State Standardb (µg/m3)
2-Butoxyethanol	0.11	2.5	1,200
Acetic Acid	0.01	0.23	250
Acetone	1.23	26.3	5,900
Acetonitrile	0.03	0.54	340
Ammonia	0.43	9.2	180
Dioxane	0.01	0.29	36
Fluoride Compounds	0.01	0.29	25

Hexane (N-hexane)	0.05	1.05	1,800
Hydrogen Chloride	0.21	4.4	70
Isopropyl Alcohol	0.09	2.0	9,800
Methyl Acetate	0.17	3.6	6,100
Methyl Alcohol	0.50	10.7	2,600
Methyl Ethyl Ketone	0.37	7.7	5,900
Methylene Chloride (dichloromethane)	0.08	1.7	2,610
N-butyl Acetate	0.01	0.24	7,100
Nitric Acid	0.19	4.1	50
Nitric Oxide	0.12	2.5	300
Nitrogen Oxide	0.12	2.5	300
Nitrous Oxide	0.05	1.09	449
sec-Butyl Alcohol	0.01	0.26	3,050
Stoddard Solvent	0.11	2.3	5,250
Sulfuric Acid	0.01	0.29	10
Tetrahydrofuran	0.02	0.47	5,900
Toluene (methylbenzene)	0.03	0.65	3,750
Trichloroethylene	0.14	3.0	250
Trichloromethane	0.05	1.07	97.5
Turpentine	0.07	1.4	5,600
VM&P Naphtha	0.25	5.2	13,500
Xylene (dimethylbenzene)	0.15	3.3	4,350

E4 3540
a Only those emitted at rates greater than or equal to 100 lb/yr (0.01 lb/hr) are listed. b One one-hundredth of the OEL. Source:LANL, 1990b.

Table D2.1.6-1.-Existing Ambient Air Quality Data for LANL (mg/m3)

		Ozone	TSP b	
Monitoring Station	Time Period	Max 1-hour	Annual	24-hour
Los Alamos	1985 - 1989	a	26.6	150.8
White Rock	1985 - 1989	a	29.7	92.6
Bandelier	Jan- Jun	149	a	a

E4 3544

a Not measured.
b Total suspended particulates.

Source: LANL, 1986, 1987a, 1988a, 1989b, 1990b.

Table D2.1.7-1.-Existing Ambient Air Quality Data for the Oak Ridge Reservation

		Ambient Concentration (µg/m3)						
		Sulfur Dioxide			TSPa		Hydrogen Fluoride	
Monitoring Station	Time Period	Annual	Max. 24-hour	Max. 3-hour	Annual	Max. 24-hour	Max. 30-day	Max. 7-day
Y-12 East	1989 -	35.1	165.6	322.0	45.0	129.2	b	b
Y-12 West	1989 -	18.6	110.5	253.8	76.0	385.6	b	b
Y-12 #4	1989 -	b	b	b	b	b	0.16	0.28

E4 3546

a Total suspended particulates.
b Not measured.

Source: Y-12 MMES, 1990, 1991b.

Table D2.1.7-2.-Source Emission Inventory for the Oak Ridge Reservation-Criteria Pollutants

		Emission Rate (lb/hr)

Pollutant	Source	
Carbon Monoxide (CO)	Y-9401 West Stk Y-9401 East Stk	24 24
Nitrogen Dioxide (NO2)	Y-9401 West Stk Y-9401 East Stk	782 782
Particulate Matter (PM10)	Y-9401 West Stk Y-9401 East Stk	103 103
Sulfur Dioxide (SO2)	Y-9401 West Stk Y-9401 East Stk	2,420 2,420
		E4 3547

Source: LA DOE, 1991a.

Table D2.1.7-3.-Emission Rates and Maximum Site Boundary Concentration of HazardousToxic Air Pollutants at the Oak Ridge Reservation

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)a	Maximum 8-hour Average Concentration (µg/m3)	Tennessee Department of Health and Environment Standard (µg/m3)
1,1,1-Trichloroethane	3.49	92.6	19,000
Acetonitrile	0.30	7.9	6,700
Chlorine	0.07	2.1	150
Hydrogen Chloride	2.35	62.6	700
Methyl Alcohol	10.05	266.8	26,000
Nitric Acid	6.62	175.8	500
Tetrachloroethylene	1.87	49.9	17,000
Trichlorotrifluoroethane	6.58	174.9	562,000

E4 3548

a Only those emitted at rates greater than or equal to approximately 100 lb/yr (0.01 lb/hr) are listed.

Table D2.2.7-1.-City of Oak Ridge Maximum Allowable Noise Limits Applicable to ORR

Adjacent Uses	Where Measured	Maximum Sound Level (dBA)

All Residential Districts	Common Lot Line	50
Neighborhood Business District	Common Lot Line	55
General Business District	Common Lot Line	60
Industrial District	Common Lot Line	65
Major Street	Street Lot Line	75
Secondary Residential Street	Street Lot Line	60

Source: Oak Ridge, 1985.

E4
3551

Table D2.1.2-1.-Existing Ambient Air Quality Data for Mound Plant

	Ambient Concentration (µg/m3)											
	Ozone	Sulfur Dioxide			Carbon Monoxide		Nitrogen Dioxide	TSPb		PM10c		Lead
Monitoring Station	Max. 1-hour	Annual	Max. 24-hour	Max. 3-hour	Max. 8-hour	Max. 1-hour	Annual	Annual	Max. 24-hour	Annual	Max. 24-hour	Max. Calendar Quarter
McEwen	a	a	a	a	a	a	a	a	a	22	75	a
E. Monument	a	a	a	a	a	a	a	a	a	29	89	a
Timberlane	233.5	a	a	a	a	a	a	36	104	a	a	0.1
W. Third St.	a	15.7	57.6	112.7	a	a	a	a	a	a	a	a
E. Fourth St.		a	a	a	4,466	13,969	a	a	a	a	a	a

a											
W. Fairview Ave.a	a	a	3,664	6,985	a	a	a	a	a	a	a

E4 3561

a Not measured.

b Total suspended particulates.

c Particulate matter less than 10 microns in diameter.

Source: MD DOE, 1991a.

Table D2.1.8-2.-Source Emission Inventory for SNL-Criteria Pollutants

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide (CO)	Boiler 1	0.667
	Boiler 2	0.429
	Boiler 3	0.511
	Boiler 5	0.269
	Boiler 6	1.123
	Diesel Generator	0.034
Hydrocarbons (HC)	Boiler 1	0.053
	Boiler 2	0.034
	Boiler 3	0.041
	Boiler 5	0.009
	Boiler 6	0.039
Nitrogen Dioxide (NO2)	Boiler 1	2.670

	Boiler 2	1.710
	Boiler 3	2.050
	Boiler 5	3.700
	Boiler 6	15.46
	Diesel Generato r	0.297
Sulfur Dioxide (SO2)	Boiler 1	0.011
	Boiler 2	0.007
	Boiler 3	0.009
	Boiler 5	0.005
	Boiler 6	0.016
Total Suspended Particulates	Boiler 1	0.096
	Boiler 2	0.062
	Boiler 3	0.073
	Boiler 5	0.034
	Boiler 6	0.142

E4 3562A
Source:SN DOE, 1991b.

Table D3.1.1-1.-Potential Emission Rates of Air Pollutants from Proposed Actions at KCP (lb/hr)a

Pollutant	Mound	Rocky Flats	Pinellas	Totalc
Hazardous Air Pollutants and Other Toxic Compounds				
Acetone	b	b	0.02	0.02
D'Limonene	0.03	b	b	0.03
Ethyl Alcohol	0.01	b	b	0.01
Glycol Ethers	0.09	b	0.01	0.10
Isopropyl Alcohol	0.01	0.08	0.06	0.15

Mineral Spirits/Naptha	b	0.03	b	0.03

E4 3566

a Projected for 1995 workload.
b Projected emissions are less than 100 lb/yr (0.01 lb/hr).
c Total does not include quantities noted by b.

Table D2.1.8-1.-Existing Ambient Air Quality Data for SNLe

	Ambient Concentration (µg/m3)					
	Carbon Monoxide		Nitrogen Dioxide	PM10b		Ozone
Monitoring Stationd	Max. 8-hour	Max. 1-hour	Annual	Annual	Max. 24-hour	Max. 1-hour
2G	a	a	a	21.3c	48	a
2R	5,153	10,305	a	31.3c	63	174.6
2ZE	6,527	10,305	a	17.0c	31	170.7
2ZF	a	a	a	a	a	192.3
2ZH	a	a	a	35.8c	104	186.4
2ZK	7,537	13,740	a	21.2c	36	a
2ZL	2,045	8,015	a	18.8c	39	a
2ZM	5,954	13,740	159.9c	19.2c	45	160.9
2ZN	a	a	a	18.9c	53	a
2ZO	a	a	a	29.4c	56	a

E4 3567

a Not monitored.
b Particulate matter less than 10 microns in diameter.
c Indicates that less than 75 percent of readings were present for calculation.
d Monitoring Station Information:

2G: City Yards 5501 Pino Road N.E., Albuquerque, Bernalillo
2R: 4100 Isleta S.W., Albuquerque, Bernalillo

2ZE: Charles Well #1 2421 Mesilla N.E., Albuquerque, Bernalillo
2ZF: Well 1 mi. west of Tramway & Tramway, Albuquerque, Bernalillo
2ZH: Alameda Fire Station - 9819 2nd N.W., Albuquerque, Bernalillo
2ZK: LE CO #2621 San Mateo N.E., Albuquerque, òMicro CO,ò Bernalillo
2ZL: 10155 Coors Road N.W., Albuquerque, Bernalillo
2ZM: 4700-A San Mateo N.E., Albuquerque, Bernalillo
2ZN: N.S.E., Albuquerque, Bernalillo
2ZO: 1500 Broadway N.E., Albuquerque, Bernalillo
e Data provided are for city of Albuquerque monitoring stations only; ambient air quality monitoring is not performed at SNL/NM.

Source: SN DOE, 1991b.

Table D2.1.1-4.-Maximum Allowable Prevention of Significant Deterioration (PSD) Concentration Increments (all sites)

	Averaging	PSD Increment (µg/m3)a		
Pollutant	Time	Class I	Class II	Class III
Nitrogen Dioxide (NO2)	Annual	2.5	25	50
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	2 5 25	20 91 512	40 182 700
Total Suspended Particulates (TSP)	Annual 24-hour	5 10	19 37	37 75

E4 3568

a Short-term increments are not to be exceeded more than once per year.

Source: 40 CFR 52.21.

Table D2.1.3-1.-Existing Ambient Air Quality Data for the Pinellas Plant

	Ambient Concentration (µg/m3)							
	Sulfur Dioxide			Carbon Monoxide		TSPb		Ozone
		Max.	Max.	Max.	Max.		Max.	Max.

Monitoring Station	Annual	24-hour	3-hour	8-hour	1-hour	Annual	24-hour	1-hour
Clearwater	a	a	a	a	a	33	56	a
Sheriff Dept	a	a	a	a	a	41	236	a
19th St. N., St. Petersburg	a	a	a	a	a	54	155	a
Azalea Park	a	a	a	a	a	36	61	a
Derby Lane	23	118	526	a	a	40	89	a
Anclote Road, Tarpon Springs	5	30	114	a	a	45	97	a
Coast Guard Station, Tampa	a	a	a	3,435	5,725	a	a	243.4
Tampa Stadium	a	a	a	6,870	9,160	a	a	a
Seminole Hts. School	a	a	a	8,016	13,742	a	a	a
Madison Avenue, Tampa	a	a	a	5,725	10,305	a	a	a
Pinellas Park	12	80	503	a	a	a	a	a
Brooker Creek Park	9	56	198	a	a	a	a	a
Simons Park	a	a	a	a	a	a	a	231.5

E4 3569
a No data available.
b Total suspended particulates.
Source: PI DOE, 1991d.

Table D2.1.2-2.-Source Emission Inventory for Mound Plant -Criteria Pollutants

Pollutant	Source	Emission Rate(lb/hr)
Carbon Monoxide (CO)	Boiler 1 Boiler 2 Keystone 14M	0.241 0.936 1.321
Nitrogen Dioxide (NO2)	Boiler 1 Boiler 2 Keystone 14M	0.960 3.743 5.284
Particulate Matter (PM10)	Boiler 1 Boiler 2 Keystone 14M 37-EF-01 49-CHF-01 COS-EF-01 DS-EF-13 DS-EF-27 W-EF-B	0.021 0.080 0.113 0.010 0.011 0.003 0.100 0.231 0.421
Sulfur Dioxide (SO2)	Boiler 1 Boiler 2 Keystone 14M	0.004 0.016 0.023
		E4 3571

Source: MD EG&G, 1991a.

Table D2.1.6-2.-Source Emission Inventory for LANL-Criteria Pollutants

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide (CO)	TA-3 Boiler TA-16 Boiler TA-21 Boiler West Area Boiler NG-Burning LPG-Burning Diesel-Burning	22.88 1.49 1.49 1.575 1.133 0.005 1.806
Nitrogen Dioxide (NO2)	TA-3 Boiler TA-16 Boiler TA-21 Boiler West Area Boiler NG-Burning LPG-Burning Diesel-Burning	14.1 5.95 5.95 6.3 5.67 0.023 8.306
Particulate Matter (PM10)	TA-3 Boiler TA-16 Boiler TA-21 Boiler West Area Boiler NG-Burning Diesel-Burning	1.62 0.13 0.13 0.135 0.17 0.59
		E4 3572

Source: LA DOE, 1991a.

Table D2.1.2-3.-Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at Mound Plant

Hazardous/Toxic Air Pollutant	Emission Ratea (lb/hr)	Maximum 1-hour Source Contribution at Site Boundary (µg/m3)	Ohio State Standards a (µg/m3)
1,1,1-Trichloroethane	1.03	42.5	1,310
Acetone	1.37	56.6	42,380
Ammonia	0.63	25.9	405
Hydrogen Chloride	0.40	16.5	179
Isopropyl Alcohol	0.50	20.9	23,405
Tricholorotrifluoroethane	0.42	17.5	182,619

E4 3573

a American Conference of Governmental Industrial Hygienists TLVs divided by a safety conversion factor of 42.
Source: MD EG&G, 1991a.

Table D2.1.3-2.-Source Emission Inventory for Pinellas Plant-Criteria Pollutants

Pollutant	Source	Emission Rate (lb/hr)
Lead (Pb)	1 through 10	0.0014a
Sulfur Dioxide	1	0.637

E4 3574
a Emission rate for each source. Source: PI DOE, 1991d.

Table D2.1.3-3.-Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at Pinellas

Hazardous/Toxic	Emission Rate	Maximum Source Contribution at Site Boundary (µg/m3)			FDER Air Toxic Working List Guidelines (µg/m3)		
Air Pollutant	(lb/hr)a	Annual	24-hour	8-hour	Annual	24-hour	8-hour
1,4 Dioxane	0.06	0.02	16.0	30.0	b	216	900
1,1,1-Trichloroethane	2.28	NA	26.0	40.0	b	9,168	38,200
Acetic Acid	0.21	3.06	12.22	21.39	b	60.0	250.0
Acetone	3.33	48.69	194.74	340.8	b	8,544	35,600
Ammonia	0.04	0.62	2.48	4.34	100.0	40.8	170.0
Chlorodifluoromethane	0.21	2.99	11.98	20.96	b	16,992	70,800
Dichlorodifluoromethane	0.16	2.39	9.57	16.79	200.0	23,760	99,000

Hexane	0.01	0.16	0.63	1.1	b	422.4	1,760
Hydrochloric Acid	0.84	1.07	5.0	11.0	7.0	18.0	75.0
Isopropyl Alcohol	0.84	12.25	48.99	85.73	b	2,359.2	9,830
Lead	0.01	0.01	0.07	0.1	0.09	0.12	0.5
Methyl Alcohol	0.69	10.1	40.4	70.7	b	628.8	2,620
Methyl Ethyl Ketone	0.02	0.27	1.07	1.87	80.0	1,416	5,900
Methylene Chloride	7.45	2.0	30.0	60.0	2.10	417.6	1,740
Naptha	0.06	0.81	3.23	5.65	80.0	1,041.6	4,340
Nickel	0.03	0.01	0.10	0.3	b	0.24	1.0
Nitric Acid	0.91	NA	3.0	5.0	b	12.48	52.0
Phosphoric Acid	0.19	NA	0.9	2.5	b	2.4	10.0
Tetrachloroethylene	0.23	0.08	0.3	0.53	b	813.6	3,390
Toluene	0.45	6.57	26.28	45.98	300	898	3,770
Trichloroethylene	1.66	NA	8.0	14.0	b	645.6	2,690
Trichlorotrifluoroethane	11.0	16.06	624.3	1124.1	b	36,816	153,400

E4 3575

a Only those Hazardous/Toxic Air Pollutants emitted at rates greater than or equal to 100 lb/yr (0.01 lb/hr) are listed.
b No standard.
Source: PI DOE, 1992c.

Table D2.2.5-1.-Aiken County Maximum Allowable Noise Levelsa

	Nighttime (9:00 p.m. - 7:00 a.m.) Sound Pressure Levels (dB)	
Frequency Band (Hz)	At Non-residential Lot Line	At Residential Lot Line
20 - 75	69	65
75 - 150	60	50
150 - 300	56	43
300 - 600	51	38

600 - 1,200	42	33
1,200 - 2,400	40	30
2,400 - 4,800	38	28
4,800 - 10,000	35	20

Daytime (7:00 a.m. - 9:00 p.m.) Sound Pressure Levels: Apply only one of the following corrections to the nighttime levels above.

Type of Operation in Character of Noise	Correction (dB)
Daytime operation only	plus 5
Noise source operates less than 20% of any one-hour period	plus 5
Noise source operates less than 5% of any one-hour period	plus 10
Noise source operates less than 1% of any one-hour period	plus 15
Noise of impulsive character (hammering, etc.)	minus 5
Noise of periodic character (hum, speech, etc.)	minus 5

a Noise from construction between 7:00 a.m. and 9:00 p.m. is exempt from these limits. E4 3578

Source: Aiken County, 1991.

Table D2.1.4-2.-Source Emission Inventory for RFP-Criteria Pollutants

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide	Bldg. 443-44-86	24.0
(CO)	Bldg. 440-D. GEN.	24.0
Nitrogen Dioxide	Bldg. 44-44-86	3.01
(NO2)	Bldg. 440-D. GEN.	0.25
	Bldg. 776-73	0.46

	Bldg. 776-74	0.46
	Bldg. 776-112	0.46
	Bldg. 776-117	0.46
	Bldg. 771-86	0.46
Particulate Matter	Bldg. 333-18	0.34
(PM10)	Bldg. 334-13	0.21
	Bldg. 776-24	0.29
	Bldg. 776-32	0.11
	Bldg. 451-201	0.71
	Bldg. 443-44-86	1.28
	Bldg. 440-G5	0.37
	Bldg. 444- 106	5.25
	Bldg. 444-122	0.43
	Bldg. 44-200	0.39
	Bldg. 776-32	0.41
	Bldg. 374-3	1.62
Sulfur Dioxide	Bldg. 44315	0.62
(SO2)	Bldg. 443-44-86	10.82

E4 3579
Source: RF EG&G, 1990a, 1991e.

Table D3.1.1-3.-Potential Emission Rates of Hazardous/Toxic Air Pollutants from Proposed Actions at SNL

Hazardous/Toxic Air Pollutant	Emission Rate (lb/hr)a
1,1,1-Trichloroethane	0.12
Acetone	0.10
Amyl Acetate	0.10

Isopropyl Acetate	0.05
Methylene Chloride	0.24
Toluene (methylbenzene)	0.13
Trichloroethylene	0.13
Trichlorotrifluoroethane	0.14

E4 3591

a Only those emitted at rates greaterthan or equal to 100 lb/yr (0.01lb/hr) are listed.

Source: FDI, 1993.

Table D3.1.2-1.-Potential Emission Rates of Air Pollutants for Alternative Consolidation at Mound (lb/hr)

Pollutant	Kansas City	Rocky Flats	Pinellas	Total b
Criteria Pollutants				
Carbon Monoxide (CO)				3.00
Nitrogen Dioxide (NO2)				6.39
Sulfur Dioxide (SO2)				0.01
Total Suspended Particulates (TSP)				0.38
Hazardous Air Pollutants and Other Toxic Compounds				
1,4-Dioxane	0.03	a	a	0.03
1,1,1-Trichloroethane	0.01	a	a	0.01
Acetic Acid	0.02	a	a	0.02
Acetone	0.37	a	0.02	0.39
Chlorodifluoroethane	0.02	a	a	0.02
Chlorodifluoromethane	0.01	a	a	0.01
D'Limonene	0.06	a	a	0.06

Dichlorodifluoromethane	0.01	a	a	0.01
Dimethyl Formamide	0.01	a	a	0.01
Ethylbenzene	0.02	a	a	0.02
Fluoboric Acid	0.02	a	a	0.02
Fluorine End-Capped Homopolymers	0.19	a	a	0.19
Fluoroaliphatic Polymeric Esters	0.01	a	a	0.01
Fluorobenzene	0.14	a	a	0.14
Fluorotelomer	0.01	a	a	0.01
Glycol Ethers	1.20	a	0.01	1.21
Hexane	0.03	a	a	0.03
Hydrochloric Acid	0.15	a	a	0.15
Isopropyl Alcohol	0.70	0.08	0.06	0.83
Methyl Alcohol	0.01	a	a	0.01
Methyl Ethyl Ketone	0.03	a	a	0.03
Methyl Isobutyl Ketone	0.07	a	a	0.07
Methylene Chloride (dichloromethane)	0.01	a	a	0.01
Mineral Spirits/Naptha	0.17	0.03	a	0.21
Nitric Acid	0.43	a	a	0.43
Phosphoric Acid	0.03	a	a	0.03
Sulfuric Acid	0.27	a	a	0.27
Tetrachloroethylene	0.02	a	a	0.02
Toluene (methylbenzene)	0.19	a	a	0.19
Trichloroethylene	0.22	a	a	0.22
Trichlorotrifluoroethane	0.01	a	a	0.01
Xylene (dimethylbenzene)	0.13	a	a	0.13

E4 3592

a If emitted at all, compound would be released at a rate of less than

100 lb/yr (0.01 lb/hr).
b The individual values may not add up to the total because of rounding.

Source: FDI, 1993.

Table D3.1.2-2.-Potential Emission Rates of Air Pollutants for Alternative Consolidation at Pinellas (lb/hr)

Pollutant	Kansas City	Mound	Rocky Flats	Total b
Criteria Pollutants				
Carbon Monoxide (CO)				4.62
Nitrogen Dioxide (NO2)				9.87
Sulfur Dioxide (SO2)				0.02
Total Suspended Particulates (TSP)				0.58
Hazardous Air Pollutants and Other Toxic Compounds				
1,4-Dioxane	0.03	a	a	0.03
1,1,1-Trichloroethane	0.01	a	a	0.01
Acetic Acid	0.02	a	a	0.02
Acetone	0.37	a	a	0.37
Chlorodifluoroethane	0.02	a	a	0.02
Chlorodifluoromethane	0.01	a	a	0.01
Dichlorodifluoromethane	0.01	a	a	0.01
DòLimonene	0.06	0.03	a	0.09
Dimethyl Formamide	0.01	a	a	0.01
Ethyl Alcohol	a	0.01	a	0.01
Ethylbenzene	0.02	a	a	0.02
Fluoboric Acid	0.02	a	a	0.02
Fluorine End-Capped Homopolymers	0.19	a	a	0.19

Fluoroaliphatic Polymeric Esters	0.01	a	a	0.01
Fluorobenzene	0.14	a	a	0.14
Fluorotelomer	0.01	a	a	0.01
Glycol Ethers	1.20	0.09	a	1.29
Hexane	0.03	a	a	0.03
Hydrochloric Acid	0.15	a	a	0.15
Isopropyl Alcohol	0.70	0.01	0.08	0.79
Methyl Alcohol	0.01	a	a	0.01
Methyl Ethyl Ketone	0.03	a	a	0.03
Methyl Isobutyl Ketone	0.07	a	a	0.07
Methylene Chloride (dichloromethane)	0.01	a	a	0.01
Mineral Spirits/Naptha	0.17	a	0.03	0.21
Nitric Acid	0.43	a	a	0.43
Phosphoric Acid	0.03	a	a	0.03
Sulfuric Acid	0.27	a	a	0.27
Tetrachloroethylene	0.02	a	a	0.02
Toluene (methylbenzene)	0.19	a	a	0.19
Trichloroethylene	0.22	a	a	0.22
Trichlorotrifluoroethane	0.01	a	a	0.01
Xylene (dimethylbenzene)	0.13	a	a	0.13

E4 3593

a If emitted at all, compound would be released at a rate of less than 100 lb/yr (0.01 lb/hr).
b The individual values may not add up to the total because of rounding.

Source: FDI, 1993.

Table D3.1.2-3.-Potential Emission Rates of Air Pollutants for Alternative Consolidation at Rocky Flats (lb/hr)

Pollutant	Kansas City	Pinellas	Mound	Total b
Criteria Pollutants				
Carbon Monoxide (CO)				4.99
Nitrogen Dioxide (NO2)				10.61
Sulfur Dioxide (SO2)				0.02
Total Suspended Particulates (TSP)				0.63
Hazardous Air Pollutants and Other Toxic Compounds				
1,4-Dioxane	0.03	a	a	0.03
1,1,1-Trichloroethane	0.01	a	a	0.01
Acetic Acid	0.02	a	a	0.02
Acetone	0.37	0.02	a	0.39
Chlorodifluoroethane	0.02	a	a	0.02
Chlorodifluoromethane	0.01	a	a	0.01
DòLimonene	0.06	a	0.03	0.09
Dichlorodifluoromethane	0.01	a	a	0.01
Dimethyl Formamide	0.01	a	a	0.01
Ethyl Alcohol	a	a	0.01	0.01
Ethylbenzene	0.02	a	a	0.02
Flouboric Acid	0.02	a	a	0.02
Fluorine End-Capped Homopolymers	0.19	a	a	0.19
Fluoroaliphatic Polymeric Esters	0.01	a	a	0.01
Fluorobenzene	0.14	a	a	0.14
Fluorotelomer	0.01	a	a	0.01
Glycol Ethers	1.20	0.01	0.09	1.30
Hexane	0.03	a	a	0.03

Hydrochloric Acid	0.15	a	a	0.15
Isopropyl Alcohol	0.70	0.06	0.01	0.76
Methyl Alcohol	0.01	a	a	0.01
Methyl Ethyl Ketone	0.03	a	a	0.03
Methyl Isobutyl Ketone	0.07	a	a	0.07
Methylene Chloride (dichloromethane)	0.01	a	a	0.01
Mineral Spirits/Naptha	0.17	a	a	0.17
Nitric Acid	0.43	a	a	0.43
Phosphoric Acid	0.03	a	a	0.03
Sulfuric Acid	0.27	a	a	0.27
Tetrachloroethylene	0.02	a	a	0.02
Toluene (methylbenzene)	0.19	a	a	0.19
Trichloroethylene	0.22	a	a	0.22
Trichlorotrifluoroethane	0.01	a	a	0.01
Xylene (dimethylbenzene)	0.13	a	a	0.13

E4 3594

a If emitted at all, compound would be released at a rate of less than 100 lb/yr (0.01 lb/hr).
b The individual values may not add up to the total because of rounding.
Source: FDI, 1993.

Table D2.1.1-2.-Existing Ambient Air Quality Data for Kansas City Plant

	Ambient Concentration (µg/m3)					
Lead	Ozone	Sulfur Dioxide	Carbon Monoxide	Nitrogen Dioxide	TSPb	PM10c

Monitoring Station	Annual	Max. 24-hour	Max. 3-hour	Max. 8-hour	Max. 1-hour	Annual	Annual	Max. 24-hour	Annual	Max. 24-hour	Max. Calendar Quarter	Max. 1-hour
KCP #1	3.4	13.0	35.8	40.0a	68.7	22.7	47.8	95.1	25.0	54.7	<0.1	263.1
KCP #2	3.8	16.2	42.7	3.0a	73.3	24.9	48.6	105.5	27.8	53.0	<0.1	243.4
KCP #3	2.9	18.8	63.7	5.2a	81.3	23.3	50.8	135.4	25.6	48.3	<0.1	261.1

E4 3702

a Indicates running average, the average of 8-hour periods beginning at each hour of the year.
b Total suspended particulate. Missouri has no TSP standard to compare with these data.
c Particulate matter less than 10 microns in diameter.

Source: KC ASAC, 1991e.

Table D2.1.1-3.-Source Emissions Inventory for KCP-Criteria Pollutants

Pollutant	Source	Emission Rate (lb/hr)
Carbon Monoxide	Boiler 1	2.01
(CO)	Boiler 2	5.40
	Boiler 3	0.02
	Boiler 4	3.54
Nitrogen Dioxide	Boiler 1	1.77
(NO2)	Boiler 2	1.81
	Boiler 3	2.07
	Boiler 4	3.36
Sulfur Dioxide	Boiler 1	0.74

(SO2)	Boiler 2	0.94
	Boiler 3	1.90
	Boiler 4	1.17
Total Suspended	Boiler 1	0.02
Particulates (TSP)	Boiler 2	0.005
	Boiler 3	0.06
	Boiler 4	0.03

E4 3703
Source: KC ASAC, 1991e.

Table 4.4-1.-Potential D&D Design Features

ò Modular, separable confinements for radioactive and other hazardous materials that preclude contamination of fixed portions of the structure
ò Localized liquid transfer systems that avoid long runs of buried contaminated piping, including special provisions that ensure the integrity of joints in buried pipelines
ò Exhaust filtration components of the ventilation systems at or near individual enclosures to minimize long runs of internally contaminated ductwork
ò Equipment, including effluent decontamination equipment, that precludes the accumulation of radioactive or other hazardous materials in relatively inaccessible areas, including curves and turns in piping and ductwork
ò Easily decontaminated materials that reduce the amount of radioactive and other hazardous materials requiring disposal
ò Designs that ease cutup, dismantlement, removal, and packaging of contaminated equipment from the facility
ò Modular radiation shielding in lieu of or in addition to monolithic shielding walls
ò Lifting lugs on large tanks and equipment
ò Fully drainable piping systems that carry contaminated or potentially contaminated liquids
E4 3710

Table 5-1.-Federal Legislation and DOE Orders Applicable to All Alternatives
[Page 1 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirement	Potential Applicability
Air Resources	Clean Air Act (CAA)	42 USC 7401 et seq.	EPA	Permit	DOE shall comply with all applicable sections of CAA.
	National Ambient Air Quality Standards (NAAQS)	42 USC 7409	EPA	Permit	DOE shall comply with standards regulating chemicals including SO2, NOx, CO, PM10, O3, and Pb.
	Standards of Performance - New Stationary Sources	42 USC 7411	EPA	Permit	DOE shall comply with state-submittedstandards governing stationary sources.
	National Emission Standards for Hazardous Air Pollutants (NESHAP)	42 USC 7412	EPA	Permit	DOE shall comply with standards governing hazardous pollutants including radionuclides.
	Prevention of Significant Deterioration (PSD)	42 USC 7470 et seq.	EPA	Permit	DOE will be held accountable for preventing the further deterioration of air quality.
	CAA Amendments of 1990 - State Implementation Plan (SIP)	42 USC 7410	EPA	Permit	DOE shall comply with the relevant requirements from each stateòs SIP.
Water Resources	Clean Water Act (CWA)	33 USC 1251 et seq.	EPA	Permit	DOE shall comply with all applicable sections of CWA.
	National Pollutant Discharge Elimination System Permit (NPDES)	33 USC 1342	EPA	Permit	DOE shall obtain a new, or modify an existing, NPDES permit if required.
	Storm Water Discharge Permit (section 402 of NPDES)	40 CFR 122.26	EPA	Permit	DOE shall obtain a new, or modify an existing, storm water permit if required.
	Dredge and Fill Activity	33 USC 1344	Corps of Engineers	Permit	DOE shall obtain a new, or modify an existing, dredge/fill permit if required.
	Underground Injection Control Program	40 CFR 144-149	EPA	Permit	DOE shall obtain approval from EPA for any modification to the drinking water supply

					resulting from underground injection activities.
	Rivers and Harbors Appropriations Act of 1899	33 USC 401 et seq.	EPA	Permit	DOE shall obtain a section 10 permit for work affecting navigable waters.
	Safe Drinking Water Act (SDWA)	42 USC 300 (f) et seq.	EPA	Permit	DOE shall obtain approval from EPA for any modification to the drinking water supply.
	Wild and Scenic Rivers Act	16 USC 1274 et seq.	DOI	Compliance	If applicable, DOE shall not degrade the physical or biological properties of a river designated wild and scenic.
	Executive Order 11988: Floodplain Management	3 CFR, 1977 Comp., p.	EPA	Compliance	DOE shall comply with all applicable requirements of the order, as
	Executive Order 11990: Protection of Wetlands	3 CFR, 1977 Comp., p.	EPA	Compliance	DOE shall comply with all applicable requirements of the order.
	Compliance with Floodplain/Wetlands Environmental Review Requirements	10 CFR 1022	DOE	Compliance	DOE shall follow implementing procedures.

E4 3713-1

Table 5-1.-Federal Legislation and DOE Orders Applicable to All Alternatives
-Continued [Page 2 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirement	Potential Applicability
Waste Management	Resource Conservation and Recovery Act (RCRA)	42 USC 6901et	EPA	Permit	DOE shall comply with all applicablesections of RCRA.
	Authorization under subpart C	42 USC 6926	EPA	Part B Permit	DOE shall modify any part B permits if required.
	Subtitle 1 - Underground Storage Tanks (UST)	42 USC 6991et seq.	EPA	Compliance	DOE shall comply with the design criteria and permit requirements for USTs.
	Comprehensive Environ. Response, Compen., and Liability Act (CERCLA)	42 USC 9601et seq.	EPA	Permit	DOE shall comply with all applicablesections of CERCLA.
	Executive Order 12580: Superfund Implementation	3 CFR, 1987Comp.,	EPA	Compliance	DOE shall comply with the National Contingency Plan (NCP) in addition

		p.193			to the other requirements of the order, as amended.
	Hazardous Materials Transportation Act	49 USC 1801et seq.	DOT	Compliance	DOE shall comply with the requirements governing hazardous materials transportation.
	Toxic Substances Control Act (TSCA)	15 USC 2601-2671	EPA	Compliance	DOE shall comply with all applicablesections of TSCA.
	Hazardous Materials Packaging for Transport-Administrative Procedures	DOE Order 1540.2	DOE	Compliance	DOE shall comply with the order.
	Base Technology for Radioactive Material Transportation Packaging Systems	DOE Order 1540.3	DOE	Compliance	DOE shall comply with the order.
	Hazardous and Radioactive Mixed Waste Program	DOE Order 5400.3	DOE	Compliance	DOE shall comply with the order.
	CERCLA Requirements	DOE Order 5400.4	DOE	Compliance	DOE shall comply with the order.
	NEPA Compliance Program	DOE Order 5440.1E	DOE	Compliance	DOE shall comply with the order.
	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes	DOE Order 5480.3	DOE	Compliance	DOE shall comply with the order.
	Radioactive Waste Management	DOE Order 5820.2A	DOE	Compliance	DOE shall comply with the order.
Biotic Resources	Wild Free-Roaming Horses and Burros Act of 1971	16 USC 1331et seq.	DOI	Compliance	DOE shall consult with DOI and minimize impact.
	Wilderness Act of 1964	16 USC 1131et seq.	DOI	Compliance	DOE shall consult with DOI and minimize impact.

Table 5-1.-Federal Legislation and DOE Orders Applicable to All AlternativesòContinued [Page 3 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Biotic Resources	Endangered Species Act	16 USC 1531 et seq.	DOC/DOI	Compliance	DOE shall study the impact on endangered species and comply with the act.
(continued)	Migratory Bird Treaty Act	16 USC 703 et seq.	DOI	Compliance	DOE shall consult with DOI and minimize impact.
	Bald and Golden Eagle Protection Act	16 USC 668-668d	DOI	Compliance	DOE shall consult with DOI and minimize impact.
Fish	Fish and Wildlife Coordination Act	16 USC 661 et seq.	FWS	Compliance	DOE shall consult with the U.S. and Wildlife Service and minimize
Cultural Resources	Archaeological Resources Protection Act	16 USC 470aa-470ll	DOI	Compliance	DOE shall obtain authorization for any excavation or removal of archaeological resources.
	Archaeological and Historic	16 USC 469a et seq.	DOI	Compliance	DOE shall obtain authorization for any

	Preservation Act				disturbance of archaeological resources.
applicable	Antiquities Act	16 USC 431-33	DOI	Compliance	DOE shall comply with all sections of the act.
	National Historic Preservation Act of 1966	16 USC 470 et seq.	DOI	Compliance	DOE shall consult with the State Historic Preservation Office (SHPO).
of	Executive Order 11593: Protection and Enhancement of the Cultural Environment	3 CFR, 1971-1975 Comp., p. 559	DOI	Compliance	DOE shall aid in the preservation historic and archaeologic data that may be lost during construction activities pursuant to the order.
	American Indian Religious Freedom Act of 1978	42 USC 1996	DOI	Compliance	DOE shall consult with pertinent Native American groups regarding their inherent rights to religious freedom.
objects	Native American Graves Protection and Repatriation Act of 1990	25 USC 3001	DOI	Compliance	DOE shall consult with pertinent Native American groups regarding the disposition of human remains and certain of

					cultural patrimony.
Public / Worker applicable	Occupational Safety and Health Act	5 USC 5108	OSHA	Compliance	DOE shall comply with all safety and health legislation.
Health applicable	Occupational Safety and Health Administration (OSHA) Guidelines	29 USC 660	OSHA	Compliance	DOE shall comply with all safety and health legislation.
	Occurrence Reporting and Processing of Operations Information	DOE Order 5000.3A	DOE	Compliance	DOE shall comply with the order.

E4 3713-3

Table 5-1.-Federal Legislation and DOE Orders Applicable to All AlternativesòContinued [Page 4 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirement	Potential Applicability
Public / Worker	Radiation Protection of the Public and the Environment	DOE Order 5400.5	DOE	Compliance	DOE shall comply with the order.
Health (continued)	Environmental, Safety, and Health Program for DOE Operations	DOE Order 5480.1B	DOE	Compliance	DOE shall comply with the order.
	Environmental Protection, Safety, and Health Protection Standards	DOE Order 5480.4	DOE	Compliance	DOE shall comply with the order.
	Safety of DOE-Owned Nuclear Reactors	DOE Order 5480.6	DOE	Compliance	DOE shall comply with the order.
	Fire Protection	DOE Order 5480.7	DOE	Compliance	DOE shall comply with the order.

	Construction Safety and Health Program	DOE Order 5480.9	DOE	Compliance	DOE shall comply with the order.
	Contractor Industrial HygieneProgram	DOE Order 5480.10	DOE	Compliance	DOE shall comply with the order.
	Radiation Protection for Occupational Workers	DOE Order 5480.11	DOE	Compliance	DOE shall comply with the order.
	Nuclear Safety Analysis Reports	DOE Order 5480.23	DOE	Compliance	DOE shall comply with the order.
	Safety Analysis and Review Systems	DOE Order 5481.1B	DOE	Compliance	DOE shall comply with the order.
	Occupational Safety and Health Program for DOE Contractor Employees at Government-OwnedContractor-Operated	DOE Order 5483.1A	DOE	Compliance	DOE shall comply with the order.
	Environ. Protection, Safety, and Health Protection Info. Reporting Requirements	DOE Order 5484.1	DOE	Compliance	DOE shall comply with the order.
	Safeguards and Security Program	DOE Order 5630.11	DOE	Compliance	DOE shall comply with the order.
	Safeguards and Security Inspection and Evaluation Program and Assessment Program	DOE Order 5630.12A	DOE	Compliance	DOE shall comply with the order.
	Atomic Energy Act of 1954	42 USC 2011	DOE	Compliance	DOE shall follow its own standards and procedures to ensure the safe operation of its facilities.

E4 3713-4

Table 5-1.-Federal Legislation and DOE Orders Applicable to All AlternativesòContinued [Page 5 of 5]

Resource Area	Legislation/Order	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Other	National Environmental Policy Act (NEPA)	42 USC 4321 etseq.	Council on Environmenta lQuality	Compliance	DOE shall comply with all applicablesections of NEPA.

	National Environmental Policy Act; Implementing Procedures and GuidelinesRevocation	57 CFR 15122, April 24, 1992, to be codified at 10CFR 1021	DOE	Compliance	DOE shall comply with NEPA implementing procedures.
	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	7 USC 136	EPA	Compliance	DOE shall comply with all applicablesections of FIFRA.
	Emergency Planning and Community Right-To-Know Act of 1986 (EPCRA)	42 USC 11001-11050	EPA	Compliance	DOE shall comply with the requirements of the act.
	Executive Order 12088: Federal Compliance with Pollution Control Standards	3 CFR, 1978 Comp., p. 243	EPA	Compliance	DOE shall comply with all relevant Federal pollution control standards pursuant to the order, as amended.
	Noise Control Act of 1972	42 USC 4901 etseq.	EPA	Compliance	DOE shall comply with reducing noiselevels that jeopardize the health and safety of the public.
	Uranium Mill Tailings Radiation Control Act	42 USC 7901 etseq.	EPA	Compliance/ Licenses	DOE shall enforce and implement health and environmental standards.
	General Environmental Protection Program	DOE Order 5400.1	DOE	Compliance	DOE shall comply with the order.
	Environmental Compliance Issue Coordination	DOE Order 5400.2A	DOE	Compliance	DOE shall comply with the order.
	Environment, Safety, and Health Appraisal Program	DOE Order 5482.1B	DOE	Compliance	DOE shall comply with the order.
	Emergency Management System	DOE Order 5500.1B	DOE	Compliance	DOE shall comply with the order.
	Planning and Preparednessfor Operational Emergencies	DOE Order 5500.3A	DOE	Compliance	DOE shall comply with the order.
	Quality Assurance	DOE Order 5700.6C	DOE	Compliance	DOE shall comply with the order.
	General Design Criteria	DOE Order 6430.1A	DOE	Compliance	DOE shall comply with the order.
	Farmland Protection Policy Act	7 USC 4201 et seq.	Soil Conservation Service	Compliance	DOE shall prevent any adverse effects to prime and unique farmlands.

E4 3713-5

Table 5-2.-State Permit and Notification RequirementsòProposed Action [Page 1 of 4]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Air Resources or	Missouri Air Conservation Law	MO Stat., Title 40, Chapter 643	MO Department of Natural Resources	Permit	Required prior to the construction modification of an air contaminant source.
or	Missouri Air Quality Standards	MO Code 10-6.060	MO Department of Natural Resources	Permit	Required prior to the construction modification of an air contaminant source.
or	South Carolina PollutionControl Act	SC Code, Title 48, Chapter 1	SC Department of Health and Environ. Control	Permit	Required prior to the construction modification of an air contaminant source.
or	New Mexico Air Quality Control Act	NM Stat., Title 74, Article 2	NM Health and Environ. Dept.	Permit	Required prior to the construction modification of an air contaminant source.
or	New Mexico Air Quality Standards and Regulations	NM Air Quality Control Regs., 100	NM Health and Environ. Dept.	Permit	Required prior to the construction modification of an air contaminant source.

or	Tennessee Air Quality Act	TN Code, Title 68, Chapter 25	TN Air Pollution Control Board	Permit	Required prior to the construction modification of an air contaminant source.
or	Tennessee Air Pollution Control Regulations	TN Rules, Division of Air Pollution	TN Air Pollution Control Board	Permit	Required prior to the construction modification of an air contaminant source.
					E4 3714-1

Table 5-2.-State Permit and Notification RequirementsòProposed ActionòContinued [Page 2 of 4]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Water Resources construction or	Missouri Clean Water Law	MO Stat., Title 40, Chapter 644	MO Department of Natural Resources	Permit	Required prior to the modification of a water discharge source.
construction or	New Mexico Water Quality Act	NM Stat., Title 74, Article 6	NM Water Quality ControlCom.	Permit	Required prior to the modification of a water discharge source.
construction or	New Mexico Water Quality Regulations	NM Water Regulations	NM Water Quality ControlCom.	Permit	Required prior to the modification of a water discharge source.
	South Carolina Pollution	SC Code,	SC Department	Permit	Required prior to the

construction or	Control Act	Title 48, Chapter 1	of Health and Environ. Control		modification of a water discharge source.
construction or	South Carolina Water Quality Standards	SC Code, Chap. 61, Regulation 68	SC Department of Health and Environ. Control	Permit	Required prior to the modification of a water discharge source.
construction or	Tennessee Water Quality Control Act	TN Code 70-324 et seq.	TN Water Quality ControlBoard	Permit	Required prior to the modification of a water discharge source.
construction or	Tennessee General Regulations	TN Code, 1200-4-1-.05	TN Water Quality ControlBoard	Permit	Required prior to the modification of a water discharge source.
					E4 3714-2

Table 5-2.òState Permit and Notification RequirementsòProposed Action òContinued [Page 3 of 4]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Waste Management	Missouri Solid Waste Law	MO Code, Title 10, Division 80	MO Department of NaturalResources	Permit	Required prior to the construction or modification of a solid waste disposal facility.

construction or modification of a	Missouri Hazardous Waste Management Law	MO Code, Title 10, Division 25	MO Department of NaturalResources	Permit	Required prior to the hazardous waste disposal facility.
construction or modification of a	New Mexico Solid Waste Act	NM Stat., Chap. 74, Article 8	NM Health and Environ. Dept.	Permit	Required prior to the solid waste disposal facility.
construction or modification of a	New Mexico Solid Waste Management Regulations	NM Solid Waste Mgmt. Regs.	NM Environmental Improvement Div.	Permit	Required prior to the solid waste disposal facility.
construction or modification of a	New Mexico Hazardous Waste Management Regulations	NM Hazardous Waste Mgmt. Regs.	NM Environmental Improvement Div.	Permit	Required prior to the hazardous waste disposal facility.
construction or modification of a	South Carolina Solid Waste Regulations	SC Code, Chap. 61, Regulation 60	SC Department of Health and Environ. Control	Permit	Required prior to the solid waste disposal facility.
construction or modification of a	South Carolina Industrial Solid Waste Disposal Site Regulations	SC Code, Chap. 61, Regulation 66	SC Department of Health and Environ. Control	Permit	Required prior to the solid waste disposal facility.
					E4 3714-3

Table 5-2.-State Permit and Notification RequirementsòProposed ActionòContinued [Page 4 of 4]

Resource	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Waste Management (continued)	South Carolina Hazardous Waste Management Act	SC Code, Title 44, Chapter 56	SC Department of Health and Environ. Control	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
	Tennessee Solid Waste Processing and Disposal Regulations	TN Rules, 1200-1-7-.02	TN Division of Solid Waste Mgmt.	Permit	Required prior to the construction or modification of a solid waste disposal facility.
	Tennessee Hazardous Waste Management Act	TN Code, Title 68, 1200-1-11	TN Division of Solid Waste Mgmt.	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
Chemical and Material Storage	New Mexico Underground Storage Tank Regulations	NM Underòground Storage Tank Regulations	NM Health and Environ. Dept.	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.
	Missouri Underground Storage Tank Act	MO Code, Title 10	MO Department of Natural Resources	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.

requirements modification of an	South Carolina UndergroundStorage Tanks Act	SC Code, Title 44, Chapter 2	SC Department of Health and Environ. Control	Permit	Required to comply with tank prior to the construction or underground storage tank.
requirements modification of an	Tennessee Underground Storage Tank Program Regulations	TN Rules, Chapter 1200-1-15	TN Division of USTPrograms	Permit	Required to comply with tank prior to the construction or underground storage tank.
					E4 3714-4

Table B1-1.-Operations Transferring to KCP

Pinellas	Mound	RFP
Support Pads Optoelectronics Assemblies Neutron Detectors Lightning Arrestor Connectors Transducers Lithium Ambient Batteries	Flat Cable Products Mechanical Assemblies Round Wire Detonator Cables Nonnuclear Acorn Plastic Headers	Reservoirs Nuclear Grade Steels/Oxnard Safe Secure Trailers Weapon Trainer Shop Metrology Services

E4 3715

Table B1-2.-Kansas City Plant: Estimated Additional Annual Wastes Associated With Relocated Functions

	Waste Typea	
	Hazardous/Toxic	Nonhazardous

	Liquid		Solid		Liquid		Solid	
Product	lb	gal	lb	ft3	lb	gal	lb	ft3
Support Pads	100	10	518	7	1,548,800	154,880	1,371	18
Optoelectronics Assembly	365	37	128	2	5,280	528	109	1
Neutron Detectors	153	15	30	<1	0	0	13	<1
Lightning Arrestor Connectors	510	51	23	<1	1,725	172	213	3
Transducers	153	15	55	<1	0	0	5	<1
Lithium Ambient Batteries	22	2	23	<1	0	0	0	0
Flat Cable Products	2,414	241	3,327	44	5,956	596	1,965	26
Mechanical Assemblies	6,646	665	702	9	42,078	4,208	1,046	14
Round Wire Detonator Cables	50	5	25	<1	150,000	15,000	7	<1
Plastic Headers	0	0	0	0	0	0	404	5
Reservoirs and Nonnuclear Acorn	68,850	6,885	250	3	15,003,100	1,500,310	13,400	179
Nuclear Grade Steel/Oxnard	0	0	0	0	0	0	0	0
Safe Secure Trailers	2,000	200	3,000	40	7,000	700	2,000	27
Weapon Trainer Shop	60	6	0	0	0	0	600	8
Metrology Services	0	0	0	0	0	0	0	0
Total	81,323	8,132	8,081	108	16,763,939	1,676,394	21,133	282

E4 3716
a No LLW or mixed waste is anticipated.

Note: Table assumes conversion of 1 gallon = 10 lb = 0.1337 ft3.
Source: KC ASAC, 1992a and 1993b.

Table B2-2.-Savannah River Plant: Estimated Additional Wastes Associated With Relocated Functions

	Waste Type			
	Hazardous/ Toxic	Nonhazardous	LLW	Mixed
Product	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid
Reservoir Surveillance Operations	None None	82,125 gal 500 ft3	None 200 ft3	None None
Gas Transfer Systems and Commercial Sales/ICF Target Loading	None None	219,000 gal 500 ft3	None 300 ft3	None None
Total Liquid Solid	None None	301,125 gal 1,000 ft3	None 500 ft3	None None

E4 3719
Source: SR DOE, 1992a.

Table B2-1.-Operations Transferring to SRS

Mound
Reservoir Surveillance Operations Gas Transfer Systems Commercial Sales/ICF Target Loading
E4 3720

Table B3-1.-Operations Transferring to LANL

Mound
High-Power Detonators
Calorimeters

Pinellas
Neutron Tube Target Loading
RFP
Beryllium Technology
Pit Support Functions
E4 3732

Table B3-2.-LANL: Estimated Additional Wastes Associated With Relocated Functions

	Waste Type			
	Hazardous/ Toxic	Nonhazardous	LLW	Mixed
Product	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid
High-Power Detonators	7,000 gal 205 ft3	244,400 gal 2,000 ft3	None None	None None
Calorimeters	None None	98,800 gal 2,000 ft3	None None	None None
Neutron Tube Target Loading	None None	41,600 gal 2,000 ft3	30 gal 200 ft3	None 20 ft3
Beryllium Technology Functions	500 gal 60 ft3	26,000 gal 3,120 ft3	None None	None None
Pit Support Functions	8 gal 40 ft3	31,200 gal 1,560 ft3	None None	None None
Total Liquid Solid	7,508 gal 305 ft3	442,000 gal 10,680 ft3	30 gal 200 ft3	None 20 ft3

E4 3733
Source:LA FDI, 1993; LA DOE, 1992.

Table E3.3-2.-Los Alamos National Laboratory ROI Housing Characteristicsa

		Owner-occupied Units	Renter-occupied Units	

County/City	Total Units	Number of Units	Percent Vacant	Number of Units	Percent Vacant	Mobile Homes
1970						
New Mexico						
Los Alamos County	4,706	3,210	1	1,251	13	126
Rio Arriba County	7,503	4,910	2	1,483	8	550
Española	1,362	799	1	430	5	122
Santa Fe County	16,135	10,321	1	4,979	5	785
Santa Fe	12,558	7,881	1	4,182	5	379
ROI (County Total)	28,344	18,441	1	7,713	7	1,461
1980						
New Mexico						
Los Alamos County	6,585	4,629	4	1,654	7	197
Rio Arriba County	11,107	7,086	20	1,992	11	2,372
Española	2,641	1,718	10	662	11	625
Santa Fe County	28,314	17,460	8	8,827	6	2,865
Santa Fe	19,028	10,932	7	6,919	4	548
ROI (County Total)	46,006	29,175	11	12,473	7	5,434
1990						
New Mexico						
Los Alamos County	7,565	5,367	1	1,846	5	411
Rio Arriba County	14,357	9,218	1	2,243	13	4,468
Española	2,461	1,548	2	669	14	846
Santa Fe County	41,464	25,621	1	12,219	7	7,234
Santa Fe	24,681	13,592	1	9,197	7	1,464

ROI (County Total)	63,386	40,206	1	16,308	8	12,113

E4 3736

Source: Census, 1972, 1982, 1991b.

Table E3.4-2.-Oak Ridge Reservation ROI Housing Characteristics

		Owner-occupied Units		Renter-occupied Units		
County/City	Total Units	Number of Units	Percent Vacant	Number of Units	Percent Vacant	Mobile Homes
1970						
Tennessee						
Anderson County	20,451	13,536	1	5,595	9	790
Clinton	1,702	1,128	1	483	6	26
Oak Ridge	9,972	6,205	1	3,235	10	1
Blount County	21,835	15,300	2	5,041	7	1,242
Knox County	93,011	57,656	2	29,709	7	2,507
Knoxville	61,042	32,767	1	24,292	9	689
Loudon County	8,439	5,924	1	1,901	7	529
Roane County	13,189	9,188	1	2,985	8	687
ROI (County Total)	156,925	101,604	1	45,231	7	5,755
1980						
Tennessee						
Anderson County	25,849	17,667	4	6,949	6	2,077
Clinton	2,073	1,415	3	571	7	38

Oak Ridge	11,487	7,082	3	3,939	6	19
Blount County	30,836	21,112	9	7,065	8	2,473
Knox County	125,883	74,569	8	43,382	4	5,091
Knoxville	73,263	35,075	5	33,499	8	3,153
Loudon County	10,835	8,077	5	2,212	5	1,024
Roane County	18,732	13,229	8	3,849	11	1,821
ROI (County Total)	212,135	134,654	7	63,457	5	12,486
1990						
Tennessee						
Anderson County	29,323	19,401	1	7,983	9	3,260
Clinton	4,006	2,229	1	1,566	6	230
Oak Ridge	11,664	6,962	1	3,852	12	60
Blount County	26,947	25,072	2	8,552	8	4,548
Knox County	143,582	85,369	2	48,270	8	9,222
Knoxville	76,453	34,892	2	35,081	9	1,402
Loudon County	12,995	9,428	2	2,727	7	1,919
Roane County	20,334	14,102	1	4,351	10	3,041
ROI (County Total)	233,181	153,372	2	71,883	8	21,990

E4 3737

Source: Census, 1972, 1982, 1991b.

Table E3.5-2.-Sandia National Laboratories, New Mexico, ROI Housing Characteristics

		Owner-occupied Units		Renter-occupied Units		
County/City	Total Units	Number of	Percent Vacant	Number of	Percent Vacant	Mobile Homes

		Units		Units		
1970						
New Mexico						
Bernalillo County	98,638	61,509	1	32,714	6	3,886
Albuquerque	78,788	48,830	1	28,826	11	2,068
Sandoval County	4,785	3,323	1	818	7	239
Valencia County	11,554	7,574	2	2,761	12	1,388
ROI (County Total)	114,977	72,406	1	36,293	6	5,513
1980						
New Mexico						
Bernalillo County	162,126	95,533	5	55,504	10	9,503
Albuquerque	132,788	75,389	5	48,649	10	5,056
Sandoval County	12,286	8,711	15	1,753	14	1,300
Valencia County	22,353	15,503	2	3,610	17	5,495
ROI (County Total)	196,765	119,747	7	60,867	10	16,298
1990						
New Mexico						
Bernalillo County	201,235	112,589	2	72,993	10	15,869
Albuquerque	166,870	88,186	2	65,632	10	9,159
Sandoval County	23,667	17,268	2	3,599	8	2,746
Valencia County	16,781	12,650	3	2,520	15	5,664
ROI (County Total)	241,683	142,507	2	79,112	10	24,279
E4 3738						
Source: Census, 1972, 1982, 1991b.						

Table E3.6-2.-Mound Plant ROI Housing Characteristics

		Owner-occupied Units		Renter-occupied Units		
County/City	Total Units	Number of Units	Percent Vacant	Number of Units	Percent Vacant	Mobile Homes
1970						
Ohio						
Butler County	69,284	46,512	0	20,598	6	1,760
Montgomery County	197,397	122,311	0	68,494	5	3,049
Centerville	2,984	2,244	0	647	6	n/a
Dayton	85,401	41,609	1	39,998	6	815
Miamisburg	4,837	3,116	0	1,611	4	94
Warren County	24,059	17,155	1	6,139	4	426
ROI (County Total)	290,740	185,978	1	95,231	5	5,235
1980						
Ohio						
Butler County	92,528	61,518	4	26,612	7	3,760
Montgomery County	227,582	136,729	6	75,128	9	3,026
Centerville	6,922	4,884	3	1,677	11	2
Dayton	86,789	39,265	12	38,387	10	767
Miamisburg	5,891	3,689	4	1,902	7	1
Warren County	33,292	23,849	4	7,776	8	624
ROI (County Total)	353,402	222,096	5	109,516	9	7,410

1990						
Ohio						
Butler County	110,353	72,365	2	32,170	8	5,783
Montgomery County	240,820	142,371	1	83,821	8	5,939
Centerville	8,801	5,297	2	2,401	9	802
Dayton	80,370	37,049	2	35,621	10	1,601
Miamisburg	6,844	4,364	1	2,272	4	51
Warren County	40,636	29,252	1	9,898	6	1,213
ROI (County Total)	391,809	243,988	1	125,889	8	12,935
E4 3739						
Source: Census, 1972, 1982, 1991b.						

Table E3.7-2.-Pinellas Plant ROI Housing Characteristics

		Owner-occupied Units		Renter-occupied Units		
County/City	Total Units	Number of Units	Percent Vacant	Number of Units	Percent Vacant	Mobile Homes
1970						
Florida						
Hillsborough County	168,555	115,857	2	42,893	10	11,380
Pasco County	34,816	26,000	3	4,360	15	5,807
Pinellas County	228,771	159,881	2	51,420	12	22,042
Clearwater	23,333	14,470	2	6,746	12	1,976
Largo	9,244	6,970	2	1,743	11	1,283
St. Petersburg	97,116	62,743	2	26,159	11	2,906

ROI (County Total)	432,142	301,738	2	98,673	11	39,229
1980						
Florida						
Hillsborough County	263,619	159,104	10	78,139	9	15,562
Pasco County	100,846	69,317	20	12,029	15	19,621
Pinellas County	377,052	229,769	17	89,758	11	34,106
Clearwater	44,183	23,786	17	13,574	13	2,354
Largo	31,366	18,237	17	8,671	8	5,638
St. Petersburg	119,486	68,159	14	35,935	11	3,297
ROI (County Total)	741,517	458,190	15	179,926	10	69,289
1990						
Florida						
Hillsborough County	367,740	204,966	4	119,906	14	45,459
Pasco County	148,965	98,384	4	23,290	15	41,445
Pinellas County	458,341	263,388	4	117,247	14	57,149
Clearwater	53,833	27,267	4	16,871	16	4,457
Largo	38,711	21,012	4	10,909	12	11,914
St. Petersburg	125,452	66,577	4	39,126	14	6,747
ROI (County Total)	975,046	566,738	4	260,443	14	144,053
E4 3740						
Source: Census, 1972, 1982, 1991b.						

Table E3.8-2.-Rocky Flats Plant ROI Housing Characteristics

		Owner-occupied Units		Renter-occupied Units		
County/City	Total Units	Number of Units	Percent Vacant	Number of Units	Percent Vacant	Mobile Homes
1970						
Colorado						
Adams County	51,457	37,603	1	12,421	5	3,506
Arapahoe County	48,919	34,481	1	13,048	3	1,708
Boulder County	44,307	25,012	1	15,842	5	1,963
Boulder	21,632	10,718	1	8,131	4	557
Denver County	193,754	93,156	1	92,175	6	594
Jefferson County	72,092	50,800	1	17,563	4	2,016
Arvada	12,551	10,344	1	2,056	3	4
Westminster	5,224	3,935	0	1,210	4	5
ROI (County Total)	410,529	241,052	1	151,049	5	9,787
1980						
Colorado						
Adams County	89,280	58,354	5	25,865	8	10,297
Arapahoe County	113,229	75,471	6	30,547	7	2,294
Boulder County	74,638	42,428	9	26,536	6	3,608
Boulder	30,287	13,489	6	15,185	5	723
Denver County	227,879	106,299	6	105,267	8	718
Jefferson County	138,542	98,633	6	36,145	7	1,751
Arvada	29,360	20,860	3	7,342	6	10
Westminster	18,560	12,083	7	5,093	7	578
ROI (County Total)	643,568	381,185	6	224,360	8	18,668
1990						

Colorado						
Adams County	106,947	63,129	4	33,224	14	12,803
Arapahoe County	168,665	98,376	3	56,334	13	3,411
Boulder County	94,621	54,031	2	34,371	5	4,730
Boulder	36,270	16,007	2	18,674	5	1,070
Denver County	239,636	103,765	4	107,187	14	2,645
Jefferson County	178,611	116,830	3	49,715	9	3,107
Arvada	33,643	23,085	2	8,813	9	181
Westminster	29,868	18,151	3	9,677	10	652
ROI (County Total)	788,480	436,131	3	280,831	11	26,696

E4 3741

Source: Census, 1972, 1982, 1991b.

Table B4-1.-Operations Transferring to Yò12

RFP
Beryllium Technology Pit Support Functions
E4 3756

Table B4-2.-Yò12 Plant: Estimated Additional Annual Wastes Associated with Relocated Functions

	Waste Type			
	Hazardous/ Toxic	Nonhazardous	LLW	Mixed
Product	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid	Liquid/ Solid
Beryllium Technology and Pit Support Functions	4,310 gal 950 ft3a	3,579 galb Negligible	Nonec 22.2 ft3	None None

Total	4,310 gal 950 ft3a	3,579 galb Negligible	None 22.2 ft3	None None

E4 3757

a Assumes 15 percent sludge generated from water during treatment at the Y-12 Central Pollution Control Facility and West End Treatment Facility.
b This amount is Central Pollution Control Facility & West End Treatment Facilityòtreated water discharged into EastFork Poplar Creek.
c The LLW machine coolant, identified in table B4-3, is first treated at the Waste Coolant Processing Facility in which the organics are removed. The remaining LLW aqueous waste is then taken to the West End Treatment Facility or Central Pollution Control Facility for further treatment. After treatment a small amount of LLW solid and nonhazardous liquid remains. These quantities are included in the LLW solid and nonhazardous liquid columns.

Source:Y-12 DOE, 1992b.

Table B4-3.-Y-12 Plant: Process-Specific Wastes, Generation, and Waste Management AlternativesòContinued
[Page 2 of 2]

Category	Description	Generation Point(s)a	Estimated Generation Rate	Waste Handling Procedures/Facilities
Solid, Nonhazardous Waste contaminated metallic waste Yard to be stored in 8 storage boxes	Metal machine turnings & other nonhazardous metal scrap (stainless steel (SS), titanium (Ti), tantalum (Ta), vanadium (Va), etc.)	MACH, SF	3 drums/yr	Treat as low-radiation and send to Y-12 Salvage ft x 8 ft x 20 ft waste
Liquid Aqueous Wastes Treatment Facility	LLW machine coolant (Trimsol)	MACH	2 drums/yr	Treated at Y-12 West End
Aqueous Wastes Treatment Facility	Be-contaminated nitric acid solutions	DECAN	<500 gal/yr	Send to Y-12 West End

Solid, Non-RCRA Hazardous Waste	Be-contaminated HEPA filters & prefilters	9201-5 3rd floor exhaust system	Est. 60 filters/yr (240 ft3/yr uncompacted)	Convert to BeO and dispose of in Y-12 landfill or Declare "no radiation added" and ship to offsite secure landfill
Solid Nonhazardous	Be-contaminated Oil/coolant filters	MACH	Variable <1 drum/yr	Long term storage as RCRA in the Containerized Waste Storage Area. Keep as "no radiation added"
Solid, Non-RCRA Hazardous	Be-contaminated graphite	VIM, GA	<200 lb/yr	Convert to BeO and dispose of in Y-12 landfill or For noncleanable metals, prove "no radiation added" and ship to offsite secure landfill or Bag and store onsite in 4 ft x 6ft x 4ft waste storage boxes

E4 3758-2

a Abbreviations used for generation points are as follows:
BRAZ = brazing; DECAN = can dissolution; GA = gas atomization; HIP = hot isostatic pressing; HT = post machining heat treat; IG = impact grinding;
MACH = machining operations; NNS = near net shape forming process;
PH = powder handling (NNS step); SF = spinforming; UC = ultrasonic cleaning;
VIM = vacuum induction melting;.

Source: Y-12 DOE, 1992b.

Table B4-3.-Y-12 Plant: Process-Specific Wastes, Generation, and Waste Management AlternativesòContinued
[Page 2 of 2]

Category	Description	Generation Point(s)a	Estimated Generation Rate	Waste Handling Procedures/Facilities

Solid, Nonhazardous Waste contaminated metallic waste to be stored in 8 boxes	Metal machine turnings & other nonhazardous metal scrap (stainless steel (SS), titanium (Ti), tantalum (Ta), vanadium (Va), etc.)	MACH, SF	3 drums/yr	Treat as low-radiation and send to Y-12 Salvage Yard ft x 8 ft x 20 ft waste storage
Liquid Aqueous Wastes Treatment Facility	LLW machine coolant (Trimsol)	MACH	2 drums/yr	Treated at Y-12 West End
Aqueous Wastes Facility	Be-contaminated nitric acid solutions	DECAN	<500 gal/yr	Send to Y-12 West End Treatment
Solid, Non-RCRA Hazardous in Y-12 landfill Waste and ship to offsite	Be-contaminated HEPA filters & prefilters	9201-5 3rd floor exhaust system	Est. 60 filters/yr (240 ft3/yr uncompacted)	Convert to BeO and dispose of or Declare òno radiation addedò secure landfill
Solid Nonhazardous the Containerized òno radiation addedò	Be-contaminated Oil/coolant filters	MACH	Variable <1 drum/yr	Long term storage as RCRA in Waste Storage Area. Keep as
Solid, Non-RCRA Hazardous in Y-12 landfill òno radiation addedò landfill 6ft x 4ft waste	Be-contaminated graphite	VIM, GA	<200 lb/yr	Convert to BeO and dispose of or For noncleanable metals, prove and ship to offsite secure or Bag and store onsite in 4 ft x storage boxes

E4 3758-2

a Abbreviations used for generation points are as follows:
BRAZ = brazing; DECAN = can dissolution; GA = gas atomization; HIP = hot isostatic pressing; HT = post machining heat treat; IG = impact grinding; MACH = machining operations; NNS = near net shape forming process; PH = powder handling (NNS step); SF = spinforming; UC = ultrasonic cleaning; VIM = vacuum induction melting;.

Source: Y-12 DOE, 1992b.

Table B4-3.-Y-12 Plant: Process-Specific Wastes, Generation, and Waste Management Alternatives-Continued
[Page 2 of 2]

Category	Description	Generation Point(s)a	Estimated Generation Rate	Waste Handling Procedures/Facilities
Solid, Nonhazardous Waste contaminated metallic waste to be stored in 8 boxes	Metal machine turnings & other nonhazardous metal scrap (stainless steel (SS), titanium (Ti), tantalum (Ta), vanadium (Va), etc.)	MACH, SF	3 drums/yr	Treat as low-radiation and send to Y-12 Salvage Yard ft x 8 ft x 20 ft waste storage
Liquid Aqueous Wastes Treatment Facility	LLW machine coolant (Trimsol)	MACH	2 drums/yr	Treated at Y-12 West End
Aqueous Wastes Facility	Be-contaminated nitric acid solutions	DECAN	<500 gal/yr	Send to Y-12 West End Treatment
Solid, Non-RCRA Hazardous in Y-12 landfill Waste and ship to offsite	Be-contaminated HEPA filters & prefilters	9201-5 3rd floor exhaust system	Est. 60 filters/yr (240 ft3/yr uncompacted)	Convert to BeO and dispose of or Declare òno radiation addedò secure landfill
Solid Nonhazardous the Containerized	Be-contaminated Oil/coolant	MACH	Variable <1	Long term storage as RCRA in

òno radiation addedò	filters		drum/yr	Waste Storage Area. Keep as
Solid, Non-RCRA Hazardous in Y-12 landfill òno radiation addedò landfill 6ft x 4ft waste	Be-contaminated graphite	VIM, GA	<200 lb/yr	Convert to BeO and dispose of or For noncleanable metals, prove and ship to offsite secure or Bag and store onsite in 4 ft x storage boxes

E4 3758-2
a Abbreviations used for generation points are as follows: BRAZ = brazing; DECAN = can dissolution; GA = gas atomization; HIP = hot isostatic pressing; HT = post machining heat treat; IG = impact grinding; MACH = machining operations; NNS = near net shape forming process; PH = powder handling (NNS step); SF = spinforming; UC = ultrasonic cleaning; VIM = vacuum induction melting;.
Source: Y-12 DOE, 1992b.

Table B5-1.-Operations Transferring to Sandia National Laboratories

Mound
Milliwatt Heat Source Surveillance
Pinellas
Neutron Generators Thermal Batteries Cap Assemblies
E4 3759

Table B5-2.-SNL: Estimated Additional Wastes Associated With Relocated Functions

	Waste Type

Product	Hazardous/ Toxic Liquid/ Solid	Nonhazardous Liquid/ Solid	LLW Liquid/ Solid	Mixed Liquid/ Solid
Cap Assemblies	250 gal 3 ft3	216,000 gal 800 ft3	None None	None 0.005 ft3
Neutron Generators	1,000 gal 150 ft3	3,000,000 gal 8,500 ft3	100 gal 294 ft3	None None
Thermal Batteries	None 44 ft3	None None	None None	None None
Milliwatt Heat Source Surveillance	2 gal 12 ft3	None 40 ft3	None None	None None
Total Liquid Solid	1,252 gal 209 ft3	3,216,000 gal 9,340 ft3	100 gal 294 ft3	None 0.005 ft3

E4 3760
Source: SN DOE, 1992d; SN FDI, 1992.

Table 3.4.2-3.-Pinellas Plant Alternative: Estimated Additional Annual Waste Generation at Pinellas

Waste	Quantity
Hazardous/Toxic Liquid Solid	 51,500 gal 12,300 ft3
Nonhazardous Liquid Solid	 153 million gal 473,000 ft3
LLW Liquid Solid	 None 15 ft3
Mixed Liquid Solid	 None None

E4 3762
Source: FDI, 1993.

Table 3.3.3-3.-Los Alamos National Laboratory: Estimated Construction Material/Resource RequirementsòProposed Action

Materials/Resources	Requirement
Utilities:	
Electricity	1,750
Water	5,200
Solids:	
Concrete	264 yd3
Steel (structural, rebar, ductwork, and piping)	23 tons
Liquid Fuels	18,200
Gases	48,000 ft3

E4 3766

a Average daily consumption.

Source: LA FDI, 1993.

Table 4.1.4.2-2.-Contribution to Air Quality from Proposed Action and Total Concentrations at ORR with Comparison to Applicable Regulations and Guidelines

Concentration Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3)d	Proposed Action Concentration (µg/m3)	Total (µg/m3)
Carbon Monoxide (CO)	8-hour	10,000b	_ 7.5	e	_ 7.5
	1-hour	40,000b	_ 15.4	e	_ 15.4

Hydrogen Fluoride (HF) (as fluorides)	30-day	1.2c	0.2	e	0.2
	7-day	1.6c	0.3	e	0.3
	24-hour	2.9c	f	e	f
	12-hour	3.7c	f	e	f
	8-hour	250c	_ 9.5	e	_ 9.5
Lead (Pb)	Calendar Quarter	1.5b	f	e	f
Nitrogen Dioxide (NO2)	Annual	100b	_ 9.0	e	_ 9.0
Sulfur Dioxide (SO2)	Annual	80b	62.9	e	62.9
	24-hour	365b	565.2	e	565.2
	3-hour	1,300b	1,591.6	e	1,591.6
Total Suspended Particulates (TSP)	Annual	60c	77.2	e	77.2
	24-hour	150c	402.6	e	402.6

Hazardous Air Pollutants and Other Toxic Compoundsa

1,1,1-Trichloroethane	8-hour	19,000c	_ 92.6	e	_ 92.6
Acetonitrile	8-hour	6,700c	_ 7.9	e	_ 7.9
Chlorine	8-hour	150c	_ 2.1	e	_ 2.1
Hydrogen Chloride	8-hour	700c	_ 62.6	e	_ 62.6

Methyl Alcohol	8-hour	26,000c	_ 266.8	e	_ 266.8
Nitric Acid	8-hour	500c	_ 175.8	e	_ 175.8
Tetrachloroethylene	8-hour	17,000c	_ 49.9	e	_ 49.9
Trichlorotrifluoroethane	8-hour	562,000c	_ 174.9	e	_ 174.9

E4 3774

a Compounds listed are the major pollutants of concern (Y-12 MMES, 1991b).
b Federal standard (40 CFR 50).
c Design report indicates that emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (Y-12 MMES, 1992b).
d Baseline Concentration values are from table 4.1.4.2-1.
e Design report indicates that emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (Y-12 MMES, 1992b).
f Data unavailable.

Table 4.1.3.2-1-LANL Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3)	No Action Concentration (µg/m3)	Baseline Concentration (µg/m3)
Carbon Monoxide (CO)	8-hour	10,000b	d	1,792	_1,792
	1-hour	15,000b	d	9,402	_9,402
Hydrogen Sulfide (H2S)	1-hour	14b	d	f	d

Lead (Pb)	Calendar Quarter	1.5c	d	f	d
Nitrogen Dioxide (NO2)	Annual	94b	d	8	_8
	24-hour	188b	d	169	_169
Ozone (O3)	1-hour	118b	149.0	f	149
Particulate Matter (PM10)	Annual	50c	29.7e	0.4e	30
	24-hour	150c	150.8e	7.5e	158
Sulfur Dioxide (SO2)	Annual	52b	d	0.1	_0.1
	24-hour	262b	d	2.7	_2.7
	3-hour	1,300c	d	9.3	_9.3
Total Reduced Sulfur	1-hour	4b	d	f	d
Total Suspended Particulates (TSP)	Annual	60b	29.7	0.4	30.1
	30-day	90b	d	0.9	_0.9
	7-day	110b	d	g	d
	24-hour	150b	150.8	7.5	158.3
Hazardous Air Pollutants and Other Toxic Compoundsa					
2-Butoxyethanol	8-hour	1,200b	d	2.5	_2.5
Acetic Acid	8-hour	250b	d	0.2	_0.2
Acetone	8-hour	5,900b	d	26.3	_26.3
Acetonitrile	8-hour	340b	d	0.5	_0.5
Ammonia	8-hour	180b	d	9.2	_9.2

Dioxane	8-hour	36b	d	0.3	_0.3
Fluoride Compounds	8-hour	25b	d	0.3	_0.3
Hexane (N-hexane)	8-hour	1,800b	d	1.1	_1.1
Hydrogen Chloride	8-hour	70b	d	4.4	_4.4
Isopropyl Alcohol	8-hour	9,800b	d	2.0	_2.0
Methyl Acetate	8-hour	6,100b	d	3.6	_3.6
Methyl Alcohol	8-hour	2,600b	d	10.7	_10.7
Methyl Ethyl Ketone	8-hour	5,900b	d	7.7	_7.7
Methylene Chloride	8-hour	2,610b	d	1.7	_1.7
N-butyl Acetate	8-hour	7,100b	d	0.2	_0.2
Nitric Acid	8-hour	50b	d	4.1	_4.1
Nitric Oxide	8-hour	300b	d	2.5	_2.5
Nitrogen Oxide	8-hour	300b	d	2.5	_2.5
Nitrous Oxide	8-hour	449b	d	1.1	_1.1
sec-Butyl Alcohol	8-hour	3,050b	d	0.3	_0.3
Stoddard Solvent	8-hour	5,250b	d	2.3	_2.3
Sulfuric Acid	8-hour	10b	d	0.3	_0.3

E4 3775-1
Footnotes at end of table.

Table 4.1.3.2-1-LANL Ambient and No Action Concentrations Comparison with Applicable Regulations and Guidelines -Continued [Page 2 of 2]

Concentration Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Maximum Background Concentration (µg/m3)	No Action Concentration (µg/m3)	Baseline (µg/m3)

Hazardous Air Pollutants and Other Toxic Compoundsa					
Tetrahydrofuran	8-hour	5,900b	d	0.5	_0.5
Toluene	8-hour	3,750b	d	0.7	_0.7
Trichloroethylene	8-hour	250b	d	3.0	_3.0
Trichloromethane	8-hour	97.5b	d	1.1	_1.1
Turpentine	8-hour	5,600b	d	1.4	_1.4
VM&P Naphtha	8-hour	13,500b	d	5.2	_5.2
Xylene	8-hour	4,350b	d	3.3	_3.3

E4 3775-2

a Compounds listed are the major pollutants of concern (LANL, 1990b).
b State standard (NM EIB, 1991a and b).
c Federal standard (40 CFR 50).
d Data unavailable.
e It is assumed that all PM10 concentrations are TSP concentrations.
f No sources indicated or negligible emissions.
g Not calculated, concentration values between the 24-hour and 30-day values.

Table 4.1.3.2-2.òContribution to Air Quality from Proposed Action and Total Concentrations at LANL with Comparison to Applicable Regulations and Guidelines [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3) g	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Carbon Monoxide (CO)	8-hour 1-hour	10,000b 15,000b	_ 1,792 _ 9,402	f f	_ 1,792 _ 9,402

Hydrogen Sulfide (H2S)	1-hour	14b	d	f	d
Lead (Pb)	Calendar Quarter	1.5c	d	f	d
Nitrogen Dioxide (NO2)	Annual 24-hour	94b 188b	_ 8 _ 169	f f	_ 8 _ 169
Ozone (O3)	1-hour	118b	149	f	149
Particulate Matter (PM10)	Annual 24-hour	50c 150c	30e 158e	f f	30 158
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	52b 262b 1,300c	_ 0.1 _ 2.7 _ 9.3	f f f	_ 0.1 _ 2.7 _ 9.3
Total Reduced Sulfur	1-hour	4b	d	f	d
Total Suspended Particulates (TSP)	Annual 30-day 7-day 24-hour	60b 90b 110b 150b	30.1 _ 0.9 d 158.3	f f f f	30.1 _ 0.9 d 158.3

Hazardous Air Pollutants and Other Toxic Compoundsa

2-Butoxyethanol	8-hour	1,200b	_2.5	f	_2.5
Acetic Acid	8-hour	250b	_0.2	f	_0.2
Acetone	8-hour	5,900b	_26.3	f	_26.3
Acetonitrile	8-hour	340b	_0.5	f	_0.5
Ammonia	8-hour	180b	_9.2	f	_9.2
Dioxane	8-hour	36b	_0.3	f	_0.3
Fluoride Compounds	8-hour	25b	_0.3	f	_0.3
Hexane (N-hexane)	8-hour	1,800b	_1.1	f	_1.1
Hydrogen Chloride	8-hour	70b	_4.4	f	_4.4
Isopropyl Alcohol	8-hour	9,800b	_2.0	f	_2.0
Methyl Acetate	8-hour	6,100b	_3.6	f	_3.6
Methyl Alcohol	8-hour	2,600b	_10.7	f	_10.7
Methyl Ethyl Ketone	8-hour	5,900b	_7.7	f	_7.7
Methylene Chloride	8-hour	2,610b	_1.7	f	_1.7

N-butyl Acetate	8-hour	7,100b	_0.2	f	_0.2
Nitric Acid	8-hour	50b	_4.1	f	_4.1
Nitric Oxide	8-hour	300b	_2.5	f	_2.5
Nitrogen Oxide	8-hour	300b	_2.5	f	_2.5
Nitrous Oxide	8-hour	449b	_1.1	f	_1.1
sec-Butyl Alcohol	8-hour	3,050b	_0.3	f	_0.3
Stoddard Solvent	8-hour	5,250b	_2.3	f	_2.3
Sulfuric Acid	8-hour	10b	_0.3	f	_0.3

E4 3776-1
Footnotes at end of table.

Table 4.1.7.3-1.-Summary of Surface Water Quality Monitoring, Pinellas Plant

Receiving Water: Site Retention Ponds-1992			
Parametera	Unit of Measure	Water Quality Criteria	Average Existing Water Body Concentration
East Retention Pond			
Biochemical Oxygen Demand	mg/L	NA	2
Chemical Oxygen	mg/L	NA	14
Conductivity	µmhos	NA	193
Iron	mg/L	0.3b	0.13
Maganese	mg/L	0.1b	0.02
pH	pH units	6.5-8.5b	7.72
Total Organic Carbon	mg/L	NA	2,200
Total Suspended Solids	mg/L	NA	6
Zinc	mg/L	1b	0.16
South Retention Pond			
Biochemical Oxygen Demand	mg/L	NA	2

Chemical Oxygen Demand	mg/L	NA	35
Conductivity	µmhos	NA	459
Copper	mg/L	0.015b	0.04
Iron	mg/L	0.3b	0.45
Manganese	mg/L	0.1b	0.02
Nitrate	mg/L	10b	0.02
Nitrite/Nitrate	mg/L	10c	0.02
pH	pH units	6.5-8.5b	7.65
Phosphorous	mg/L	0.0001b	0.24
Total Organic Carbon	mg/L	NA	12
Total Suspended Solids	mg/L	NA	5
Zinc	mg/L	1b	0.07

E4 3777

a Parameters measured at levels below the detection limit of the analysis method are not listed.

b Florida State Water Quality Criteria for Class II Water-Shellfish Propagation or Harvesting.

c Maximum Containment Level (MCL), EPA Primary Drinking Water Regulations (40 CFR 14). Listed for comparison purposes only.

Source: PI GE, 1992.

Table 4.1.1.2-2.-Contribution to Air Quality from Proposed Action and Total Concentrations at KCP with Comparison to Applicable Regulations and Guidelines [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3)d	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)

Carbon Monoxide (CO)	8-hour	10,000a	78.9	f	78.9
	1-hour	40,000a	230.1	f	230.1
Lead (Pb)	Calendar Quarter	1.5a	e	f	e
Nitrogen Dioxide (NO2)	Annual	100a	68.4	f	68.4
Ozone (O3)	1-hour	235a	263.1	f	263.1
Particulate Matter (PM10)	Annual	50a	34.7	f	34.7
	24-hour	150a	128.3	f	128.3
Sulfur Dioxide (SO2)	Annual	80a	28.5	f	28.5
	24-hour	365a	305.1	f	305.1
	3-hour	1,300a	1,013.5	f	1,013.5
Hazardous Air Pollutants and Other Toxic Compoundsg					
1,1,1-Trichloroethane	24-hour	1,040b	_20.3	f	_20.3
1,4-Dioxane	24-hour	24.5b	_0.6	f	_0.6
Acetic Acid	8-hour	c	_0.7	0.8	_1.5

Acetone	24-hour	161b	_6.3	0.3	_6.6
Chlorodifluoroethane	8-hour	c	_0.7	f	_0.7
Chlorodifluoromethane	8-hour	c	_0.4	f	_0.4
DòLimonene	8-hour	c	e	1.2	_1.2
Dichlorodifluoromethane	8-hour	c	_9.0	f	_9.0
Dimethyl Formamide	24-hour	8.13b	_0.2	f	_0.2
Ethyl Alcohol	8-hour	c	_0.4	0.3	_0.7
Ethyl Benzene	24-hour	118b	_0.4	f	_0.4
Fluoboric Acid	8-hour	c	_0.7	f	_0.7
Fluorine End-capped Homopolymers	8-hour	c	_6.1	f	_6.1
Fluoroaliphatic Polymeric Esters	8-hour	c	_0.4	f	_0.4
Fluorobenzene	8-hour	c	_4.3	f	_4.3
Fluorotelomer	8-hour	c	_0.4	f	_0.4
Glycol Ethers	8-hour	c	_26.0	f	_26.0

Hexane	8-hour	2,400b	e	1.1	_1.1
Hydrogen Chloride	24-hour	2.03b	_2.6	f	_2.6
Isopropyl Alcohol	8-hour	13,100b	_22.0	4.7	_26.7
Methyl Alcohol	24-hour	7.13b	_0.2	f	_0.2
Methyl Ethyl Ketone	24-hour	32.1b	_0.6	f	_0.6
Methyl Isobutyl Ketone	24-hour	55.7b	_1.2	f	_1.2
Methylene Chloride	8-hour	c	_5.8	f	_5.8
Footnotes at end of table.					E4 3778-1

Table 4.1.1.2-2.-Contribution to Air Quality from Proposed Action and Total Concentrations at KCP with Comparison to Applicable Regulations and GuidelinesòContinued [Page 2 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3)d	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Naphtha/Mineral Spirits	8-hour	c	_5.4	1.0	_6.4
Nitric Acid	8-hour	66.7b	_13.7	f	_13.7
Phosphoric Acid	24-hour	0.27	_0.6	f	_0.6
Sulfuric Acid	24-hour	2.72b	_4.7	f	_4.7
Tetrachloroethylene	24-hour	922b	_0.4	f	_0.4
Toluene	24-hour	10.2b	_3.3	f	_3.3

Trichloroethylene	24-hour	36.5b	_34.9	f	_34.9
Trichlorotrifluoroethane	8-hour	101,333b	_40.9	f	_40.9
Xylene	8-hour	5,800b	_4.0	f	_4.0

E4 3778-2

a Federal standard (40 CFR 50).
b State guideline (MO DNR, 1992).
c No state standard or guideline.
d Baseline Concentration values are from table 4.1.1.2-1.
e Data unavailable.
f Design report indicates that emissions for this pollutant would be less than 100 lb/yr (0.01 lb/hr) (FDI, 1993).
g Compounds listed are the major pollutants of concern (FDI, 1993).

Table 3.3.1-2.-Kansas City Plant: Interior Construction/Modification Requirements-Proposed Action [Page 1 of 4]

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Support Pads This activity would be located in two areas of the MMB. One area within thewelding department would require modification to accommodate the equipment that would be moved from Pinellas.	Modify and enlarge existing acoustical spray rooms; relocate a pair of doors; rearrange existing equipment; remove and replace coreboard partitions.	None	Temporarily disconnect existing electrical utility service and reinstall after modifying existing acoustical spray room.
Optoelectronics Assemblies This activity would be moved into existing departments and vacant space in the MMB and MSB requiring modifications necessary to accommodate the equipment that would be moved from Pinellas. In the MSB, a hydrogen furnace area will be provided and in the MMB, equipment will be installed in an existing clean room.	Remove floor tile, coreboard partitions, and doors; construct hydrogen furnace/metallization work area.	None	Remove and replace utility piping, ductwork, and vents, including compressed air, city and chilled water, steam, gaseous and liquid nitrogen, argon, helium, and hydrogen piping; remove and replace bus tap switch; safety switch andpanel board; rearrange existingelectrical services; installhydrogen detection system; modifyfire protection sprinkler system;install additional power andlighting.

E4 3779-1

Footnotes at end of table.

Table 3.3.1-2.-Kansas City Plant: Interior Construction/Modification Requirementsò Proposed Actionò Continued [Page 2 of 4]

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Neutron Detectors This process would be integrated into the TelemetryLaboratory area in	Rearrange existing equipment and install bankeròs partition within an existing	None	Relocate utility piping; install carbon dioxide piping system; install low voltage panelboard; relocate receptacles.
Lightning Arrestor Connectors This would be located primarily in the EPMB with two processes (testing and lead mixing) integrated into appropriate laboratory areas in the MMB.	Rearrange existing equipment;construct Lead Titanate room and install new Class 100 clean room and bankeròs partitions.	None	Remove existing ductwork and utility piping; install new compressed air, chilled water, gaseous nitrogen piping; modify existing sprinklersystems; remove and replace existing electrical utilities, including receptacles, bus tap switches, and miscellaneous wiring; install lowvoltage panelboard, additionalpower, and lighting.
Transducers This process would be integrated into the TelemetryLaboratory area in the MMB.	Rearrange existing equipment within an existing department.	None	Modify existing exhaust systems, vacuum pump, compressed air, chilled water, and gaseous nitrogen piping systems; install liquid nitrogen dewars, argon gas, and deionized water bottles; install dust collection system.
Lithium Ambient Batteries This activity would be located in the MMB requiring the rearrangement and excessing of equipment to provide space for equipment that would be movedfrom Pinellas.	Remove and replace existing coreboard partitions and cribfence; install new 8 foot high coreboard partitions.	None	Modify existing and install special exhaust systems for potential Sulfur Dioxide release with monitors andalarms. Modify existing gaseous and liquid nitrogen piping systems. Rearrange existing electrical services.
Flat Cable Products This activity would be moved into three areas in the MMB which would require modifications necessary to accommodate the equipment that	Remove gypsum wallboard partitions; construct an addition to an existing Class10,000 clean room. Construct a 1,000 ft.2 Class 1,000 clean room.	None	Remove and replace utility piping, ductwork, and drains; including compressed air, city, deionized, and chilled water, steam, gaseous nitrogen piping; install new

would be moved from Mound in addition to building a new clean room.			HEPAfilters, air handling unit, andductwork; modify sprinkler system; remove and replace transformer and panel board; rearrange existing electrical services; install firealarm and communications system;install additional power andlighting.

E4 3779-2
Footnotes at end of table.

Table 3.3.1-2.-Kansas City Plant: Interior Construction/Modification RequirementsòProposed A`ctionòContinued [Page 3 of 4]

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Mechanical Assemblies This product line would be integrated into five specificareas of the MMB.	Remove and replace existingvinyl floor tile; modify anexisting Class 100,000 clean room.	None	Remove and replace utility piping, ductwork, and drains; including compressed air and gaseous nitrogen piping; install city, deionized, and chilled water, steam; install new HEPA filters, air handling unit, and ductwork; modify sprinkler system; rearrange existing electrical services; install additional power and lighting.
Round Wire Detonator Cables This product line would be integrated into the flex cables department and installed on existing workbenches located in the MMB. It will share the Class 1,000 clean room being constructed for Flat Cable Products.	Minor rearrangement of existing space and equipment required; equipment to be consolidated on existing workbenches.	None	None
Plastic Headers This technology would be absorbed into an existing department in the MMB withoutadditional equipment, construction, or rearrangement being required.	Additional space requirements included with existing injection molded products manufacturing area.	None	None

Reservoirs and Nonnuclear Acorn This product line would make use of existing departments, requiring relocation and rearrangement of existing equipment, and vacant space, requiring removal and replacement of concrete floor, and modifications necessary to accommodate new production equipment in the MMB and	Remove and replace concretefloor, coreboard andsheetrock walls; constructchase walls and acousticalceiling; modify existingvacant area in MMB.	Remove woodblock floor.	Install new HEPA filters, air handling unit, ductwork, and steam to water heat exchanger; install additional power and lighting.
Nuclear Grade Steels/Oxnard This activity would be placedin existing vacant space in the MMB which would require modifications necessary to accommodate new equipment.	Remove concrete floor; construct bridge crane superstructure and footings; modify existing vacant areain MMB.	None	Install deionized water system with pump and utility piping; modify existing utilities;install additional power and lighting.

E4 3779-3
Footnotes at end of table.

Table 3.3.1-2.-Kansas City Plant: Interior Construction/Modification RequirementsòProposed ActionòContinued [Page 4 of 4]

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Safe Secure Trailers This technology would be placed in two existing departments inthe MMB and would require therelocation of storage racks toan existing vacated storagearea.	Remove concrete floor and masonry wall; construct four bridge crane superstructures and footings; construct new masonry and reinforced concrete walls, ceiling openings, overhead door openings, and basement renovation for locker area.	None	Install new air handling units,and ductwork; remove and replace existing electrical services; install additional power and lighting; install new compressed air piping.
Weapon Trainer Shop This activity would be moved into vacated space within an existing department in the MMBand would require only minormodifications.	Remove and replace metal stud and gypsum wallboard partitions; cut opening in two-hour fire rated wall for new vehicle fire door, ceilingopenings.	None	Install new dust collector/filter and ductwork; remove and replace existing electrical services; install additional power and lighting.
Metrology Services	No space requirements.	None	None

This activity would be incorporated into an existing department in the MMB. This activity requires no additional equipment or space at KCP.			

E4 3779-4
Source:KC ASAC, 1992a.

Table 3.3.1-4.-Kansas City Plant: Estimated Additional Annual Waste Generation-Proposed Action

Waste Type	Quantity
Hazardous/Toxic Liquid Solid	 8,132 gal 108 ft3
Nonhazardous Liquid Solid	 1,676,394 gal 282 ft3
LLW Liquid Solid	 None None
Mixed Liquid Solid	 None None

E4 3780
Source: KC ASAC, 1993b.

Table 3.3.2-2.-Savannah River Site: Interior Construction/Modification Requirements-Proposed Action

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Gas Transfer Systems This activity would be located in four separate buildings. Building 735-11A would require modifications in order to	No structural or architectural modifications required.	None	Install new helium and argon tank systems, gas handling manifold, refrigeration

provide space to install manufacturing development equipment. Building 232-H would require mechanical modifications and installation of additional equipment. Further modifications will be done in buildings 233-H and 234-H.			units, dumbwaiter, and piping systems; modify existing glove boxes; install argon-inert glove box and function test station; modify existing communications and fire protection systems; install additional power and lighting.
Commercial Sales/ Inertial Confinement Fusion (ICF) Target Loading This activity would be located in two separate buildings both of which would require no building modifications.	No structural or architectural modifications required.	None	Modify existing utilities; install additional lighting.
Reservior Surveillance Operations This activity would be located in five separate buildings. Building 233-H would require extensive modifications and rearrangements. Building 249-H would require some mechanical and electrical modifications. Existing facilities and equipment would be used in buildings 232-H, 234-H, and 236-H.	Construct wall and mezzanine structure; construct access road to new nitrogen and argon tanks; install electrical dumbwaiter.	None	Modify existing HVAC system; install new nitrogen and argon tank systems and piping systems; modify existing communications and fire protection systems; install additional power and lighting.

E4 3781
Source: SR DOE, 1992a.

Table 3.3.2-4.-Savannah River Site:
Estimated Additional Annual Waste Generation-Proposed Action

Waste Type	Quantity
Hazardous/Toxic	
Liquid	None
Solid	None
Nonhazardous	

Liquid Solid	301,125 gal 1,000 ft3
LLW Liquid Solid	 None 500 ft3
Mixed Liquid Solid	 None None

E4 3782
Source: SR DOE, 1992a.

Table 3.3.5-1.-Sandia National Laboratories, New Mexico-Proposed Action

Activity	Space Req. (ft2)	Location	Donor Site
Neutron Generators	84,210	Bldgs. 807, 842, 860, 870, 878, 882, 891, 905,957, 6730	Pinellas
Cap Assemblies	12,020	Bldgs. 805, 840, 841, 860, 864, 870, 878, 891,and 957	Pinellas
Thermal Batteries and Milliwatt Heat Source Surveillance	9,200	Bldg. 894	Pinellas and Mound
Total	105,430		

E4 3795
Source: SNL, 1992.

Table 3.3.4-2.-Oak Ridge Reservation Y-12 Plant: Interior Construction/Modification RequirementsòProposed Action

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Beryllium Technology This activity would be located inBuilding 9201-5 which wouldrequire modifications necessary to accommodate theequipment that would be moved	Remove and replace existing equipment, platforms, stairs, and support structures; relocate equipment from current location in preparation for vacuum furnace relocation; install walls		

from RFP.	and wall partitions; air lock entrances, gloveport windows; construct supportsand platforms; construct new room tohouse gas atomization equipment;construct walls, doors, ceilings,windows. Construct new enclosure forultrasonic cleaner to shield remaining work area from noise. Relocate vacuum furnace from within Y-12. Construct small enclosed room for cleaning beryllium contaminated items._NoneRemove and replace space heating, sump pump,utility piping and ductwork; modifyexisting large inert gas atmosphericglove box to provide an enclosed washstation with breakout chambers; install new HEPA filter system; install/modify sprinkler systems in atomization chamber, Hot Isostatic Press area, measuring machine area, and machiningtools area; rearrange existingelectrical services; modify existingvacuum chamber electricity services;install gasketed lighting fixtures for enclosed decontamination room; install additional power and lighting._		
Pit Support Functions This activity would be located inBuilding 9204-4, which wouldrequire modifications necessary to accommodate theequipment that would be moved from RFP.	Remove existing equipment and piping;modify existing floor to allow forvibration isolation for forming machine.	None	Relocate and install auto spin machine, power supply cabinets, hydraulic unit, and control equipment; install piping fornatural gas and tower water,instrument air and plant air.Remove and replace piping,raceway, conduit and wiringassociated with equipment,power distribution system androute to forming machineequipment; install additionalpower and

E4 3797
Source: Y-12 MMES, 1992b.

Table 3.3.4-4.-Oak Ridge Reservation Y-12 Plant:
Estimated Additional Annual Waste Generation-Proposed Action

Waste Type	Quantity
Hazardous/Toxic Liquid Solid	 4,310 gal 950 ft3a
Nonhazardous Liquid (treated H2O) Solid	 3,579 gal Negligible
LLW Liquid Solid	 None 22.2 ft3
Mixed Liquid Solid	 None None

E4 3798
a Includes solid sludges generated from treatment of aqueous waste streams-assumed to be 15% of treated water volume and other solids such as HEPA filters.
Source: Y-12 DOE, 1992b.

Table 3.3.5-2.-Sandia National Laboratories, Albuquerque: Interior Construction/Modification RequirementsòProposed Action

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
Neutron Generators This activity would be located in Buildings 807, 842, 860, 870, 878,891, 905, 957, and 6730.	Remove existing liquid nitrogenand oxygen tanks; demolish north wing, foundations, floor	Install new liquid nitrogen, argon storage tanks at Building 870; install new piping and gas	

Building882 would be modified to supportequipment staging for new andtransferred equipment during renovations to Building 870.	slabs,superstructure, and exteriorwalls and reconstruct north wing and second story; construct newClass 10,000 to Class 100 cleanrooms; and install new walkways at Building 870; modify Buildings 842, 860, 878; selective demolition, new partitions, repair floor and ceiling materials in Building 891; and relocate existing bridgecrane, force and pressuretest frame, and 3 pressurechambers to another building and install a 30,000-gallon tank for potentially contaminated firewater runoff for Building 6730. No modifications to existing space in Buildings 807, 905, and 957._Remove asbsestos and contaminated concrete.	manifolds to connect to hydrogen gas cylinders; install new HVAC, electrical & plumbing utility systems; new power and lighting in all buildings except 891.	
Cap Assemblies This activity would be moved into	Install new fire resistant walls	Remove asbsestos and contaminated	Install additional or replacement equipment

in No utilities 891	Buildings, 805, 840, 841 (mostly vacant), 860, 864, 870, 878, 891, and 957. Existing facilities in Building 860 will be used for high pressuretesting.	and ceiling and strengthen floor foundation in Building 840; install Class 1,000 clean room in Building 841; minor facility modifications such as installation of wall partitionsand 1-hour-rated walls inBuildings 860 and 864. Nomodifications to existing spacein Buildings 805, 870, 878, 891and 957.	concrete.	Building 840. Install hydrogen gas storage manifold or gas pipeline at Buildings841 and 864. upgrades toonsite would berequired in Buildings 805,830, 878, and 957.
ductwork	Thermal Batteries and Milliwatt Heat Source Surveillance These activities would be moved into Building 894. An existing dry room in Building 894 will be utilized for thermal battery R&D and backup production capability. Building 882 would be modified to support staging for new and transferred equipment	Demolish interior partitions, ceilings, mechanical and electrical equipment. Remove argon and nitrogen tanks and concrete pads. Install new wall partitions, ceilings, concrete loading dock, stairs, ramp and hazardous materials storage room.	Remove asbsestos and contaminated concrete.	Modify HVAC systems; installnew exhaust and roof-mounted exhaust fans; install new domestic water and sewage lines and gas piping system;install new fire protectionsystems.

during renovations to Building			

E4 3800
Source: SN DOE, 1992d.

Table 3.3.5-4.-Sandia National Laboratories, New Mexico: Estimated Additional Annual Waste Generation -Proposed Action

Waste Type	Quantity
Hazardous/Toxic Liquid Solid	 1,252 gal 209 ft3
Nonhazardous Liquid Solid	 3,216,000 gal 9,340 ft3
LLW Liquid Solid	 100 gal 294 ft3
Mixed Liquid Solid	 None 0.005 ft3

E4 3803
Source: SN DOE, 1992d.

Table 4.2.3.2-1.-Contribution to Air Quality from RFP Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines [Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3) f	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Carbon Monoxide (CO)	8-hour 1-hour	10,000b 40,000b	4,444 11,122	11.1 15.8	4,455.1 11,137.8
Hydrogen Sulfide (H2S)	1-hour	142c	_18.8	e	_18.8
Lead (Pb)	Calendar Quarter	1.5b	0.1	e	0.1

	30-day	1.5c	g	e	g
Nitrogen Dioxide (NO2)	Annual	100b	21	0.2	21.2
Ozone (O3)	1-hour	160c	561.5	e	561.5
Particulate Matter (PM10)	Annual 24-hour	50b 150b	21.9 83.8	0.01 0.8	21.9 84.6
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	80b 365b 1,300b	13.3 94.2 133.9	0.0005 0.03 0.05	13.3 94.2 134.0

Hazardous Air Pollutants and Other Toxic Compoundsa

1,1,1-Trichloroethane	Annual	d	>0.4	0.001	_0.4
1,4-Dioxane	Annual	d	g	0.003	_0.003
Acetic Acid	Annual	d	g	0.002	_0.002
Acetone	Annual	d	_0.003	0.04	_0.04
Ammonia	Annual	d	_0.2	e	_0.2
Carbon Tetrachloride	Annual	d	_0.8	e	_0.8
Chlorodifluoroethane	Annual	d	g	0.002	_0.002
Chlorodifluoromethane	Annual	d	g	0.001	_0.001
Cyclohexane	Annual	d	_0.002	0.009	_0.011
DòLimonene	Annual	d	g	0.001	_0.001

Dichlorodifluoromethane	Annual	d	g	0.001	_0.001
Dimethyl Foramide	Annual	d	g	0.001	_0.001
Dioctyl Pthalate	Annual	d	_0.004	e	_0.004
Ethyl Alcohol	Annual	d	_0.003	0.001	_0.004
Ethyl Benzene	Annual	d	g	0.002	_0.002
Ethylene Glycol	Annual	d	_0.005	e	_0.005
Fluoboric Acid	Annual	d	g	0.002	_0.002
Fluorine End-capped Homopolymers	Annual	d	g	0.02	_0.02
Fluoroaliphatic Polymeric Esters	Annual	d	g	0.001	_0.001
Fluorobenzene	Annual	d	g	0.01	_0.01
Fluorotelomer	Annual	d	g	0.001	_0.001
Glycol Ethers	Annual	d	g	0.1	_0.1
					E4

3805-1

Footnotes at end of table.					

Table 4.2.3.2-1.-Contribution to Air Quality from RFP Consolidation Alternative and Total Concentration with Comparison to Applicable Regulations and GuidelinesòContinued [Page 2 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3) f	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Hexane	Annual	d	g	0.003	_0.003
Hydrogen Chloride	Annual	d	_0.04	0.012	_0.05
Hydrogen Fluoride	Annual	d	_0.1	e	_0.1
Isopropyl Alcohol	Annual	d	_0.003	0.08	_0.08
Methyl Alcohol	Annual	d	g	0.001	_0.001
Methyl Ethyl Ketone	Annual	d	g	0.003	_0.003
Methyl Isobutyl Ketone	Annual	d	g	0.007	_0.007
Methylene Chloride	Annual	d	_0.07	0.001	_0.07
Naptha/Mineral Spirits	Annual	d	g	0.02	_0.02
Nitric Acid	Annual	d	_0.05	0.04	_0.09
Phosphoric Acid	Annual	d	g	0.003	_0.003
Sulfuric Acid	Annual	d	g	0.03	_0.03
Tetrachloroethylene	Annual	d	g	0.002	_0.002
Toluene	Annual	d	g	0.02	_0.02
Trichloroethylene	Annual	d	g	0.02	_0.02
Trichlorotrifluoroethane	Annual	d	_0.4	0.001	_0.4
Xylene	Annual	d	g	0.01	_0.01

E4 3805-2
a Compounds listed are the major pollutants of concern (FDI,

1993).
b Federal standard (40 CFR 50).
c State standard (CO DOH, 1989).
d No state standard.
e Emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (FDI, 1993).
f Baseline Concentrations are from table 4.1.8.2-1.
g Data unavailable.

Table 4.1.2.2-2.-Contribution to Air Quality from Proposed Action and Total Concentrations at SRS with Comparison to Applicable Standards
and Regulations and Guidelines

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3)d	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Carbon Monoxide (CO)	8-hour 1-hour	10,000b 40,000b	_ 38 _ 195	g g	_ 38 _ 195
Hydrogen Fluoride (HF)	30-day 7-day 24-hour 12-hour	0.8c 1.6c 2.9c 3.7c	f f f f	g g g g	f f f f
Lead (Pb)	Calendar Quarter	1.5b	f	g	f
Nitrogen Dioxide (NO2)	Annual	100b	22	g	22
Ozone (O3)	1-hour	235b	224	g	224
Particulate Matter (PM10)	Annual 24-hour	50b 150b	28 64	g g	28 64
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	80b 365b 1,300b	16 266 1,122	g g g	16 266 1,122
Total Suspended Particulates (TSP)	Annual	75c	28	g	28
Hazardous Air Pollutants and Other Toxic Compoundsa					
1,1,1-Trichloroethane	24-hour	9,550c	_1.3	g	_1.3
Nitric Acid	24-hour	125c	_1.1	g	_1.1
Trichlorotrifluoroethane	24-hour	e	_23.3	g	_23.3

E4 3806
a Compounds listed are the major pollutants of concern (SR DOE, 1991a). b Federal standard (40 CFR 50). c State standard (SC DHEC, 1991). d Baseline Concentration values are from table 4.1.2.2-1. e No standard or guideline. f Data unavailable. g Design report indicates that emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (WSRC, 1992b and c).

Table 4.1.5.2-2.-Contribution to Air Quality from Proposed Action and Total Concentrations at SNL with Comparison to Applicable Regulations or Guidelines

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3)e	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Carbon Monoxide (CO)	8-hour 1-hour	10,000c 15,000c	7,762.8 13,722.2	f f	7,762.8 13,522.2
Hydrogen Sulfide (H2S)	1-hour	14c	g	f	g
Lead (Pb)	Calendar Quarter	1.5b	g	f	g
Nitrogen Dioxide (NO2)	Annual 24-hour	94c 188c	_1.8 _20.3	f f	_1.8 _20.3
Ozone (O3)	1-hour	118c	192.3	f	192.3
Particulate Matter (PM10)	Annual 24-hour	50b 150b	35.8 104.3	f f	35.8 104.3
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	52b 262b 1300c	_0.004 _0.04 _0.1	f f f	_0.004 _0.04 _0.1
Total Reduced Sulfur	1-hour	4c	g	f	g
Total Suspended Particulates (TSP)	Annual 30-day 7-day 24-hour	60c 90c 110c 150c	g g g g	f f f f	g g g g

Hazardous Air Pollutants and Other Toxic Compoundsa

1,1,1-Trichloroethane	8-hour	d	_0.7	0.5	_1.2

Acetone	8-hour	5,900c	_0.3	0.4	_0.7
Amyl Acetate	8-hour	5,300c	g	0.4	_0.4
Hydrogen Chloride	8-hour	70c	_0.04	f	_0.04
Isopropyl Acetate	8-hour	9,500c	g	0.2	_0.2
Isopropyl Alcohol	8-hour	9,800c	_0.1	f	_0.1
Methyl Alcohol	8-hour	2,600c	_0.1	f	_0.1
Methylene Chloride	8-hour	2,610c	_0.04	1.0	_1.0
Toluene	8-hour	3,750c	_0.6	0.6	_1.1
Trichloroethylene	8-hour	250c	_0.1	0.5	_0.7
Trichlorotrifluoroethane	8-hour	d	_0.1	0.6	_0.7
Xylene	8-hour	4,350c	_0.6	f	_0.6

E4 3808

a Compounds listed are the major pollutants of concern (SN DOE, 1991b).
b Federal standard (40 CFR 50).
c State standard (NM EIB, 1981; NM EIB, 1991a).
d No state standard.
e Baseline Concentrations are from table 4.1.5.2ò1.
f Design report indicates that the additional emission of this pollutant will be less than 100 lb/yr (0.01 lb/hr) (SN FDI, 1992).

g Data unavailable.

Table F-3.-Compounds and Processes of Major Concern Because of Their Hazardous Potentiala

Compounds	Compound Associated Processes	Use
Methylene Chloride	Support Pads (Sunshine Foam)	Cleaning
	Optoelectronics	
	CAP Assembly Reservoir Assembly and Testing (in Cee Bee)	
Methylene Dianiline	Transducers	Resins/Epoxy Mixtures
Beryllium Compounds (BeO, BeSO4)	Vacuum Induction Melting Machining Technology	Mold/Crucible coatings Parts Manufacturing
Trichloroethylene	Optoelectronics CAP Assembly Transducers Neutron Detectors Round Wire Cables Reservoirs	Degreasing
Toluene Diisocyanate &Methylene Diisocyanate	Lightning Arrestor Connectors	Foam Mixing

E4 3830

a Alternative chemicals or reduced levels of these chemicals may be proposed in order to reduce or eliminate the risk to workers (onsite) and/or the public (offsite).

Source: FDI, 1993; KC ASAC, 1993b; WSRC, 1992aòf; LA FDI, 1993; Y-12 DOE, 1992b; SNL, 1992.

Table 3.2.5-2.-Savannah River Site: Existing Resource Requirements

Utility Resources	Average Daily Consumption	Peak Demand	System
Electricity	38,000 kWh	2,000 kW	35,000 kW
Natural Gas	N/A	N/A	N/A
Water	576,000 gal	500 gpm	2,000 gpma

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	160,000 gal	3,000 gal
Argon	1,300,000 ft3	60,000 ft3
Helium	10,000 ft3	1,800 ft3
Hydrogen	3,600 ft3	600 ft3
Deuterium	2,300 ft3	400 ft3

E4 3835

Table assumes SRS operates 365 days per year. Table addresses resource requirements for H-Area Tritium-Handling facilities and H Area utilities.

a Includes firewater.

Source: SR DOE, 1992a.

Table 3.2.6-2.-Los Alamos National Laboratory: Existing Resource Requirements

Utility Resources	Average Daily Consumption	Peak Demand	System
Electricity	1,045,000 kWh	87,000 kW	120,000 kWa
Natural Gas	4,200,000 ft3	417,000 ft3/hr	500,000 ft3/hr
Water	4,100,000 gal	6,600 gpm	6,900 gpm

Chemical Resources	Total Annual Consumption	Storage Capacity
Liquid Nitrogen	1,189,00 gal	5,500 gal
Argon	11,486,000 ft3	1,125,000 ft3
Helium	1,066,000 ft3	67,000 ft3
Hydrogen	35,000 ft3	1,100 ft3
Oxygen	5,057,000 gal	135,000 gal
Carbon Dioxide	686,000 ft3	96,200 ft3

E4 3836

Table assumes LANL operates 365 days per year.

a Electrical system capacity in 1992 was 90,000 kW. By the end of 1995, the capacity will be increased by 30,000 kW.
Source: LA DOE, 1992.

Table 3.2.7-2.-Oak Ridge Reservation Y-12 Plant: Existing Resource Requirements

Utility Resources	Average Daily Consumption	Peak Demand	System Capacity
Electricity	1,320,000 kWh	70,000 kW	300,000 kW
Natural Gasa	N/A	N/A	N/A
Water	7,000,000 gal	5,000 gpm	17,000 gpm

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	4,027,770,000 gal	46,083,000 gal
Argon	90,000,000 ft3	3,430,000 ft3
Helium	4,464,000 ft3	707,000 ft3
Hydrogen	5,475,600 ft3	234,000 ft3
Oxygen	44,886,000 gal	30,672,000 gal

E4 3837

Table assumes that Y-12 operates 365 days per year.
a The Y-12 Plant steam boiler currently consumes natural gas. Natural gas will become a backup boiler fuel in 1993 when the steam boiler plant reverts to burning coal using a clean coal burning technology approved by the State of Tennessee. Source: Y-12 DOE, 1992b.

Table E3.1-4.-Kansas City Plant ROI Education Characteristics, 1990

County/School District	Enrollment a	Enrollment Capacity b	Pupil-Teacher Ratio a,c,d	Per Pupil Expenditure a,d
Missouri				
Cass County	12,301	13,290	16.3	3,023.86
Belton #124	3,946	3,950	16.9	2,982.91
Cass County	454	650	13.8	3,072.91
Drexel	293	310	13.3	3,035.16
East Lynne	169	210	13.0	4,982.03
Harrisonville	2,061	2,195	14.9	3,343.07
Midway	584	600	15.4	2,976.57
Pleasant Hill	1,238	1,250	18.2	2,619.91
Raymore-Peculiar	2,696	3,000	17.2	2,906.19
Sherwood	750	1,000	15.6	2,799.96
Strasburg	110	125	15.7	4,478.86
Jackson County	96,502	105,128	15.8	4,586.84
Blue Springs	10,914	11,000	19.6	3,098.95
Center School #58	2,888	3,000	14.5	5,041.36
Fort Osage	5,203	5,600	19.4	3,102.86
Grain Valley	938	1,200	16.9	2,846.55
Grandview	4,461	5,500	15.8	4,261.08
Hickman Hills	7,505	12,425	15.6	4,135.86

Independence	11,020	10,300	18.0	3,329.52
Kansas City #33	34,640	35,297	13.6	6,356.29
Leeòs Summit	8,826	8,826	18.3	3,467.39
Lone Jack	355	380	13.9	3,057.84
Oak Grove	1,523	1,600	18.5	2,880.10
Raytown	8,229	10,000	15.5	3,943.06
Kansas				
Johnson County	57,559	65,252	13.8	4,919.16
Blue Valley	8,572	10,002	14.1	5,572.85
DeSoto	1,786	1,971	14.3	4,332.14
Gardner, Edgerton, Antioch	1,698	1,772	14.5	5,147.52
Olathe	13,974	13,980	12.7	5,267.16
Shawnee-Mission	30,235	36,027	14.1	4,616.30
Spring Hill	1,294	1,500	16.0	4,417.70
Wyandotte County	29,715	32,389	14.6	4,400.23
Bonner Springs	2,134	2,149	16.9	4,276.34
Kansas City	22,543	25,000	14.4	4,447.70
Piper-Kansas City	1,054	1,040	16.5	4,606.64
Turner-Kansas	3,984	4,200	14.3	4,143.39
ROI (County	196,077	216,059	15.0	4,558.06

E4 3839

a KS DEd 1990; MO DEd, 1990a; Slaughter.
b Fields, Gordon, Moore, Sagaser, Akers, Hanna, Harris, Barnett, Collins, Hill,Manning, Briegel, Wiggins, Miller, Dean, Malicoat, Esselman, Williams, Walker,Carter, Foraker, Plummer, Braley, Jones, Bush, Cook, Marsh, Norris, Wisely,Shephard, Vielbig.
c Jones.
d MO DEd, 1990b; Watson.

Table E3.2-4.-Savannah River Site ROI Education Characteristics, 1990

County/School District	Enrollment a	Enrollment Capacity_b	Pupil-Teacher Ratio a,c	Per Pupil Expenditure a
South Carolina				
Aiken County	23,973	23,290	20.0	3,218.90
Allendale County	2,467	2,400	15.7	3,881.65
Bamberg County	3,405	3,756	17.3	3,722.60
Bamberg District #1	1,928	2,056	18.2	3,584.78
Bamberg District #2	1,477	1,700	16.1	3,902.50
Barnwell County	4,796	5,670	18.1	3,627.89
Barnwell District #19	1,271	1,300	18.7	3,589.91
Barnwell District #29	999	1,670	16.8	3,841.88
Barnwell District #45	2,526	2,700	18.2	3,562.38
Edgefield County	3,812	4,500	16.6	3,409.08
Orangeburg County	16,803	18,357	17.9	3,789.49
Orangeburg District #1	1,098	1,300	15.8	3,735.23
Orangeburg District #2	918	1,200	16.1	3,714.62
Orangeburg District #3	3,440	3,400	17.5	3,660.18
Orangeburg District #4	2,080	2,225	19.5	3,123.32
Orangeburg District #5	6,676	7,394	18.7	4,142.71
Orangeburg District #6	966	1,100	17.6	3,413.91
Orangeburg District #7	985	938	17.1	3,758.34
Orangeburg District #8	640	800	17.0	3,780.32
Georgia				
Columbia County	13,161	13,161	20.7	2,657.45
Richmond County	31,669	38,350	16.9	3,462.95
ROI (County Total)	100,086	109,484	18.2	3,378.40

E4 3840
a SC DEd, 1991.

b Clark, Gamele, Steadman, Wright, Huggins, Frederick, Williams, Christie, Williams, Rice, Middleton, Barr, Myers, Lynn, Hardwick, Ethridge, Price, Rovell.

c Hall.

Table E3.3-4.-Los Alamos National Laboratory ROI Education Characteristics, 1990

County/School District	Enrollment a	Enrollment Capacity b	Pupil-Teacher Ratio a	Per Pupil Expenditure a
New Mexico				
Los Alamos County	3,522	3,532	15.7	4,971.39
Los Alamos	3,522	3,532	15.7	4,971.39
Rio Arriba County	7,073	8,850	18.0	3,482.05
Chama Valley	582	1,250	15.8	4,407.43
Dulce	635	1,000	15.8	3,776.97
Española	5,363	6,000	18.8	3,212.13
Jemez Mountain	493	600	16.4	4,946.01
Santa Fe County	14,373	15,983	18.5	2,840.20
Pojoaque Valley	1,817	2,000	19.6	3,187.15
Santa Fe	12,556	13,983	18.4	2,789.99
ROI (County	24,968	28,365	17.9	3,322.65

	E4 3841

a NM DEd, 1990.

b Barck, Valdez, Martinez, Rodriquez, Gomez, Blea, Padilla.

Table E3.4-4.-Oak Ridge Reservation ROI Education Characteristics, 1990

County/School District	Enrollment a	Enrollment Capacity b	Pupil-Teacher Ratio a	Per Pupil Expenditure a
Tennessee				
Anderson County	12,102	11,360	17.3	3,703.21
Anderson County	6,466	5,560	17.4	3,385.93
Clinton City Elementary	1,122	980	19.4	2,787.89
Oak Ridge	4,514	4,820	16.8	4,385.20
Blount County	14,139	12,440	19.6	3,038.21
Alcoa	1,380	1,520	16.7	4,191.19
Blount County	9,429	7,760	21.3	2,738.85
Maryville	3,330	3,160	17.0	3,408.07
Knox County	54,943	50,640	19.7	2,944.89
Loudon County	5,650	5,280	20.9	2,629.37
Lenoir City	1,831	1,860	23.0	2,447.94
Loudon County	3,819	3,420	20.0	2,716.35
Roane County	7,873	6,640	19.4	2,870.09
Harriman	1,915	1,940	17.7	2,932.66
Roane County	5,958	4,700	20.0	2,849.97
ROI (County Total)	94,707	86,360	19.4	3,030.68

	E4 3842

a TN DEd, 1990.
b TN DEd, 1992.

Table E3.5-4.òSandia National Laboratories, Albuquerque, ROI Education Characteristics, 1990

County/School District	Enrollment a	Enrollment Capacity b	Pupil-Teacher Ratio a	Per Pupil Expenditure a
New Mexico				

Bernalillo County	86,653	86,716	17.9	3,194.07
Albuquerque	86,653	86,716	17.9	3,194.07
Sandoval County	4,322	5,392	17.0	3,695.78
Bernalillo	3,164	3,250	18.0	3,328.18
Cuba	644	725	15.5	5,109.87
Jemez Valley	514	1,417	14.0	4,186.83
Valencia County	9,600	10,563	20.3	2,945.34
Belen	4,189	4,574	20.1	3,084.37
Los Lunas	5,411	5,989	20.5	2,837.71
ROI (County Total)	100,575	102,671	18.1	3,191.89

	E4 3843

a NM DEd, 1990.
b Adamo, Whitcamp, Spradling, Goodalay, Perry, Baca, Marcus.

Table E3.6-4.-Mound Plant ROI Education Characteristics, 1990

County/School District	Enrollment a	Enrollment Capacity b	Pupil-TeacherRatio a,c	Per Pupil Expenditure a,d
Ohio				
Butler County	48,049	55,058	19.2	3,493.83
Madison	1,565	2,000	19.2	3,297.16
Edgewood City	2,481	2,450	18.4	3,477.87
Fairfield	7,883	7,910	20.9	3,486.67
Lakota	8,712	10,100	20.2	3,371.75
Hamilton	10,553	11,088	18.7	3,422.21
Middletown	9,749	12,675	17.7	3,747.41
New Miami	1,073	1,735	17.3	3,401.19
Ross	2,624	2,875	21.3	3,160.55

Talawanda	3,409	4,225	19.5	3,706.52
Montgomery County	85,832	99,503	17.5	4,353.78
Brookville	1,527	1,725	18.9	3,245.58
Centerville	6,730	8,050	17.9	4,214.22
Dayton	27,662	27,661	16.0	5,373.03
Huber Heights	7,855	7,800	21.0	3,293.17
Jefferson	1,126	1,750	15.4	4,213.83
Kettering	7,520	9,881	16.3	4,625.94
Mad River	4,303	5,400	17.3	4,049.70
Miamisburg	4,254	6,011	19.4	3,477.85
New Lebanon	1,342	2,000	18.8	3,151.19
Northmont	6,116	7,520	20.8	3,308.03
Northridge	2,315	3,600	17.8	4,368.22
Oakwood	1,362	1,835	14.0	5,477.83
Trotwood-Madison	4,228	4,500	17.6	4,052.87
Valley View	1,892	1,970	19.4	3,321.88
Vandalia-Butler	3,412	4,000	18.1	3,859.41
West Carollton City	4,188	5,800	19.3	3,701.91
Warren County	19,236	23,307	19.4	3,331.70
Carlisle	2,025	2,800	19.4	3,619.25
Clearcreek (Springboro)	2,209	2,400	20.2	3,330.60
Franklin	3,304	4,300	19.3	3,487.97
Kings	2,643	3,675	20.1	3,206.09
Lebanon	3,245	3,432	20.8	2,928.11
Little Miami	2,165	2,700	18.8	3,360.92
Mason	2,572	2,500	18.6	3,432.59
Wayne	1,073	1,500	16.5	3,539.18
ROI (County Total)	153,117	177,868	18.3	3,955.52

E4 3844
a OH DEd, 1990a.
b Pieratt, Cash, Grady, Glass, Citizen, DiStuala, Surface, Robinson, Purdue, Williams,DePalma, Keith, Franklin, Barry, Elms, Lauter, McCabe, Tipton, Blessing, Jarbo, Public Information Office, Dayton School District, MontgomeryCounty, OH. Laman, Bowman, Karn, Cornn, Keebah, Mummal, Draffen, Oldfield, Gogole, Porter, Groth, Rogers, Wallace, DeRosa, Williams.
c OH DEd, 1990c.
d OH DEd, 1990b.

Table E3.7-4.-Pinellas Plant ROI Education Characteristics, 1990

County/School District	Enrollment a	Enrollment Capacity b	Pupil-Teacher Ratio a	Per Pupil Expenditure c
Florida				
Hillsborough	120,364	128,734	21.5	4,626.62
Pasco County	32,626	41,206	22.8	3,698.04
Pinellas County	92,490	106,012	21.5	3,983.37
ROI (County	245,480	275,952	21.7	4,260.84

E4 3845
a FL DEd, 1990. b Wooten. c FL DEd, 1991.

Table E3.8-4.òRocky Flats Plant ROI Education Characteristics, 1990

County/School District	Enrollment a	Enrollment Capacity b	Pupil-Teacher Ratio a	Per Pupil Expenditure a,c
Colorado				
Adams County	47,496	57,625	18.5	4,681.70
Adams County	5,981	13,000	19.5	4,549.76
Bennett	810	931	15.1	5,313.05

Brighton	3,925	4,565	17.9	5,217.36
Mapleton	4,727	6,000	20.0	4,448.24
Northglen-Thornton	20,692	22,304	18.5	4,715.89
Strasburg	437	325	13.2	6,132.97
Westminster	10,924	10,500	18.3	4,492.88
Arapahoe County	74,811	80,731	18.6	5,332.17
Adams-Arapahoe	25,345	25,983	18.2	5,264.16
Byers	339	520	13.3	6,164.35
Cherry Creek	28,027	28,097	18.6	5,733.66
Deer Trail	181	350	10.3	6,441.77
Englewood	4,039	7,000	20.0	4,708.99
Littleton	15,356	17,200	19.4	4,818.58
Sheridan	1,524	1,581	17.5	5,589.22
Boulder County	35,942	45,322	18.3	5,318.49
Boulder Valley	21,013	28,255	18.0	5,980.55
St. Vrain Valley	14,929	17,067	18.8	4,386.63
Denver County	58,299	81,851	16.0	6,192.31
Denver	58,299	81,851	16.0	6,192.31
Jefferson County	75,164	83,674	21.1	4,775.62
Jefferson	75,164	83,674	21.1	4,775.62
ROI (County Total)	291,712	349,203	18.5	5,253.07

E4 3846
a CO DEd,1990.
b Goldberg, Lathrop, Bennett, Pocello, Hill, Keanan, Pachello, Morris, Glanstaff, Phillips, Collins, Colt, Dempsey, Beabar, Atchinson, Geist, Eckering,
c CO DEd, 1989.

Table E3.1-1a.-Distribution of Kansas City Plant Employees by Place of Residence, 1991a

County/City	Number of Employees	Percent of Site
Missouri		
Cass County	761	14.0
Belton	237	4.4
Harrisonville	150	2.8
Jackson County	3,246	59.8
Grandview	305	5.6
Independence	311	5.7
Kansas City	1,499	27.6
Lee's Summit	609	11.2
Raytown	199	3.7
Kansas		
Johnson County	915	16.9
Olathe	188	3.5
Overland Park	376	6.9
Wyandotte County	135	2.5
Kansas City	126	2.3
ROI (County Total)	5,057	93.2

E4 3847
a Includes employees from AlliedSignal Aerospace Company which represent 96 percent of KCP total.
Source: KC ASAC, 1993b.

Table E3.2-1a.-Distribution of Savannah River Site Employees by Place of Residence, 1991a

County/City	Number of Employees	Percent of Site
South Carolina		
Aiken County	9,978	51.9

Aiken	4,928	25.7
North Augusta	2,666	13.9
Allendale County	217	1.1
Bamberg County	329	1.7
Barnwell County	1,401	7.3
Edgefield County	288	1.5
Orangeburg County	305	1.6
Georgia		
Columbia County	2,036	10.6
Richmond County	3,358	17.5
Augusta	2,780	14.5
ROI (County Total)	17,912	93.3

E4 3848
a Includes DOE, Westinghouse, University of Georgia, U.S. Forest Service, and Wackenhut Services.
Source: Shedrow.

Table E3.3-1a.-Distribution of Los Alamos National Laboratory Employees by Place of Residence, 1991a

County/City	Number of Employees	Percent of Site
New Mexico		
Los Alamos County	4,697	48.3
Rio Arriba County	2,027	20.8
Española	944	9.7
Santa Fe County	1,851	19.0
Santa Fe	1,548	15.9
ROI (County Total)	8,575	88.2

E4 3849

a Includes employees from Los Alamos National Laboratory, BDM, Butler Services, Ewing Technical Design, Johnson Controls, Johnson Engineering Services, Kirk Mayer, Mason and Hanger, Ray Rashkin Lissac, and SAIC.
Source: Van Hecke.

Table E3.4-1a.-Distribution of Oak Ridge Reservation Employees by Place of Residence, 1990 a

County/City	Number of Employees	Percent of Site
Tennessee		
Anderson County	7,849	33.3
Clinton	1,744	7.4
Oak Ridge	4,861	20.6
Blount County	566	2.4
Knox County	8,464	35.9
Knoxville	7,452	31.6
Loudon County	1,331	5.6
Lenoir City	986	4.2
Roane County	3,900	16.5
Harriman	1,253	5.3
Kingston	1,561	6.6
ROI (County Total)	22,110	93.8

E4 3850
a Includes employees from Martin Marietta Energy Systems (Oak Ridge Reservation, Y-12 Departments 2000-2999, and Paducah Departments 5400-5499), U.S. Department of Energy, M.K. Ferguson of Oak Ridge Company, and Oak Ridge Associated Universities.
Source:Williams, Truex, Miller, Counties.

Table E3.5-1a.-Distribution of Sandia National Laboratories, New

Mexico, Employees by Place of Residence, 1991a

County/City	Number of Employees	Percent of Site
New Mexico		
Bernalillo County	6,815	91.3
Albuquerque	6,429	86.1
Sandoval County	146	2.0
Valencia County	188	2.5
ROI (County Total)	7,149	95.8

E4 3851
a Includes all regular and part-time employees from Sandia National Laboratories, New Mexico. Source: McMahon.

Table E3.6-1a.-Distribution of Mound Plant Employees by Place of Residence, 1991a

County/City	Number of Employees	Percent of Site
Ohio		
Butler County	195	9.3
Middletown	122	5.8
Montgomery County	1,371	65.1
Centerville	212	10.1
Dayton	369	17.5
Germantown	97	4.6
Kettering	128	6.1
Miamisburg	320	15.2
West Carrollton	136	6.5
Warren County	289	13.7
Carlisle/Franklin	243	11.5
ROI (County Total)	1,855	88.1

E4 3852
a Mound Plant employee headcount totals, September 30, 1991. Source: Hatfield.

Table E3.7-1a.-Distribution of Pinellas Plant Employees by Place of Residence, 1991a

County/City	Number of Employees	Percent of Site
Florida		
Hillsborough County	75	4.4
Pasco County	61	3.6
Pinellas County	1,545	91.5
Clearwater	387	22.9
Largo	300	17.8
Pinellas Park/Seminole	353	20.9
St. Petersburg	505	29.9
ROI (County Total)	1,681	99.6

E4 3853
a Includes 100 percent Pinellas Plant employees. Source: Kikel.

Table E3.8-1a.-Distribution of Rocky Flats Plant Employees by Place of Residence, 1991a

County/City	Number of Employees	Percent of Site
Colorado		
Adams County	1,415	17.8
Broomfield	159	2.0
Thornton	341	4.3
Westminster	327	4.1
Arapahoe County	407	5.1

Boulder County	1,889	23.7
Boulder	488	6.1
Broomfield	372	4.7
Longmont	428	5.4
Denver County	669	8.4
Denver	669	8.4
Jefferson County	2,985	37.5
Arvada	1,239	15.6
Broomfield	106	1.3
Golden	420	5.3
Lakewood	259	3.3
Westminster	657	8.2
ROI (County Total)	7,365	92.5

E4 3854

a Includes employees from EG&G Rocky Flats, U.S. Department of Energy, and Wackenhut Services.

Source:Powell, Duffy, West.

Table 3.4.1-1.-Mound Plant Alternative: Additional Land Area Requirements at Mound

	Total Area	
Land Use	Square Feet	Acres
Building(s) footprint(s)	685,575	16
Additional parking	693,925	16
Construction laydown area	1,133,600	26
Construction parking	174,400	4
Total	2,687,500	62

E4 3862
Source:FDI, 1993.

Table 3.4.2-1.-Pinellas Plant Alternative: Additional Land Area Requirements at Pinellas

	Total Area	
Land Use	Square Feet	Acres
Building(s) footprint(s)	546,750	13
Additional parking	326,425	8
Construction laydown area	1,526,000	35
Construction parking	305,200	7
Total	2,704,375	63

E4 3863
Source: FDI, 1993.

Table 3.4.3-1.-Rocky Flats Plant Alternative: Additional Land Requirements at Rocky Flats

	Total Area	
Land Use	Square Feet	Acres
Building(s) footprint(s)	782,700	18
Additional parking	1,111,600	26
Construction lay down area	959,200	22
Construction parking	261,600	6
Total	3,115,100	72

E4 3864
Source:FDI, 1993.

Table 3.4-2.-Estimated Peak Additional Construction/Operations Work force RequirementsòProposed Alternatives

	Mound Alternative		Pinellas Alternative		RFP Alternative	
Site	Const.	Ops.	Const.	Ops.	Const.	Ops.
Mound Plant	775	3,120				
Pinellas Plant			1,149	3,995		
Rocky Flats Plant					958	3,710
Savannah River Site			100	45	100	45
LANL	30	20	45	75	30	75
SNL	90	385	0	0	95	385
Total	895	3,525	1,294	4,115	1,183	4,215

E4 3873

Source: DOE, 1993b; FDI, 1993.

Table 3.3-1.-Estimated Additional Peak Construction/Operations Workforce RequirementsòProposed Action

Site	Construction Workforce	Operations Workforce
Kansas City Plant	80	425
Savannah River Site	100	45
Los Alamos National Laboratory	60	115
Y-12 Plant	(80)a	(10)a
Sandia National Laboratories, New	95	385
Total	335a	970a
		E4 3874

a Y-12 option to Proposed Action workforce numbers not included in totals.

Source:DOE, 1993b; KC ASAC, 1992a; LA DOE, 1992; SN DOE, 1992d; SR DOE, 1992a; Y-12 MMES, 1992b.

Table E3.1-5.- Baseline Traffic by Link, Kansas City Plant a

			1995			2000		
Route	From	To	ADT	PHV	LOS	ADT	PHV	LOS
Bannister Rd	Holmes Rd	I-435	29,589	2,959	B	31,579	3,158	B
Troost Ave	Bannister Rd	85th St	21,667	2,167	E	23,125	2,313	E
Troost Ave	85th St	47th St	27,026	2,703	E	28,844	2,884	F
95th St	Bannister Rd East	Blue River Rd	15,610	1,561	D	16,660	1,666	D
95th St	Blue River Rd	Bannister Rd West	14,678	1,468	D	15,665	1,567	D

E4 3902

a Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

Source: Cunningham; KS DOT, 1991; MO Hwy, 1989, 1990; TRB, 1985.

Table E2.3.-Definitions of Level of Service Used for Transportation System Assessments

Level of Service	Definition
A-Free flow	Operation of vehicles is virtually unaffected by the presence of other vehicles, and operations are constrained only by the geometric features of the highway and driver preferences. Minor disruptions to flow are easily

	absorbed at this level without causing significant delays or queues.
B-Stable flow (upper speed limit)	Indicative of free flow, although the presence of other vehicles begins to be noticeable. Average travel speeds are generally over 53 mph on sections with 70 mph design speed. Minor disruptions are easily absorbed at this level, though local deterioration in the level of service will be more obvious.
C-Stable flowA range where the influence of traffic density becomes marked. Ability to maneuver within the traffic stream and to select an operating speed is clearly influenced by the presence of other vehicles. Average travel speeds are reduced to about 50 mph on 70 mph design speed sections. Minor disruptions may be expected to cause serious local deterioration in service, and queues may form behind any significant travel disruptions. Severe or long term disruptions may result in deterioration of service to forced flow conditions._	
D-Approaching unstable flow	Speeds and ability to maneuver are severely restricted because of traffic congestion. Average traffic speeds are approximately 40 mph on 70 mph design speed sections. Only the most minor disruptions can be absorbed without the formation of extensive queues and deterioration of levels of service to forced flow conditions.
E-Unstable flow	Operations at or near capacity. Disruptions cannot be dampened or dissipated and any disruption, however minor, will cause queues to form and the level of service to deteriorate to forced flow conditions. Average speeds at capacity are approximately 30 mph.
F-Forced flowaOccurs at a point where vehicles arrive either at a rate greater than that at which they are discharged, or at a point in a planned facility where forecasted demand exceeds computed capacity. While operations at such points and on immediately downstream sections will appear to be at capacity or better, queues will form behind these breakdowns. Operations within queues are highly unstable, with vehicles experiencing	

short spurts of movement followed by stoppages. Average travel speeds within the queues are generally below 30 mph._

E4 3903

a Also called breakdown flow.

Source: TRB, 1985.

Table E3.2-5.- Baseline Traffic by Link at Savannah River Site a

			1995			2000		
Route	From	To	ADT	PHV	LOS	ADT	PHV	LOS
US 278	US 1/25/78 @ North Augusta	SCSR 39	4,473	447	A	5,185	519	B
SCSR 19	US 1/78 @ Aiken	US 278	20,259	2,026	E	23,483	2,348	E
SCSR 64	US 278	Snelling	2,193	219	A	2,541	254	A
SCSR 125	Silverton St @ Jackson	SCSR 3	2,061	206	A	2,389	239	A

E4 3905

a Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

Source: Cunningham; GA DOT, 1991a; SC DHwy, 1990; TRB, 1985.

Table E3.3-5.-Baseline Traffic by Link at Los Alamos National Laboratory[a]

			1995			2000		
Route	From	To	ADT	PHV	LOS	ADT	PHV	LOS
NMSR 4	NMSR 126	NMSR 501 N at Los Alamos W Gate	723	72	A	790	79	A
NMSR 4	NMSR 501 N at Los Alamos W Gate	NMSR 502	3,013	301	A	3,294	329	A
NMSR 501	NMSR 4 East	NMSR 502 at Los Alamos	9,327	933	C	10,197	1,020	C
NMSR 502	NMSR 501 at Los Alamos	NMSR 4	8,941	894	C	9,776	978	C
NMSR 502	NMSR 4	NMSR 30	12,267	1,227	C	13,412	1,341	C

E4 3906

a Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

Source: NM Hwy, 1990; NM Hwy, 1991d; TRB, 1985.

Table E3.4-5.-Baseline Traffic by Link at Oak Ridge Reservation, Y-12 Plant a

			1995			2000		
Route	From	To	ADT	PHV	LOS	ADT	PHV	LOS

TSR 58	TSR 95	I-40	11,216	1,122	C	11,985	1,199	C
TSR 61	US 25W in Clinton	TSR 62 E/O Oliver Springs	7,296	730	A	7,796	780	A
TSR 62	TSR 61 in Oliver Springs	TSR 95 in Oak Ridge	41,490	4,149	C	44,333	4,433	C
TSR 62	TSR 95 in Oak Ridge	TSR 170	26,680	2,668	E	28,508	2,851	F
TSR 95	TSR 61	TSR 62 in Oak Ridge	22,760	2,276	E	24,319	2,432	E
TSR 95	TSR 62 in Oak Ridge	TSR 58	15,790	1,579	D	16,872	1,687	D
TSR 95	TSR 58	I-40/US 321	8,058	806	C	8,611	861	C
TSR 170	US 25W	TSR 62	12,959	1,296	C	13,847	1,385	C
Bear Creek Valley Rd	TSR 62 in Oak Ridge	TSR 95	9,147	915	C	9,774	977	C

E4 3907

a Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

Source: Bonine; TN DOT, 1991; TRB, 1985.

Table E3.5-5.-Baseline Traffic by Link at Sandia National Laboratories, New Mexicoa

			1995	2000

Route	From	To	ADT	PHV	LOS	ADT	PHV	LOS
Broadway Blvd	Gibson Blvd	NMSR 47	13,006b	1,301b	C	15,306b	1,531b	D
Eubank Blvd	I-40 in Albuquerque	Gibson Blvd	19,232b	1,923b	E	54,387b	5,439b	F
Gibson Blvd	I-25 in Albuquerque	Louisiana Blvd	46,213b	4,621b	F	39,406b	3,941b	F
Louisiana Blvd	Gibson Blvd	I-40 in Albuquerque	33,484b	3,348b	F	46,652b	4,665b	F
Wyoming Blvd	I-40 in Albuquerque	Kathryn Ave	39,641b	3,964b	F	22,634b	2,263b	E

E4

3908

a Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

b Derived from average weekday traffic only.

Source: NM Hwy, 1990, 1991a, 1991b; TRB 1985.

Table E3.6-5.-Baseline Traffic by Link at Mound Planta

			1995	2000

Route	From	To	ADT	PHV	LOS	ADT	PHV	LOS
Benner Rd	Main St	Mound Rd	2,926b	293b	A	3,006b	301b	A
Main St	Central Ave	Mound Rd	7,943c	794c	C	8,160c	816c	C
Main St	Mound Rd	Benner Rd	1,812	181	A	1,861	186	A
Mound Rd	Main St	Benner Rd	2,508	251	A	2,577	258	A
6th St	Central Ave	Mound Rd	1,394	139	A	1,431	143	A

E4 3909

a Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.

b Derived from 1991 data.

c Derived from 1989 data.

Source: Brown; OH DOT, 1990; TRB, 1985.

Table E3.7-5.-Baseline Traffic by Link at Pinellas Planta

			1995			2000		
Route	From	To	ADT	PHV	LOS	ADT	PHV	LOS
Belcher Rd	Ulmerton Rd	Bryan Dairy Rd	39,271b	3,927b	F	47,263b	4,726b	F
Belcher Rd	Bryan Dairy Rd	Park Blvd	34,825b	3,483b	F	41,912b	4,191b	F
Bryan Dairy Rd	Starkey Rd	Belcher Rd	35,566c	3,557c	F	42,804c	4,280c	F
Bryan Dairy Rd	Belcher Rd	66th St	35,751b	3,575b	F	43,027b	4,303b	F

E4 3912
a Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.
b Derived from 1991 data.
c Derived from 1989 data.
Source: FL DOT, 1988a and b, 1990; Pinellas County, 1992; TRB, 1985.

Table E3.8-5.-Baseline Traffic by Link at Rocky Flats Plant a

			1995			2000		
Route	From	To	ADT	PHV	LOS	ADT	PHV	LOS
CSR 93	CSR 58 in Golden	CSR 128	15473	1547	D	19834	1983	E
CSR 128	CSR 93	CSR 121	8174	817	C	10479	1048	C
Indiana St	CSR 72	CSR 128	10364	1036	C	13285	1329	C

E4 3914
a Truck traffic is estimated to comprise 15.7 percent of the total baseline traffic composition.
Source: CO DHwy, 1990, 1991b; TRB, 1985.

Table 3.2.6-1.-Los Alamos National Laboratory: Waste Management (1991)

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic		17,710 ft3a		
Liquid	72,000 gal		b	Offsite
Solid	11,000 ft3		b	Offsite
Nonhazardous				
Liquid	183,000,000	None	280 MGY	NPDES Outfall
Solid	302,200 ft3	None	None	Onsite Burial
LLW				
Liquid	5,787,430 gal	175,000 gal	200 gal/min	Not
Solid	203,600 ft3	None	None	Onsite Burial
Mixed		86,426 ft3a		
Liquid	9,000 gal		None	None
Solid	4,000 ft3		None	None

E4 3917
a Includes both liquids and solids. b Only HE hazardous waste and potentially-contaminated HE waste is burned at the incinerator flashpad at TA-16 (S-Site). Capacity available as needed. Ash residue is treated and when its hazardous characteristic can be removed and is otherwise nonhazardous, the residue is disposed of in the industrial non-RCRA landfill. Any hazardous constituent is shipped offsite using RCRA-permitted vendors.

Source:LA DOE, 1992.

Table 3.2.7-1.-Oak Ridge Reservation, Y-12 Plant: Waste Management (1991)

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic Liquid Solid	 273,670 gal 37,295 ft3 a	 None 6,500,000 gald	 5,400,000 gal/yrb, c b	 Not Applicablea Onsite Buriall, e
Nonhazardous Liquid Solid	 12,400,000 gal 289,110 ft3	 None None	 6 MGYf None	 Offsite-NPDES Outfall Onsite Buriale
LLW Liquid Solid	 247,495 gal 210,230 ft3	 152,000 galg 1,250,000 galh, j	 5,400,000 gal/yrb, c k, b	 Not Applicable Not Applicablei, l
Mixed Liquid Solid	 778,190 gal 42,705 ft3	 152,000 gala, g 1,250,000 gal	 b b	 None None

E4 3918

a Currently, all RCRA-hazardous wastes are stored at the Y-12 Plant or the K-25 Site awaiting further disposal. These wastes are not being sent offsite to RCRA-permitted commercial facilities.

b The K-25 TSCA incinerator has a design capacity to incinerate up to 2,000 lb/hr of liquids and up to 1,000 lb/hr of solids and sludge (200 lb/hr maximum sludge content). Current permits, funding, and DOE guidance have limited treatment capacity to approximately 48,000 ft3/yr of liquids only.

c Combined throughout capacity of West End Treatment Facility and Central Pollution Control Facility waste treatment facilities.

d Remaining West End Tank Farm sludge storage capacity is approximately 1,250,000 gal (2.5 of 13 tanks, 500,000 gallons each).

e New landfill to open in 1994 with 43-year capacity. Ensures 160,000 yd3/yr (uncompacted) fill rate. Approximately 186M ft3 (uncompacted) capacity for disposal of Hazardous/Toxic solids (non-RCRA and non-TSCA hazardous materials) also applies for nonhazardous solid waste. The Y-12 sanitary landfill currently in use has a design capacity of 640,000 yd3 and is anticipated to reach its limit in late 1993 or early 1994.

f Approximate Central Pollution Control Facility/West End Treatment Facility NPDES permit annual discharge volume limits for East Fork Poplar Creek.

g3 x 40,000 gallon tanks in OD09 waste oil/solvent storage facility plus [(4 x 6,500 gallons) + (2 x 3,000 gallons)] in OD10 (flammables storage).

h Capacity of the Y-12 Salvage Yard depends on how high scrap is stacked and ability to compact the waste.

i Future ability to clean, segregate, recycle, and sell scrap metal, equipment still to be determined.

j PCB-contaminated solids also contaminated with uranium stored in 9720-9 (RCRA/PCB Warehouse), 9720-58 (RCRA and PCB Container Storage Area), and 9404-7 (PCB Drum Storage Facility).

k LLW non-metallic (non-TSCA, non-RCRA hazardous) wastes such as construction debris are supercompacted and/or incinerated offsite at a local commercial waste treatment facility.

l Currently there is no available treatment/disposal technology for the hazardous/toxic solid sludges and the LLW solid sludges in storage tanks in the West End Tank Farm. The most likely future scenario would be onsite thermal treatment to remove organics, followed by an onsite uranium extraction process, and chemical fixation. The RCRA component solids would be sent to an offsite commercial RCRA-permitted landfill. The LLW component solids would be buried onsite in the planned LLW disposal facility scheduled to be operational in 1996.

Source: Y-12 DOE, 1992b; Y-12 MMES, 1992a.

Table 3.2.8-2.-Sandia National Laboratories, New Mexico: Existing Resource Requirements

Utility Resources	Average Daily Consumption	Peak Demand	System
Electricity	1,400 kWh	5,000 kW	50,000 kW
Natural Gas	1,500,000 ft3	250,000 ft3/hr	250,000
Water	1,000,000 gal	1,400 gpm	2,800 gpma

Chemical Resources	Total Annual Consumption	Storage Capacity
Nitrogen	720,000 gal	72,000 gal
Argon	400,000 gal	46,000 gal
Helium	b	b
Hydrogen	1,152,000 ft3	76,000 ft3
Oxygen	5,330,000 ft3	533,000 ft3

E4 3919

Table assumes that SNL operates 365 days per year.

a SNLòs water and natural gas systems are extensive and complex. Peak system capacity estimates should not be considered definitive. b Helium is supplied in small, portable bottles at the usage site. Cumulative site and usage figures are not available. Source: SN DOE, 1992d.

Table 3.2.5-1.-Savannah River Site: Waste Management (1991)

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic Liquid Solid	 0 3,100 ft3	 22,382 ft3	None	Offsite
Nonhazardous Liquid Solid	 185,000,000 gal 753,000 ft3 a	 None None	 32.9 MGY None	 NPDES Outfall Onsite Landfill
LLW Liquid Solid	 20,092,080 gal 763,732 ft3	 None None	 78,840,000 gal/yr3,177,000	 None Onsite
Mixed Liquid Solid	 47,427gal 1,169 ft3	 None 157,500 ft3	 1,161,600 gal/yr 1,050,000 ft3/yr	 None None

E4 3921
a Following compaction; original volume 3,011,000 ft3. Source:DOE, 1991c and g; SR DOE, 1992a.

Table D3.2.3-1.-Estimated Hourly Traffic Volumes and Traffic Noise Levels Along the Access Routes to Pinellas

	Peak Hour Traffic Volume (veh/hr)		Noise Level in Leq (1-hr) (dBA)a	
Route	Baseline	Relocate to Pinellas	Baseline	Relocate to Pinellas
Construction Belcher Road	 3,483	 3,506	 76	 76

Bryan Dairy Road	3,557	3,678	76	76
Operation Belcher Road Bryan Dairy Road	 4,191 4,280	 4,295 4,780	 76 77	 77 77

E4 3922

a Leq (1-hr) is the hourly Leq in dBA, and is predicted for a receptor located 50 feet from the center line of nearest lanes.

Table D3.2.4-1.-Estimated Hourly Traffic Volumes and Traffic Noise Levels Along the Access Routes to Rocky Flats

	Peak Hour Traffic Volume (veh/hr)		Noise Level in Leq (1-hr) (dBA)a	
Route	Baseline	Relocate to Mound	Baseline	Relocate to Mound
Construction HWY 93 HWY 72 HWY 128 Indiana Street	 1,547 540 817 1,036	 1,565 567 875 1,095	 78 71 73 74	 78 71 73 74
Operation HWY 93 HWY 72 HWY 128 Indiana Street	 1,983 692 1,048 1,329	 2,106 878 1,452 1,735	 79 72 74 75	 79 73 75 76

E4 3924

a Leq (1-hr) is the hourly Leq in dBA, and is predicted for a receptor located 50 feet from the center line of nearest lanes.

Table D3.2.2-1.-Estimated Hourly Traffic Volumes and Traffic Noise Levels Along the Access Routes to Mound

	Peak Hour Traffic Volume (veh/hr)		Noise Level in Leq (1-hr) (dBA)a	
Route	Baseline	Relocate to Mound	Baseline	Relocate to Mound

Construction				
Mound Road	251	406	67	69
Benner Road	293	316	65	65
Main Street (north of Mound Avenue)	794	896	67	67
6th Street	139	170	58	59
Operation				
Mound Road	258	859	66	71
Benner Road	301	393	65	66
Main Street (north of Mound Avenue)	816	1,211	67	69
6th Street	143	264	58	61

E4 3925
a Leq (1-hr) is the hourly Leq in dBA, and is predicted for a receptor located 50 feet from the center line of nearest lanes.

Table E3.1-3.-Primary Municipal Water and Wastewater Systems in the KCP ROI

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1991)			
Jackson County, MO			
Kansas City, MO Water Department	240.00	115.00	48
City of Independence Water Departmenta	36.00	23.00	64
Cass County, MO			
City of Harrisonville	2.20	1.47	67
Johnson County, KS			
Johnson County Water District #1b	105.00	44.60	42
City of Olathec,d	10.50	10.00	95
Wyandotte County, KS			
Kansas City, KS Board of Public Utilities	60.00	30.00	50
Total	453.70	224.07	49
Wastewater Systems (1991)			

Jackson County, MO			
Kansas City, MO Publication-Owned TreatmentWorks	132.43	101.81	77
Little Blue Valley Sewer District	40.00	27.00	68
City of Independence	10.00	8.00	80
Cass County, MO			
City of Harrisonville	3.00	1.00	33
Johnson County, KS			
Johnson County Unified Wastewater	32.65	31.29	96
City of Olathe	5.20	3.20	62
Wyandotte County, KS			
Kansas City, KS Water Pollution Control Division	42.00	20.24	48
Total	265.28	192.54	73

E4 3926

a To expand system capacity to 42 million gallons per day (MGD) by summer 1992.bTo expand one of two current plants from 50 MGD to 75 MGD by 1995, total system capacity to 130 MGD.
c Approximately 1-1.5 MGD purchased from Johnson County in 1991.
d Water for city plants from Lake Olathe (plant #1, 4.0 MGD) and 11 wells at Kaw River (plant #2, 6.5 MGD).
e To replace 6 of 14 plants in (5 in Johnson Co., 1 in Lenexa) and increase overall system capacity by 4.1 MGD to 36.75 MGD by 1995.

Source: Sidleman, Kwan, Vest, Grey, Veal, Carter, Fain, Brunner, Turner, McQuerry, Lopez, Metzler, Celter, Gill, Patten, Smith, Creek, Vangordon, Woodring, Kirch.

Table E3.3-3.-Primary Municipal Water and Wastewater Systems in the LANL ROI

		Average	
	Capacity	Daily Demand	Percent of
Location	(MGD)	(MGD)	Capacity
Water Systems (1991)			
Los Alamos County, NM			

LANL (DOE) (1988)a	4.92	4.10	83
Santa Fe County, NM			
City of Santa Fe	18.00	8.90	49
Rio Arriba County, NM			
City of Española	1.50	1.00	67
Total	24.42	13.99	57
Wastewater Systems (1991)			
Los Alamos County, NM			
Los Alamos County Utilitiesb	3.12	1.30	42
Santa Fe County, NM			
City of Santa Fe	6.50	6.00	92
Rio Arriba County, NM			
City of Españolac	1.01	1.00	99
Total	10.63	8.30	78

E4 3928

a Capacity reflects current state water rights of 5,514.3 acre-feet per year.
b Currently closing one of three plants (cap. 0.87 MGD), to expand largest plant from 1.39 to about 1.9 MGD by 1996.
c Scheduled to complete expansion to 1.6 MGD capacity by 1993.

Source:LANL, 1989a; LANL, 1990a; Pizzoli, George, Stowe, Farmer.

Table 3.3.3-1.-Los Alamos National Laboratory: Proposed Action

Activity	Space Req. (ft2)	Location	Donor Site
High-Power Detonators	13,000	Bldgs., 23, 34, 93 in TA 22 and Bldgs. 340, 342, & 460 in TA 16	Mound
Calorimeters	10,200	Bldgs. 2 & 27 in TA	Mound
Neutron Tube Target Loading	3,600	Bldg. 209 in TA 21	Pinellas
Beryllium Technology	15,170	Bldg. 141 in TA 3	RFP

Pit Support Functions	1,000	Bldgs. 39, 66 & 141 inTA 3	RFP
Total	42,970		

E4 3931
Source: LA FDI, 1993.

Table 3.3.3-2.-Los Alamos National Laboratory: Interior Construction/Modification RequirementsòProposed Action

Relocated Activity	Construction/Modification & Demolition	Remedial Measures	Mechanical & Electrical
High-Power Detonators This activity would be moved into Buildings 34 and 93 in TA 22, and Buildings 340, 342and 460 in TA 16. Existing occupants ofBuilding 34 would be relocated to Building 23 in TA 40. Building 23 would require remodeling to accommodate the new occupants. No major modifications to Buildings 93, 340, 342 and 460.	Extensive interior modifications of Building 34. Demolition of steps, landing, walls, HVAC, floors, plumbing, utilities and electrical systems, windows and roofing. Construct seismic upgrades, concrete ramps, steps and dock areas, walls and floors. Install new doors, interior walls, plumbing and utility systems. Extensive interior modifications of Building 23. Demolition of masonry walls, stairs, floor, windows, doors, HVAC, plumbing, utility, andelectrical systems and existing roofing. Construct and install seismic upgrades, floors,	Asbestos abatement	Extensive electrical and mechanical modifications for both Buildings 34 and 23; install additional power and lighting, fire protection and HVAC systems.

	walls, plumbing, and utilities.		
Calorimeters This activity would be moved into Buildings 2 and 27 in TA 35.	No major interior modifications/ construction required.	None	None
Neutron Tube Target Loading This activity would be located in Building209 in TA 21.	Demolition of interior block masonry wall, metal partitions, and doors. Construction of new walls, partitions and doors.	Asbestos abatement and removal of tritium contaminated equipment.	Modification of HVAC, plumbing, utility and electrical systems.
Beryllium Technology This activity would be moved into Building141 in TA 3.	Expand existing space; interior modifications include demolition of masonry walls, doors, windows, HVAC, electrical systems, stairway,stack and roofing; construct and install seismic upgrades, walls, doors, roof and utilities; install new HVAC equipment room; rearrange existing equipment; construct liquid waste holding tank.	Asbestos abatement	Modify existing HVAC and utilities; install new additional HVAC system; install additional power and lighting.
Pit Support Functions This activity would be moved into Buildings 39, 66 and 141 in TA 3. No modifications to	Expand existing space in Building 66; some interior modifications; rearrange existing equipment; construct new drywall and framing.	None	None

Buildings 39 and 141 are necessary for this activity.				

E4 3932
Source: LA FDI, 1992 and 1993.

Table 3.3.3-4.-Los Alamos National Laboratory: Estimated Additional Annual Waste Generation-Proposed Action

Waste Type	Quantity
Hazardous/Toxic Liquid Solid	 7,508 gal 305 ft3
Nonhazardous Liquid Solid	 442,000 gal 10,680 ft3
LLW Liquid Solid	 30 gal 200 ft3
Mixed Liquid Solid	 None 20 ft3

E4 3933
Source: LA FDI, 1993b; LA DOE,

Table F-1.-Chemical Toxicity Profiles [Page 1 of 4]

Compounds	CAS No.a	Solubilitya	Vapor Pressurea	Flammabilitya, Carcinogenicityd	Incompatibilitiesa	Route of Exposurea	Target	
Acetone	67-64-1	miscible	180 mm	1B	oxidizers, acids	inh,ing,conc	respiratory system, skin	j

Ammonia	7664-41-7	34% in waterat 68_F	> 1 atm.	combustible gas, but difficult to burn	strong oxidizers, acids, halogens, salts of silver & zinc	inh,ing,conc	respiratory system, eyes	j
Beryllium and Beryllium Compounds sufficient evidence animals, limited evidence in humans	7440-41-7	insoluble	0 mm	non-combustible	acids, caustics, chlorinated hydrocarbons, oxidizers, molten lithium	inhc	lungs, skin, eyes, muc. membranes	in
Cadmium Dust sufficient evidence animals, limited evidence in humans	7440-43-9	insoluble	0 mm	non-combustible solid, but will burn in powder form	strong oxidizers, elemental sulfur, selenium & tellurium	inh, ingc	respiratory system, kidneys, prostate, blood	in
Cadmium Fume	1306-19-0	insoluble	0 mm	non-combustible	not applicable	inhc	respiratory system, kidneys, blood	i
Carbon Tetrachloride sufficient evidence animals, no data for humans skin	56-23-5	0.05%	91 mm	non-combustible	chemically-active metals such as sodium, potassium & magnesium; fluorine; aluminum;	inh, abs, ing, conc	CNS, eyes, lungs, liver, kidneys,	in

					Note: forms highly toxic phosgene gas when exposed to flames or welding arcs			
Chlorine	7782-50-5	0.7%	> 1 atm.	noncombustible gas, but a strongoxidizer	reacts explosively or forms explosive compounds with many common substances such as acetylene, ether, ammonia, fuel gas, hydrogen, finely divided metals	inh, conc	respiratory system	j

E4 3934-1

Footnotes at end of table.

Table F-1.-Chemical Toxicity ProfilesòContinued [Page 2 of 4]

Compounds	CAS No.a	Solubilitya	Vapor Pressurea	Flammabilitya,b	Incompatibilitiesa	Route of Exposurea	Target Organsa	Carcinogenicityd
Chromium Trioxide	1333-82-0	very solubleg	i	contact with combustible materials may cause	Alcohol, ether, glycerol,spirit nitrous ether and almost	inh, ing, conc,g	skin, respiratory system, kidneyg	sufficient evidence inboth animals and humans

				firesg	every organic substance, bromides chlorides, iodides, hypophosphites, sulfites,sulfidesg			
Dimethylform-amide	68-12-2	miscible	4 mm (77_F)	IIIA	carbon tetrachloride, other halogenated compounds when in contact with iron; strongoxidizers; alkyl aluminums; inorganic nitrates	inh, abs, ing, conc	liver, kidneys, skin, cardiovascular system	j
1,4-Dioxane	123-91-1	miscible	29 mm	flammable liquidf	strong oxidizers, decaborane, triethynyl aluminum	inh, abs, ing, conc	skin, liver, eyes, kidneyse, CNSg	sufficient evidence inanimals, insufficientevidence
Formaldehyde	50-00-0	miscible	> 1 atm/1mm	IIIB	strong oxidizers, alkalis & acids; phenols; urea; pure formaldehyde has a tendency to polymerize	inh, ing, conc	respiratory system,eyes, skin	sufficient evidence inanimals, limited evidence in humans
Hydrogen Cyanide	74-90-8	miscible	630 mm	IA	amines, oxidizers,	inh, abs, ing,	CNS,	j

					acids,sodium hydroxide,calciumhydroxide, sodium carbonate, water, caustics, ammonia	conc	cardiovascularsystems, liver, kidneys	

E4 3934-2
Footnotes at end of table.

Table F-1.-Chemical Toxicity ProfilesòContinued [Page 3 of 4]

Compounds	CAS No.a	Solubilitya	Vapor Pressurea	Flammabilitya,b	Incompatibilitiesa	Route of Exposurea	Target Organsa	Carcinogenicityd
Isopropyl Alcohol	67-63-0	miscible	33 mm	IB	strong oxidizers, acetaldehyde, chlorine, ethylene oxide, acids, isocyanates	inh, ing, conc	eyes, respiratory system, skin	j
Lead Titanate	12060-00-3	i	i	i	i	i	i	i
Lithium	7439-93-2	liquid ammoniae	1 mm (723òC)e	flammable solide	atmospheric gases; bromidepentafluoride; diazomethane; metal chloride; metal and non- metal oxidese	inh, conc,e	eyes, skin, kidneyg	j

Methylene Chloride	75-09-2	2%	350 mm	combustible liquid	strong oxidizers; caustics; chemically-active metals such as aluminum, magnesium, powders, potassium and sodium; concentrated nitric acid	inh, ing, conc	skin, cardiovascular system, eyes, CNS	Sufficient evidence in animals, limited evidence in humans
4,4 Methylene Dianiline	101ò77ò9	slightly solubleg	i	combustible solide	i	ing, conc,e	liver, eyee	sufficient evidence in animals, insufficient evidence in humans
Methylene Diisocyanate	4747ò90ò4	i	i	i	polymerizes violently on contact with dimethyl formamide (DMF)e	i	i	i
Methyl Ethyl Ketone (2-Butanone)	78-93-3	28%	71 mm	IB	strong oxidizers, amines, ammonia, inorganic acids, caustics, copper, isocyanates, pyridines	inh, ing, conc	CNS, lungs	inadequate evidence in animals, no data inhumansh
Nickel Chloride	7718-54-9g	solubleg	i	i	i	inge	i	i
Nitric Acid	7697-37-2	miscible	48 mm	non-combustible	combustible materials;	inh, ing, conc	eyes, respiratory	j

				liquid but increases flammability of combustible materials	metallic powders; hydrogen sulfide;carbides; alcohols		system, skin, teeth	

E4 3934ò3
Footnotes at end of table.

Table F-1.-Chemical Toxicity ProfilesòContinued [Page 4 of 4]

Compounds	CAS No.a	Solubilitya	Vapor Pressurea	Flammabilitya,b	Incompatibilitiesa	Route of Exposurea	Target Organsa	Carcinogenicity
Phenol Isocyanate	i	i	i	i	i	i	i	i
Thionyl Chloride	7719-09-7	benzene, chloroform, carbon tetrachloridee	100mm (21.4òC)e	non-combustiblee	ammonia; dimethyl formanide and trace iron or zinc; linseed oil and quinoline, toluene, ethanol and watere	inh, abs, ing, conc,e	eyes, skin, muc. membraneg	j
Toluene	108-88-3	0.05%	20 mm (65_ F)	IB	strong oxidizers	inh, abs, ing, conc	CNS, liver, kidneys, skin	j
Toluene Diisocyanate	26471-62-5	i	i	combustible liquide	bases and acyl chloridee	inh, con, ingc,e	eye, skin, respiratory system, nosee	sufficient evidence in animals, no datain humans
1,1,1-Trichloroethane	71-55-6	insolubleg	i	non-combustible liquidg	i	inhc,g	CNS, eyes, mucus membraneg	j
1,1,2-Trichloroethane	79-00-5	0.4%	19 mm	non-combustible liquid	strong oxidizers and caustics; chemically-active metals such as aluminum, magnesium powders, sodium & potassium	inh, abs, ing, conc	CNS, eyes, nose, liver, kidneys	limited evidencein animals, noevidence in humansh
Trichloroethylene	79-01-6	0.1%	58 mm	IC	strong caustics &	inh, ing, conc	respiratory	sufficient

		(77_ F)			alkalis; chemically-active metals such as barium, lithium, sodium, magnesium, titanium, andberyllium		system, heart, liver, kidneys, CNS, skin	evidence in animals, inadequate evidence in humansh
Trichlorotrifluor-oethane	76-13-0	i	i	flammablee	aluminum, barium, lithium, samarium, sodium potassium alloy, titaniume	inh, ing, conc,e	CNS, skine	i

E4 3934-4
a NIOSH Pocket Guide to Chemical Hazards, June 1990.
b Flammable liquids are classified by OSHA (29 CFR 1910.106) as follows: Class IA- Fl.P below 73 òF and BP below 100 òF; Class IB- Fl.P below 73 òF and BP at or above 100 òF; Class IC-Fl. P at or above 73 òF and below 100 òF. Class II-Fl.P at or above 100 òF and below 140 òF; Class IIIA- Fl.P at or above 140 òF and below 20 òF; Class IIIB- l.P at or above 200 òF.
c Routes of exposure abbreviated as follows: inh-inhalation; abs-skin absorption; ing-ingestion; con-skin and/or eye contact.
d Sixth Annual Report on Carcinogens, Summary, 1991.
e Sax's Dangerous Properties of Industrial Materials, Eighth Edition, 1992.
f Registry of Toxic Effects of Chemical Substances (RTECS).
g Merck Index, 11th Edition, 1989._
h Integrated Risk Information System (IRIS).
i Information is not available.
j Not applicable.

Table F-2.-Exposure Limits [Page 1 of 4]

Compounds	CAS No.	RfD (mg/kg/day) (oral)a	RfC (mg/m3) (inhalation)a	Cancer Classb	Slope Factor (mg/kg/day)-	Conversion Factors (mg/m3)c	Occupational Exposure Levels
Acetone	67-64-1	0.1	10.5 (PNL)	D	e	2.42	OSHA-PEL: 1800 mg/m3 and 15-minute STEL of 2400 mg/m3c ACGIH-TLV: Same as aboved NIOSH-REL: 590 mg/m3c
Ammonia	7664-41-7	0.014g	0.1	e	e	0.71	OSHA-PEL: 27 mg/m3c

							ACGIH-TLV: 17 mg/m3 and a 15-minute STEL of 24 mg/m3d NIOSH-REL: 18 mg/m3 and a 15-minute STEL of 27 mg/m3c
Beryllium and Beryllium Compounds	7440-41-7	5 x 10-3	0.018i	B2	4.3 (oral)		OSHA-PEL: 2 µg/m3 [8-hr TWA], 5 µg/m3 [ceiling], 25 µg/m3 [30-min max peak]c ACGIH-TLV: 0.002 mg/m3 [8-hr TWA]d NIOSH-REL: not to exceed 0.5 µg/m3c
Cadmium Dust	7440-43-9	5 x 10-4	0.0018i	B1	f		OSHA-PEL: 0.2 mg/m3 [8-hr TWA], 0.6 mg/m3 [ceiling]d ACGIH-TLV: 0.05 mg/m3d NIOSH-REL: reduce exposure to lowest feasible concentrationd
Cadmium Fume	1306-19-0	7 x 10-4h	2.5 x 10-3i	f	f		OSHA-PEL: 0.1 mg/m3 [8-hr TWA], 0.3mg/m3 [ceiling]l NIOSH-REL: reduce exposure to lowest possible concentrationd
Carbon Tetrachloride	56-23-5	7 x 10-4	0.0025i	B2	1.3 x 10-	6.39	OSHA-PEL: 12.6 mg/m3 [8-hr TWA]c ACGIH-TLV: 32 mg/m3 [skin]d NIOSH-REL: 12.6 mg/m3 [60-min ceiling limit]c

					1(oral) 5.3 x 10-		
Chlorine	7782-50-5	0.011h	3.9 x 10-2 (PNL)	e	e	2.95	OSHA-PEL: 1.5 mg/m3 and a 15-minute ceiling STEL of 3 mg/m3c ACGIH-TLV: same as aboved NIOSH-REL: same as abovec

E4 3935-1

Footnotes at end of table.

Table F-2.-Exposure LimitsòContinued [Page 2 of 4]

Compounds	CAS No.	RfD (mg/kg/day) (oral)a	RfC (mg/m3) (inhalation) a	Cancer Classb	Slope Factor (mg/kg/day)-1b	Conversion Factors (mg/m3)c	Occupational Exposure Levels
Chromium Trioxide	1333-82-0	3.5 x 10-3h	1.23 x 10-2i	f	f		OSHA-PEL: 0.1 mg/m3 [ceiling]d ACGIH-TLV: 0.05 mg/m3d NIOSH-REL: 0.025 mg/m3 [10 hr TWA], 0.05 mg/m3 [15-min ceiling]d
Dimethylformamide	68-12-2	0.112g	3 x 10-2	f	f	3.04	OSHA-PEL: 30 mg/m3 [8-hr TWA

aboved abovec							skin]c ACGIH-TLV: same as NIOSH-REL: same as
1,4-Dioxane [skin] [skin] [30-minute	123-91-1	0.08g	0.28g	B2	1.1x10-2 (oral)	3.66	OSHA-PEL: 90 mg/m3c ACGIH-TCV: 90 mg/m3d NIOSH-REL: 3.6 mg/m3 exposure]c
Formaldehyde with a 15- lowest	50-00-0	0.2	0.7i	B1	4.5 x 10-2 (inhal); unit risk factor: 1.3 x10-5 (inhal)	1.2	OSHA-PEL: 0.9 mg/m3 minute STEL of 2.4 mg/m3l ACGIH-TLV: 1.2 mg/m3d NIOSH-REL: limit to feasible leveld
Hydrogen Cyanide [15-minute [15-min STEL	74-90-8	2 x 10-2	f	e	e	1.12	OSHA-PEL: 5 mg/m3 STEL] [skin]c ACGIH-TLV: 11 mg/m3 [skin][ceiling]d NIOSH-REL: 5 mg/m3 limit][skin]c
Isopropyl Alcohol [8-hr TWA], limit]c mg/m3 and STEL	67-63-0	0.202g	24.15 (PNL)	e	e	2.50	OSHA-PEL: 980 mg/m3 1225 mg/m3, [15-min STEL ACGIH-TLV: 1,000 of 1250

OSHAc							mg/m3d NIOSH-REL: same as
Lead Titanate	12060-00-3	0.0011h	f	f	f		OSHA-PEL: 0.05 mg Pb/m3d ACGIH-TLV: 0.15 mg Pb/m3d NIOSH-REL: 0.10mg Pb/m3d

E4 3935-2

Footnotes at end of table.

Table F-2.-Exposure LimitsòContinued [Page 3 of 4]

Compounds	CAS No.	RfD (mg/kg/day) (oral)a	RfC (mg/m3) (inhalation)a	Cancer Classb	Slope Factor (mg/kg/day)-	Conversion Factors (mg/m3)c	Occupational Exposure Levels
Lithium	7439-93-2	f	f	f	f		f
Methylene Chloride	75-09-2	6 x 10-2b	3 *	B2	7.5 x 10-3 (oral) 2.6x10-3 (inhal)k	3.53	OSHA-PEL: 1765 mg/m3 [8-hr TWA], 3500 mg/m3 [ceiling], 7000 mg/m3 [5-min max peak in any 2 hours]c ACGIH-TLV: 174 mg/m3d NIOSH-REL: reduce exposure to lowest feasible

concentrationc

4,4 -Methylene Dianiline	101-77-9	7 x 10-4h	under review 2.5 x 10-3h	f	f		ACGIH-TLV: 0.81 mg/m3 [skin]c
Methylene Diisocyanate	4747-90-4	f	f	f	f		f
Methyl Ethyl Ketone (2-Butanone)	78-93-3	5 x 10-2 * (withdrawn)	1.0	D	e		OSHA-PEL: 590 mg/m3 [8-hr TWA], 885 mg/m3[15-min STEL limit]c ACGIH-TLV: same as aboved NIOSH-REL: same as abovec
Nickel Chloride	7718-54-9	7 x 10-4h	2.45 x 10-3h	f	f		OSHA-PEL: 0.1 mg/m3d ACGIH-TLV: same as aboved NIOSH-REL: 0.015mg/m3d
Nitric Acid	7697-37-2	0.035h	0.123 (PNL)	e	e	2.62	OSHA-PEL: 5 mg/m3 and a 15-minute STEL 10 mg/m3c NIOSH-REL: same as abovec
Phenol Isocyanate	f	f	f	f	f	f	f
Thionyl Chloride	7719-09-7	f	f	f	f		OHSA-PEL: 5mg/m3 [ceiling]l ACGIH-TLV: same as aboved NIOSH-REL: same as abovem

E4 3935-3

Footnotes at end of table.

Table F-2.-Exposure LimitsòContinued [Page 4 of 4]

Compounds	CAS No.	RfD (mg/kg/day) (oral)a	RfC (mg/m3) (inhalation)a	Cancer Classb	Slope Factor (mg/kg/day)-1b	Conversion Factors (mg/m3)c	Occupational Exposure Levels
Toluene [8-hr TWA], [8-hr	108-88-3	3.46 x 10-1 #	2.0 (PNL)	D	e	3.83	OSHA-PEL: 375 mg/m3 560 mg/m3 [15-min STEL limit]c ACGIH-TLV: 383 mg/m3 TWA], 575 mg/m3 [15-minute STEL]d NIOSH-REL: same as OSHAc
Toluene Diisocyanate [8-hr limit] (for [15-	584-84-9	2.8 x 10-4h	9.8 x 10-4h	f	f	7.24	OSHA-PEL: 0.04 mg/m3 TWA], 0.15 mg/m3 [15-min STEL Toluene - 2,4-Diisocyanate)c ACGIH-TLV: 0.036 mg/m3, minute STEL

-2,4-							0.14 mg/m3] (for Toluene Diisocyanate)d NIOSH-REL: same as OSHAc
1,1,1-Trichloroethane [15-min aboved	71-55-6	3.5 x 10-2 #	1.0 *	D	e		OSHA-PEL: 1,900 mg/m3 STEL 2450 ppm mg/m3]l ACGIH-TLV: same as
1,1,2-Trichloroethane [skin]c [skin]d	79-00-5	4 x 10-3	under review	C	5.7 x 10-2 (inhal)	5.55	OSHA-PEL: 45 mg/m3 ACGIH-TLV: 55 mg/m3 NIOSH-REL: same as OSHAc
Trichloroethylene STEL 1,080 aboved	79-01-6	7.35 x 10-3 #	0.046 (PNL)	B2	f	5.46	OSHA-PEL: 270 mg/m3; mg/m3 l ACGIH-TLV: same as NIOSH-REL: 1,365 mg/m3d
Trichlorotrifluor- with a oethane aboved	76-13-1	3 x 101	105 (PNL)	e	e		OSHA-PEL: 7,600 mg/m3 15-minute STEL of 9,500 mg/m3l ACGIH-TLV: same as

E4 3935-4

a The majority of the RfD and RfC values in this table are taken from July 1992 versions of the Integrated Risk Information System

(IRIS) file for the particular chemical. In a few cases, values were copied from the Health Effects Assessment Summary Tables (HEAST), March 1992 edition. Values from the HEAST tables are denoted with the symbol (*). Values followed by the symbol (#) were taken from the Office of Drinking Wateròs Health Advisories, issued March 31, 1987. Values followed by PNL were taken from Pacific Northwest Laboratories of Battelle (1991).

b Values in the table are taken from the 1992 IRIS.

c NIOSH Pocket Guide to Chemical Hazards, June 1990; 1991-1991 Threshold Limit Values for Chemical Substances and Physical Agents, ACGIH, 1991; conversion factors used to convert ppm to mg/m3.

d Saxòs Dangerous Properties of Industrial Materials, Eighth Edition, 1992.

e Not Applicable.

f Information is not available.

g Derived from LD50 in Saxòs Eighth Edition, 1992/Registry of Toxic Effects of Chemical Substances (RTECS); calculations from the Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

h Derived from TWA value in this table; calculations from the Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

i Derived from RfD in this table; calculations from the Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

j Health Effects Assessment Summary Table (HEAST), 1992.

k National Toxicology Program, 1986. NTP-TRS-3129 CFR 1910.1000.

m NIOSH Recommendations for Occupational Safety and Health, 1992. DHHS No. 92-100.

Table 3.2.2-2.-Mound Plant: Waste Management (1991)

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	19,000 gal	14,686 gal	None	Offsite
Solid	2,825 ft3	2,880 ft3	a	Offsite
Nonhazardous				
Liquid	47,400,000 gal	b	47.5 MGY	Offsite-NPDES Outfall
Solid	140,130 ft3	21,492 ft3	None	Offsite
LLW				
Liquid	0	c	c	Not Applicable
Solid	176,678 ft3	123,000 ft3	d	Offsite-DOE
Mixed				
Liquid	79 gal	325.2 gal	None	None
Solid	4.5 ft 3	1,600 ft3	Nonee	None

E4 3938

a Burn Area has treated an average of 42 ft3/yr of explosive/reactive wastes.
b Additional capacity is obtained as required by renting commercial trailers.
c The Waste Disposal Plant has four influent tanks having a combined storage capacity of 120,000 gallons of alpha wastewater. On the average, 30,000 gallons per week of alpha wastewater are treated and discharged to the Great Miami River. Low-level tritium contaminated liquid wastes (30,000 gallons per year) are solidified and disposed of as solid LLW.
d Sludges produced in the clariflocculator from the above process are held in two 1,000-gallon tanks until solidified in 55- gallon drums.
e When available in 1995, the glass melter thermal treatment unit is expected to have a treatment capacity of 740 ft3/yr.

Source: FDI, 1993; MD DOE, 1991b; MD DOE, 1992.

Table E2.1.-Assumptions for Regional Economic Analysis, Mound Plant Example

	Category								
Employment	DSHAREa	DURa	PRDEP	DURDEPa	HHS	FF	NLOC	IURa	FURa
Direct									
Construction									
Direct	0.75	0.45	0.238b	0.054	3.11c	0.589c	0.25		
Support	0.050	0.045	0.238b	0.054	2.93c	0.618c	0.75		
Operations									
DOE Operations	0.195	0.045	0.247b	0.054	3.17d	0.708d	0.50		
Indirect									
Personal Consumption					3.17d	0.708d		0.054	
Procurement					3.17d	0.708d		0.054	
Related					3.17d	0.708d		0.054	
Other Parameters									0.045

E4 3944

a This varies from site to site.
b OWRC, 1975.
c COE, 1981.
d DOC, 1991.

Notes:

DSHARE - Employable share of available resident labor force. This is the proportion of current unemployed labor force with the necessary skills. For Direct Construction Workforce it is 1.5 times construction workers as a proportion of the total employment for year 1989 as measured by Bureau of Economic Analysis. The factor 1.5 is historically used as the unemployment rate is higher for construction workers. This ratio is assumed to be 0.05 for Support/Design. For DOE Operations, this is the proportion of manufacturing related employment in 1989 as given by Bureau of Economic Analysis.

DUR - Unemployment rate, in-migrant workers (direct employment). This is assumed to be the same as the minimum unemployment rate.

DURDEP - Unemployment rate, dependents of in-migrant workers. This is assumed to be the unemployment rate at the start of the project.

FF - Fraction of workers accompanied by dependents.

HHS - Household size of workers accompanied by dependents.

IUR - Unemployment rate, in-migrant workers (indirect employment).

NLOC - Proportion of workers assumed to be non-local.

PRDEP - Labor force participation rate of the dependents of in-migrating workforce.

FUR - Floor value for minimum employment rate. The unemployment rate for any region cannot go lower than this value. This is determined as the lowest unemployment rate in the region for 1970-1990 period. Proportion of population that is working age: 0.643e.

Table E3.8-3.-Primary Municipal Water and Wastewater Systems in the Rocky Flats Plant ROI

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1989)			
Adams County, CO			
City of Thornton	50.00	12.70	25
City of Westminster	36.00	23.00	64
City of Northglenn	15.00	4.22	28
City of Brighton	12.00	2.80	23
South Adams County Water and Sewer District (1991)	15.50	3.50	23
Arapahoe County, CO			
City of Aurora	130.00	40.00	31
City of Englewood	34.00	8.00	24
Boulder County, CO			
City of Boulder	55.00	20.10	37
City of Longmont	50.00	12.60	25
City of Broomfielda	8.00	2.68	34
City of Lafayette	8.00	2.20	28
Denver County, CO			
Denver Water Board	715.00	211.68	30
Jefferson County, CO			
City of Arvada	52.00	15.60	30
City of Golden	15.00	3.44	23
Total	1,195.50	362.52	30
Wastewater Systems (1989)			

Adams County, CO			
City of Westminster	5.50	4.18	76
City of Northglenn	6.50	3.10	48
City of Brighton	2.63	1.76	67
South Adams County Water and Sewer District (1991)	4.00	2.60	65
Arapahoe County, CO			
City of Aurorab	2.50	2.30	92
City of Englewood	35.00	23.00	66
Boulder County, CO			
City of Boulder (1991)	16.00	16.00	100
City of Broomfield	5.40	2.52	47
City of Lafayette	1.80	1.20	67
City of Longmont	11.55	6.99	61
Denver County, CO			
Denver (Metro WW Reclamation District) (Metro)	185.00	140.00	76
Total	275.88	203.65	74

E4 3945
a Purchases an average of 1.8 MGD in addition to city-supplied water.

b Represents only approximately 10 percent of Auroras daily flow, remaining 90 percent to Metro system.

Source:CO Municipal, 1991; CO DOH, 1992; Roecker, Simpson, Jones, Fabisiak, Bebler, Schat.

Table E3.5-3.-Primary Municipal Water and Wastewater Systems in the Sandia National Laboratories, Albuquerque, ROI

		Average	
	Capacity	Daily	Percent of

Location	(MGD)	(MGD)	Capacity
Water Systems (1991)			
Bernalillo County, NM			
City of Albuquerque	280.00	117.00	42
Sandoval County, NM			
City of Rio Rancho	16.00	9.00	56
City of Bernalillo	1.94	1.36	70
Valencia County, NM			
City of Los Lunas	3.38	1.00	30
City of Belen	3.00	1.00	33
Total	304.33	129.36	43
Wastewater Systems (1991)			
Bernalillo County, NM			
City of Albuquerquea	61.00	53.00	87
Sandoval County, NM			
City of Rio Rancho	4.00	3.00	75
City of Bernalillo	0.80	0.45	56
Valencia County, NM			
City of Los Lunas	0.70	0.48	69
City of Belen	1.20	1.00	83
Total	67.70	57.93	86

E4 3946
a Wastewater system capacity to be expanded to approximately 72 MGD by 1993.
Source: SN USAF, 1990; Walsh, Barrett, Knott, Wortman, Brown, Mcdonnaugh, Gaterias, Tobey, Padilla, Sanchez.

Table E3.4-3.-Primary Municipal Water and Wastewater Systems in the Y-12 (Oak Ridge Reservation) ROI [Page 1 of 2]

Location	Capacity (MGD)	Average Daily Demand (MGD)	Percent of Capacity
Water Systems (1991)			
Anderson County, TN			
Oak Ridge Reservation (DOE)	32.10	18.30	57
City of Clinton Utilities Board (1988)	2.25	1.46	65
Anderson County Utility Board	2.00	0.95	48
Blount County, TN			
City of Alcoa Utilities	24.00	7.50	31
City of Maryville	6.00	3.00	50
Knox County, TN			
City of Knoxville Utilities Board	63.60	33.09	52
First Utility District of KnoxCounty	14.00	5.82	42
West Knox Utility District	8.50	3.98	47
Hallsdale Powell Utility District	6.29	4.00	64
Knox-Chapman Utility District	2.80	2.00	71
Northeast Knox Utility District (1988)	2.30	1.05	46
Loudon County, TN			
Loudon Utilities Board	8.70	4.90	56
Tellico Area Service System	3.50	1.31	37
Lenoir City Utility Board (1988)	3.00	0.97	32
Roane County, TN			
Rockwood Water System	6.00	1.65	28
City of Harriman Utility Board(1988)	3.00	1.64	55
City of Kingston Water System	2.00	0.41	20

Total	190.04	92.03	48

E4 3949-1
Footnotes at end of table.

Table E3.4-3.-Primary Municipal Water and Wastewater Systems in the Y-12 (Oak Ridge Reservation) ROI-Continued [Page 2 of 2]

Location	Capacity (MGD)	Average Daily Demand(MGD)	Percent of Capacity
Wastewater Systems (1991)			
Anderson County, TN			
City of Oak Ridge	5.87	5.00	85
Clinton Utilities Board	2.05	0.70	34
Blount County, TN			
City of Maryville	10.00	6.20	62
Knox County, TN			
City of Knoxville UtilitiesBoard	62.89	44.33	70
Hallsdale Powell Utility District	5.55	3.90	70
First Utility Dist. of KnoxCountya	5.00	4.70	94
West Knox Utility District	4.00	2.48	62
Loudon County, TN			
Loudon Utilities Board	7.60	5.08	67
Lenoir City Utilities	2.00	1.11	56
Roane County, TN			
City of Harriman Utilities Board	1.50	1.50	100
Rockwood Wastewater System	1.50	1.50	100
Kingston Water and Wastewater	1.00	0.08	8

Department			
Total	108.96	76.58	70

E4 3949-2

a Currently expanding to 10 MGD capacity.

Source:TN KCOC, 1990; Y-12 MMES, 1991c; TN DOC, 1992; Y-12 ETDD, 1992.

Table E2.2.òParameters Used By The Model Mound Plant Example [Page 1 of 2]

Parameters Used By the Model

MSLF = .1000		FUR = .0450						

Direct Employment Parameters:

Category	DSHARE	DUR	PRDEP	DURDEP	HHS	FF	DCIV	NLNDTR	NLRLOC	SHWCON
Construction-Direct	.075	.045	.238	.054	3.110	.589	1.000	.000	.250	.000
Construction-Support	.050	.045	.238	.054	2.930	.618	1.000	.000	.750	.000
DOE Operations	.195	.045	.247	.054	3.170	.708	1.000	.000	.500	.000

Indirect Employment Parameters:

Category	IUR	HHS	FF							
Personal Consumption	.054	3.170	.708							
Procurement	.054	3.170	.708							
Related Investment	.054	3.170	.708							

Logistic Labor Force Response Parameters:

Proportion of population that is of working age = 0.643

Beta parameter of effect of project jobs on labor force participation (0 = no effect) = 1.0500
Abbreviations Used:
DCIV- Fraction of direct employment which can be filled by civilians.
DSHARE- Employable share of available resident labor force.
DUR- Unemployment rate, in-migrant workers (Direct employment).
DURDEP- Unemployment rate, dependents of in-migrant workers.
FF- Fraction of workers accompanied by dependents.
FUR- Floor value for minimum unemployment rate.
HHS- Household size, workers accompanied by dependents.
IUR- Unemployment rate, in-migrant workers (indirect employment).
MSLF- Maximum share of baseline labor force employed with project - but unemployed without it.
NLNOTR- Share of employment assumed to be non-local, and not relocating from out of region.
NLRLOC- Share of employment assumed to be non-local, but relocating from out of region.
PRDEP- Labor force participation rate, dependents of in-migrant workers.
SHWCOM- Share of direct workers who are weekly commuters.
Year: 2000
Baseline Information

Population	988,026					
Civilian Labor Force	493,321					
Labor Force Participation Rate (w/o Proj.)	.4993					
Employed Civilian Labor Force (w/o Proj.)	466,633					
Unemployment Rate	.054					
Total Employment (w/o Proj.)	466,646					
Earnings ($1,000)	12,464,970					

Personal Income ($1,000)	18,143,330					
Per Capita Income (w/o Proj.)	18,363					

Project Information:

Employment Category	Direct Employment	Earnings ($1,000)	Personal Income ($1,000)			
Construction-Direct	252.0	7,292	7,292			
Construction-Support	38.0	1,475	1,475			
DOE Operations	0.0	0	0			
Subtotal	290.0	8,768	8,768			

Indirect Employment

Personal Consumption	140.4	3,637	5,294			
Procurement	641.0	20,421	29,724			
Related Investment	0.0	0	0			
Subtotal	781.3	24,058	35,018			
Total-Place of Work	1,071.3	32,826	43,786			
Weekly Commuting Adjustment			0			
Total-Place of Residence			43,786			

E4 3950-1

Table E2.2.òParameters Used by the Model Mound Plant ExampleòContinued [Page 2 of 2]

Direct and Indirect Project Impacts
Direct Employment Category:

Category	Available Residential Labor Force	Excess Demand	Labor Force Increase	Dependents	Population Impacts	Weekly Commuters	Accompanying Labor Force
Construction-Direct	336.87	63.00	65.97	81.99	147.95	.00	19.51
Construction-Support	224.58	28.50	29.84	35.59	65.44	.00	8.47
DOE Operations	875.87	.00	.00	.00	.00	.00	.00
Subtotal	1,437.32	91.50	95.81	117.58	213.39	.00	27.98

Indirect Employment Category:

Category	Demand Share of Avail. Res. Labor Force	Excess Demand	Labor Force Increase	Dependents	Population Impacts	Labor Force Share	
Personal Consumption	548.66	.00	.00	.00	.00	.12	
Procurement	2,505.65	.00	.00	.00	.00	.56	
Related Investment	.00	.00	.00	.00	.00	.00	
Subtotal	3,054.32	.00	.00	.00	.00	.68	

Total	4,491.64	91.50	95.81	117.58	213.39		

Summary of Effects:

Employment-	Direct Employment (All Categories)	290		
	Indirect Employment (All	781		
	Total Project-Related Employment	1,071		
	Project-Related Civilian Employment	1,071		
	Civilian Labor Force Increase	124		
	Civilian Labor Force (w/Project)	493,711		
	Employed Civilian Labor Force (w/Project)	467,704		
	Unemployment Rate (w/Project)	.053		
	Total Employment (w/Project)	467,717		
	Adjusted Baseline Labor Force Particpation Rate (w/Project)	.4996		
	Labor Force Partic. Rate	.4996		
	Maximum Employment of Accompanying Labor Force	26		
Population-	Total Population Impact	213		
	Total Population (w/Project)	988,239		
	Direct Weekly Commuters	0		
Income-	Direct Project-Related Earnings ($1,000)	8,768		
	Direct Project-Related Resident Earnings ($1,000)	8,768		
	Indirect Project-Related Earnings ($1,000)	24,058		
	Earnings (w/Project $1,000)	12,497,790		
	Personal Income Impact of Project ($1,000)	43,786		
	Personal Income (w/Project $1,000)	18,187,110		
	Per Capita Income (w/Project)	18,404		

Table E3.2-3.-Primary Municipal Water and Wastewater Systems in the SRS ROI

		Average	
	Capacity	Daily Demand	Percent of
Location	(MGD)	(MGD)	Capacity
Water Systems (1989)			
Aiken County, SC			
Aiken County	16.13	8.82	55
Aiken City	10.30	8.70	84
City of North Augusta	8.00	2.51	31
City of New Ellenton	1.54	0.51	33
City of Jackson	1.00	0.17	17
Allendale County, SC			
Allendale County	6.79	0.91	13
Bamberg County, SC			
Bamberg County	3.11	1.58	51
Barnwell County, SC			
Barnwell County	1.91	0.62	32
Barnwell City	4.75	0.70	15
Edgefield County, SC			
Edgefield County (1991)	4.40	2.51	57
Orangeburg County, SC			
Orangeburg County (1991)	11.00	5.96	54
Columbia County, GA			
Columbia County	16.72	6.73	40
Richmond County, GA			
Richmond County	22.00	12.00	55

City of Augusta	60.00	28.00	47
Total:	167.65	79.72	48
Wastewater Systems (1989)			
Aiken County, SC			
Aiken County Public Service Authority	20.00	9.00	45
Allendale County, SC			
Allendale County	1.30	0.80	62
Bamberg County, SC			
Bamberg County	4.00	0.50	13
Barnwell County, SC			
Barnwell County	0.33	0.27	82
Barnwell City	1.00	0.80	80
Edgefield County, SC			
Edgefield County (1991)	1.69	0.73	43
Orangeburg County, SC			
Orangeburg County (1991)	9.00	3.70	41
Columbia County, GA			
Columbia County	5.38	3.30	61
Richmond County, GA			
Richmond County	1.71	1.27	74
City of Augusta	46.10	29.00	63
Total:	90.51	49.37	55

E4 3952
Source: SR NUS, 1990a; Nichols, Montebello.

Table 4.2.2.2-1.-Contribution to Air Quality from the Pinellas Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelinesò
[Page 1 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3)f	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Carbon Monoxide (CO)	8-hour 1-hour	10,000b 40,000b	8,016 13,742	5.1 11.3	8,021.1 13,753.3
Lead (Pb)	Calendar Quarter	1.5c	e	g	e
Nitrogen Dioxide (NO2)	Annual	100b	e	0.4	_ 0.4
Ozone (O3)	1-hour	235b	243.4	g	243.4
Particulate Matter (PM10)	Annual 24-hour	50b 150b	e e	0.02 0.3	_0.02 _0.3
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	60c 260c 1,300b	23 133 526	0.0009 0.01 0.04	23 133 526
Hazardous Air Pollutants and Other Toxic Compoundsa					
1,1,1-Trichloroethane	24-hour 8-hour	9,168c 38,200c	_26 _40	0.4 1.1	_26.4 _41.1
1,4-Dioxane	24-hour 8-hour	216c 900c	_16 _30	1.2 3.2	_17.2 _3.2
Acetic Acid	24-hour 8-hour	60c 250c	_12.2 _21.4	0.8 2.1	_13.0 _23.5
Acetone	24-hour 8-hour	8,544c 35,600c	_194.7 _340.8	12.4 34.2	_207.1 _375.0
Chlorodifluoroethane	Annual 24-hour 8-hour	d d d	e e e	0.1 0.8 2.1	_0.1 _0.8 _2.1
Chlorodifluoromethane	24-hour 8-hour	16,992c 70,800c	_12 _21	0.4 1.1	_12.4 _22.1
DòLimonene	Annual 24-hour 8-hour	d d d	e e e	0.3 3.1 8.6	_0.3 _3.1 8.6
Dichlorodifluoromethane	Annual 24-hour 8-hour	200c 23,760c 99,000c	_2.4 _9.8 _16.8	0.04 0.4 1.1	_2.4 _10.2 _17.9
Dimethyl Formamide	Annual 24-hour 8-hour	30c 72c 300c	_0 _0.01 _0.01	0.04 0.4 1.1	_0.04 _0.4 _1.1

Ethyl Alcohol	24-hour 8-hour	9,024c 37,600c	_1.2 _2.1	0.4 1.1	_1.6 _3.2
Ethyl Benzene	Annual 24-hour 8-hour	1,000c 1,041.6c 4,340c	e e e	0.1 0.8 2.1	_0.1 _0.8 _2.1

E4 3954-1
Footnotes at end of table.

Table 4.2.2.2ò1.òContribution to Air Quality from the Pinellas Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and GuidelinesòContinued [Page 2 of 3]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3)f	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Fluoboric Acid	Annual 24-hour 8-hour	d d d	e e e	0.1 0.8 2.1	_0.1 _0.8 _2.1
Fluorine End-Capped Homopolymers	Annual 24-hour 8-hour	d d d	e e e	0.6 6.6 18.2	_0.6 _6.6 _18.2
Fluoroaliphatic Polymeric Esters	Annual 24-hour 8-hour	d d d	e e e	0.04 0.4 1.1	_0.04 _0.4 _1.1
Fluorobenzene	Annual 24-hour 8-hour	d d d	e e e	0.4 4.7 12.8	_0.4 _4.7 _12.8
Fluorotelomer	Annual 24-hour 8-hour	d d d	e e e	0.04 0.4 1.1	_0.04 _0.4 _1.1
Glycol Ethers	24-hour 8-hour	42.2c 180c	0.02 0.03	43.9 120.7	_43.9 _120.7
Hexane	24-hour 8-hour	422.4c 1,760c	_.06 _1.1	1.2 3.2	_1.8 _4.3
Hydrochloric Acid	Annual 24-hour 8-hour	7c 18c 75c	_1.1 _5.0 _11.0	0.5 5.1 13.9	_1.6 _10.0 _24.9
Isopropyl Alcohol	24-hour 8-hour	2,359.2c 9,830c	_49.0 _85.7	26.8 73.7	_15.8 _159.4
Lead Compound	Annual 24-hour 8-hour	0.09c 0.12c 0.5c	_0.01 _0.07 _0.10	g g g	_0.01 _0.1 _0.1

Methyl Alcohol	24-hour 8-hour	628.8c 2,620c	_40.4 _70.7	0.4 1.1	_40.8 _71.8
Methyl Ethyl Ketone	Annual 24-hour 8-hour	80c 1,416c 5,900c	_0.3 _1.07 _1.9	0.1 1.2 3.2	_0.4 _2.2 _5.1
Methyl Isobutyl Ketone	24-hour 8-hour	492c 2,050c	e e	2.3 6.4	_2.3 _6.4
Methylene Chloride	Annual 24-hour 8-hour	2.1c 417.6c 1,740c	_2.0 _30.0 _60.0	0.04 0.4 1.1	_2.0 _30.4 _61.1
Naptha/Mineral Spirits	Annual 24-hour 8-hour	d d d	_0.8 _3.2 _5.7	0.7 7.0 19.3	_1.5 _10.2 _15.0

E4 3954-2
Footnotes at end of table.

Table 4.2.2.2ò1.òContribution to Air Quality from the Pinellas Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and GuidelinesòContinued [Page 3 of 3]

Pollutant	Averaging Time	Most StringentRegulation orGuideline	Baseline Concentration (µg/m3) f	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Nickel Chloride	24-hour 8-hour	0.24c 1c	_0.1 _0.3	g g	_0.1 _0.3
Nitric Acid	24-hour 8-hour	12.48c 52c	_3.0 _5.0	14.8 40.6	_17.8 _45.6
Phosphoric Acid	24-hour 8-hour	2.4c 10c	_0.9 _2.5	1.2 3.2	_2.1 _5.7
Sulfuric Acid	Annual 24-hour 8-hour	d d d	e e e	0.9 9.3 25.6	_0.9 _9.3 _25.6
Tetrachloroethylene	24-hour 8-hour	813.6c 3,390c	_0.3 _0.5	0.8 2.1	_1.1 _2.6
Toluene	Annual 24-hour 8-hour	2,000c 904.8c 3,770c	_6.6 _6.3 _6.0	0.6 6.6 18.2	_7.2 _32.9 _64.2
Trichloroethylene	24-hour 8-hour	645.6c 2,690c	_8 _14	7.4 20.3	_15.4 _34.3

Trichlorotrifluoroethane	24-hour 8-hour	36,816c 153,400c	e _642.7	0.4 1.1	_0.4 _642.7
Xylene	Annual 24-hour 8-hour	300c 1,041.6c 4,340c	_1,124.1 e e	0.4 4.3 11.8	_1,124.1 _4.3 _11.8

E4 3954-3

a Compounds listed are the major pollutants of concern (FDI, 1993).
b Federal standard (40 CFR 50).
c State standard (FL DER, 1992).
d No standard or guideline.
e Data unavailable.
f Baseline Concentrations are from table 4.1.7.2-1.
g Emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (FDI, 1993).

Table 3.2.8.-1.-Sandia National Laboratories, Albuquerque: Waste Management (1991)

Waste Type	Quantity Generated	Storage Capacity	Treatment Capacity	Disposal Method
Hazardous/Toxic				
Liquid	198,450 gal	70,000 gala	None	Offsite
Solid	4,500 ft3		None	Offsite
Nonhazardous				
Liquid	200,000,000 gal	None	None	Offsite-Sewer System
Solid	800,000 ft3	None	None	KAFB Landfill
LLW		89,000 ft3 a		
Liquid	4,160 gal		None	None
Solid	2,355 ft3		None	Offsite DOE
Mixed				
Liquid	480 gal	b	None	None
Solid	115 ft3		None	None

E4 3980

a Includes both solid and liquid.
b The total storage capacity for both LLW and mixed waste combined is 89,000 ft3. Separate storage capacities for LLW and mixed waste have not been designated.

Source: SN DOE, 1992d.

Table E3.2-2.òSavannah River Site ROI Housing Characteristics [Page 1 of 2]

		Owner-occupied Units		Renter-occupied Units		
County/City	Total Units	Number of Units	Percent Vacant	Number of Units	Percent Vacant	Mobile Homes
1970						
South Carolina						
Aiken County	29,400	19,951	3	7,022	12	1,656
Aiken	4,759	2,950	4	1,377	11	31
North Augusta	4,342	2,050	2	1,449	15	26
Allendale County	3,022	1,599	2	1,141	8	102
Bamberg County	4,852	2,658	2	1,607	10	247
Barnwell County	5,384	3,075	2	1,975	10	388
Edgefield County	4,552	2,733	1	1,481	6	388
Orangeburg County	20,857	11,861	2	6,987	7	1,123
Georgia						
Columbia County	6,740	4,419	2	1,806	7	1,381
Richmond County	47,751	26,116	2	18,340	9	2,031
Augusta	21,159	8,674	1	11,203	7	4
ROI (County Total)	122,558	72,412	2	40,359	9	7,316
1980						
South						

Carolina						
Aiken County	39,791	27,751	7	8,705	12	4,260
Aiken	6,173	3,623	6	2,134	7	40
North Augusta	5,470	3,549	4	1,488	16	18
Allendale County	3,939	2,346	13	1,102	12	340
Bamberg County	6,384	3,976	14	1,648	7	4,492
Barnwell County	7,282	4,622	12	1,849	8	793
Edgefield County	6,207	4,078	12	1 ,458	7	837
Orangeburg County	29,114	18,224	13	7,419	9	3,339
Georgia						
Columbia County	14,099	10,326	8	2,508	15	2,205
Richmond County	64,846	35,211	7	24,290	10	3,160
Augusta	20,825	8,173	9	10,935	8	5,365
ROI (County Total)	171,662	106,534	9	48,979	10	19,426

E4 3990-1

Footnotes at end of table.

Table E3.2-2.òSavannah River Site ROI Housing Characteristics òContinued
[Page 2 of 2]

		Owner-occupied Units		Renter-occupied Units		
County/City	Total Units	Number of Units	Percent Vacant	Number of Units	Percent Vacant	Mobile Homes
1990						

South Carolina						
Aiken County	49,266	33,491	2	11,392	11	10,083
Aiken	8,543	5,128	4	2,621	9	211
North Augusta	6,818	3,972	4	2,300	9	91
Allendale County	4,242	2,584	2	1,207	7	810
Bamberg County	6,408	4,052	2	1,535	9	1,396
Barnwell County	7,854	5,194	1	1,906	11	2,049
Edgefield County	7,290	4,904	2	1,520	7	1,807
Orangeburg County	32,340	21,165	1	7,744	10	8,368
Georgia						
Columbia County	23,745	17,322	2	4,519	8	3,697
Richmond County	77,288	38,762	2	29,913	10	7,205
Augusta	21,588	8,064	3	10,755	9	330
ROI (County Total)	208,433	127,474	2	59,736	10	35,415

E4 3990-2
Source: Census, 1972, 1982, 1991b.

Table E3.1-2.-Kansas City Plant ROI Housing Characteristics

		Owner-occupied Units		Renter-occupied Units		
County/City	Total Units	Number of Units	Percent Vacant	Number of Units	Percent Vacant	Mobile Homes
1970						
Missouri						
Cass County	13,122	8,339	2	3,738	8	1,121
Jackson County	241,919	137,019	2	87,350	1	2,411

Kansas City	272,212	157,186	1	96,519	11	2,782
Leeòs Summit	5,625	3,420	1	1,688	3	5
Kansas						
Johnson County	67,482	48,806	1	16,128	9	340
Overland Park	23,022	16,165	1	5,896	10	23
Wyandotte County	63,484	40,802	1	19,496	8	1,049
ROI (County Total)	386,007	234,966	1	126,712	4	4,921
1980						
Missouri						
Cass County	19,129	13,306	9	4,117	9	1,642
Jackson County	262,356	149,608	6	92,477	10	2,667
Kansas City	191,904	101,481	7	73,746	11	1,821
Leeòs Summit	11,923	6,944	5	4,208	8	9
Kansas						
Johnson County	102,827	71,583	5	25,344	7	958
Overland Park	31,244	20,718	5	8,928	6	23
Wyandotte County	68,506	41,490	6	21,902	10	1,890
ROI (County Total)	452,818	275,987	6	143,840	9	7,157
1990						
Missouri						
Cass County	24,337	17,486	2	5,408	9	2,859
Jackson County	280,729	154,859	2	97,723	13	5,467
Kansas City	161,763	77,287	3	63,603	15	2,749
Leeòs Summit	18,608	11,479	2	6,009	10	118
Kansas						
Johnson County	144,155	94,661	2	41,772	9	1,747
Overland Park	48,043	28,959	2	15,977	9	263

Wyandotte County	69,102	38,714	3	22,800	16	3,109
ROI (County Total)	518,323	305,720	2	167,703	12	13,182

E4 3991
Source: Census, 1972, 1982, 1991b.

Table E3.2-1b.-Indicators of Regional Growth at Savannah River Site, 1970-2040

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	146,087	201,596	256,074	288,560	299,537	289,567
Unemployment Rate (%)	5.1	7.3	5.0	6.3	6.2	6.3
Personal Income (thousand $)	1,193,114	3,488,841	7,638,990	10,629,518	13,702,827	16,403,069
Per Capita Income ($/person)	2,959	7,310	14,446	18,246	21,551	25,292
Eight-County Population						
Aiken County, SC	91,023	105,625	120,940	133,076	144,345	146,943
Aiken	13,436	14,978	19,872	21,866	23,718	24,145
North Augusta	12,883	13,593	15,344	16,884	18,313	18,643
Allendale County, SC	9,692	10,700	11,722	11,543	12,521	12,746
Bamberg County, SC	15,950	18,118	16,902	19,166	20,789	21,164
Barnwell County, SC	17,176	19,868	20,293	22,869	24,806	25,252
Edgefield County, SC	15,692	17,528	18,375	20,473	22,207	22,607
Orangeburg County, SC	69,789	82,276	84,803	93,345	99,607	101,101
Columbia County, GA	22,327	40,118	66,031	69,438	76,694	78,458
Richmond County, GA	162,437	181,629	189,719	212,645	234,867	240,269
Augusta	59,864	47,532	44,639	50,033	55,262	56,533
ROI (County Total)	404,086	475,862	528,785	582,555	635,836	648,540

E4 3992
Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source:Derived from Census, 1973, 1977, 1983, and 1991a; DOC, 1990a and b, 1991a; GA DOL, 1991; SC ESC, 1991.

Table E3.1-1b.-Indicators of Regional Growth at Kansas City Plant, 1970-2040

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	471,743	575,360	670,954	751,591	767,937	740,450
Unemployment Rate (%)	3.4	6.4	5.0	6.0	6.0	5.9
Personal Income (thousand $)	4,759,582	12,271,703	23,160,096	32,080,918	40,374,573	48,005,367
Per Capita Income ($/person)	4,319	10,912	19,076	24,034	27,410	31,764
Four-County Population						
Cass County, MO	39,448	51,029	63,808	66,926	73,855	75,775
Belton	9,783	12,708	18,150	19,037	21,008	21,554
Harrisonville	5,052	6,372	7,683	8,058	8,893	9,124
Jackson County, MO	654,558	629,266	633,232	702,723	775,476	795,638
Grandview	17,456	24,502	24,967	27,707	30,575	31,370
Independence	111,630	111,806	112,301	124,625	137,527	141,103
Kansas City	507,330	448,159	341,179	378,620	417,819	428,682
Leeòs Summit	16,230	28,741	45,985	51,031	56,315	57,779
Raytown	33,306	31,759	30,601	33,959	37,475	38,449
Johnson County, KS	217,662	270,269	355,054	376,813	415,824	426,636
Olathe	17,917	37,258	63,352	67,234	74,195	76,124
Overland Park	79,034	81,784	111,790	118,641	130,924	134,328
Wyandotte County, KS	186,845	172,335	161,993	188,352	207,852	213,256
Kansas City	168,213	161,087	149,767	174,137	192,165	197,161
ROI (County Total)	1,098,513	1,122,899	1,214,087	1,334,814	1,473,007	1,511,305

E4 3993
Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.
Source:Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991a; KS DHR,

1991; MO DES, 1991.

Table E3.4-1b.-Indicators of Regional Growth at Oak Ridge Reservation, Y-12 Plant, 1970-2040

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	195,220	237,820	277,630	319,419	330,165	321,394
Unemployment Rate (%)	3.3	6.7	4.6	7.0	7.1	7.0
Personal Income (thousand $)	1,501,397	4,628,061	9,033,962	12,862,302	16,534,511	19,899,624
Per Capita Income ($/person)	3,228	8,518	15,892	20,547	23,841	27,853
Five-County Population						
Anderson County, TN	60,300	67,346	68,250	78,265	86,858	89,550
Clinton	4,794	5,245	8,972	10,289	11,418	11,772
Oak Ridge	28,319	27,662	24,743	28,374	31,489	32,465
Blount County, TN	63,744	77,770	85,969	93,652	103,934	107,156
Knox County, TN	276,293	319,694	335,749	366,417	406,646	419,252
Knoxville	174,587	175,030	165,121	180,203	199,988	206,188
Loudon County, TN	24,266	28,553	31,255	33,852	37,108	38,036

Lenoir City	5,324	5,446	6,147	6,658	7,298	7,481
Roane County, TN	38,881	48,425	47,227	53,816	58,992	60,467
Harriman	8,734	8,303	7,119	8,112	8,892	9,115
Kingston	4,142	4,441	4,552	5,187	5,686	5,828
ROI (County Total)	463,484	541,788	568,450	626,002	693,538	714,461

E4 3994

Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source:Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991; TN DES, 1991.

Table E3.3-1b.-Indicators of Regional Growth at Los Alamos National Laboratory, 1970-2040

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	34,467	58,796	84,107	98,872	106,360	104,125
Unemployment Rate (%)	9.6	7.7	5.1	6.0	5.8	5.9
Personal Income (thousand $)	324,662	1,062,136	2,323,835	3,133,307	4,167,776	5,080,519
Per Capita Income ($/person)	3,396	8,642	15,348	18,578	21,807	25,736

Three-County Population						
Los Alamos County, NM	15,198	17,599	18,115	22,347	25,411	26,275
Rio Arriba County, NM	25,170	29,262	34,365	37,034	41,449	42,651
Española	4,528	6,803	8,389	6,692	7,490	7,707
Santa Fe County, NM	53,756	75,360	98,928	109,278	124,262	128,487
Santa Fe	41,167	48,953	55,859	61,703	70,164	72,549
ROI (County Total)	94,124	122,221	151,408	168,659	191,122	197,413

E4 3995
Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.
Source:Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991; NM DES, 1991.

Table E.3.8-1b.-Indicators of Regional Growth at Rocky Flats Plant, 1970-2040

Local Region of Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	511,935	870,145	1,009,650	1,205,374	1,283,093	1,262,184
Unemployment Rate (%)	3.7	5.2	4.5	5.6	5.6	5.6
Personal Income (thousand $)	5,572,132	18,754,878	35,768,813	51,753,781	67,743,112	81,833,679
Per Capita Income ($/person)	4,503	11,690	20,006	24,644	28,343	33,192
Five-County Population						
Adams County	185,789	245,944	265,038	325,679	370,664	382,526
Thornton	13,326	40,343	55,031	67,622	73,963	79,425

Arapahoe County	162,142	293,621	391,511	453,401	516,028	532,541
Boulder County	131,889	189,625	225,339	251,892	286,676	294,703
Boulder	66,870	76,685	83,312	93,017	105,862	108,826
Broomfield	7,261	20,730	24,638	27,541	31,344	32,222
Longmont	23,209	42,942	51,555	57,630	65,588	67,425
Denver County	514,678	492,365	467,610	570,460	649,256	670,032
Jefferson County	233,033	371,753	438,430	498,602	567,473	585,632
Arvada	46,814	84,576	86,888	98,813	112,462	116,060
Golden	9,817	12,237	13,116	14,973	17,041	17,586
Lakewood	92,787	112,860	126,481	143,840	163,708	168,947
Westminster	19,432	50,211	74,625	84,867	96,589	99,680
Total	1,227,531	1,593,308	1,787,928	2,100,034	2,230,097	2,465,434

E4 3996
Total employment includes only civilian employment. Personal Income and Per Capita Income are current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.
Source:Derived from Census, 1972, 1977, 1983, 1991a; DOC, 1990b; CO DOL, 1991.

Table E3.7-1b.-Indicators of Regional Growth at Pinellas Plant, 1970-2040

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	378,426	648,159	979,201	1,188,649	1,299,759	1,289,236
Unemployment Rate (%)	3.7	5.1	5.1	5.4	5.4	5.4
Personal Income (thousand $)	4,122,288	14,866,918	35,503,010	51,496,890	70,394,909	87,852,847
Per Capita Income ($/person)	3,749	9,404	18,051	22,837	26,183	30,424

Three-County Population						
Hillsborough County, FL	490,265	646,960	834,054	966,709	1,152,626	1,237,920
Pasco County, FL	75,955	193,661	281,131	314,527	375,017	402,768
Pinellas County, FL	522,329	728,531	851,659	973,706	1,160,969	1,246,881
Clearwater	52,074	85,528	98,784	112,940	134,661	144,626
Largo	22,031	58,977	65,674	75,085	89,526	96,151
Pinellas Park	22,287	32,811	43,426	49,649	59,198	63,578
Seminole	1,000	4,586	9,251	10,577	12,611	13,544
St. Petersburg	216,232	238,647	238,629	272,826	325,296	349,367
ROI (County Total)	1,088,549	1,569,152	1,966,844	2,254,942	2,688,612	2,887,569

E4 3997

Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.

Source:Derived from Census, 1973, 1977, 1983, and 1991a; DOC, 1990a and b, 1991; FL DOL, 1991.

Table E3.6-1b.-Indicators of Regional Growth at Mound Plant, 1970-2040

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040

Civilian Labor Force	380,253	427,787	481,700	521,680	523,780	502,189
Unemployment Rate (%)	5.1	7.9	5.3	5.6	5.6	5.9
Personal Income (thousand $)	3,802,566	9,141,306	16,594,092	22,344,200	27,930,592	33,139,543
Per Capita Income ($/person)	4,132	9,821	16,947	22,146	25,772	30,048
Three-County Population						
Butler County, OH	226,207	258,787	291,479	296,762	322,832	329,934
Middletown	48,767	43,719	46,022	46,856	50,972	52,094
Montgomery County, OH	606,148	571,697	573,809	595,964	635,941	645,480
Centerville	10,333	18,886	21,082	21,896	23,365	23,715
Dayton	242,917	203,371	182,044	189,073	201,756	204,782
Germantown	4,088	5,015	4,916	5,106	5,448	5,530
Kettering	71,864	61,186	60,569	62,908	67,127	68,134
Miamisburg	14,797	15,304	17,834	18,523	19,765	20,062
West Carrollton	10,748	13,148	14,403	14,959	15,963	16,202
Warren County, OH	84,925	99,276	113,909	116,211	124,969	127,469
Carlisle	3,821	4,276	4,872	4,970	5,345	5,452
Franklin	10,075	10,711	11,026	11,249	12,097	12,339
ROI (County Total)	917,280	929,760	979,197	1,008,937	1,083,742	1,102,883

E4 3998
Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970-1990 and are in constant 1992 $ for 2000-2040.
Source:Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991; OH BES, 1991.

Table E3.5-1b.-Indicators of Regional Growth at Sandia National Laboratories, New Mexico, 1970-2040

Local Region-of-Influence (ROI)	1970	1980	1990	2000	2020	2040
Civilian Labor Force	133,798	239,672	310,252	379,866	407,837	400,068

Unemployment Rate (%)	6.9	7.9	5.3	6.0	5.9	5.9
Personal Income (thousand $)	1,295,347	4,558,795	9,421,284	14,078,925	18,980,452	23,252,742
Per Capita Income ($/person)	3,438	8,808	15,992	20,640	24,629	29,228
Three-County Population						
Bernalillo County, NM	315,774	420,164	480,577	568,051	642,992	664,211
Albuquerque	243,751	331,767	384,736	454,765	514,761	531,748
Sandoval County, NM	17,492	34,799	63,319	68,387	76,540	78,760
Valencia County, NM	40,539	61,115	45,235	45,667	51,112	52,594
ROI (County Total)	373,805	516,078	589,131	682,105	770,644	795,565

E4 3999
Total employment includes only civilian employment. Personal Income and Per Capita Income are in current $ for 1970- 1990 and are in constant 1992 $ for 2000-2040.
Source:Derived from Census, 1973, 1977, 1983, 1991a; DOC, 1990a and b, 1991; NM ESD, 1991.

Table 4.2.2.7-1.-Pinellas Plant Alternative Economic and Population Characteristics

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	1,078,854	NA	1,188,649	NA
Baseline Unemployment Rate	5.2%	NA	5.4%	NA
Baseline Personal Income (Thousands $)	$42,758,562	NA	$51,496,890	NA
Baseline Per Capita Income ($/Person)	$20,303	NA	$22,837	NA
Baseline Employment	1,022,608	NA	1,124,772	NA
Direct Jobs	1,149	0.1 1	3,995	0.36
Indirect Jobs	3,321	0.32	7,564	0.67
In-Migrating Workforce	376	0.04	2,074	0.18
Total In-Migration	838	0.04	5,261	0.23

Population Increase				
Hillsborough County	38	0.00	237	0.02
Pasco County	30	0.01	189	0.06
Pinellas County	770	0.08	4,835	0.50
Clearwater	193	0.18	1,210	1.07
Largo	149	0.21	936	1.25
Pinellas Park	88	0.19	552	1.11
Seminole	88	0.89	552	5.22
St. Petersburg	251	0.10	1,578	0.58
ROI (County Total)	838	0.04	5, 261	0.23

E4 4000

Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991a; FL DOL 1991; FDI, 1993.

Table 4.2.3.7-1.-Rocky Flats Plant Alternative Economic And Population Characteristics

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	1,103,180	NA	1,205,374	NA
Baseline Unemployment Rate	5.0%	NA	5.6%	NA
Baseline Personal Income (Thousands $)	$43,025,241	NA	$51,753,781	NA
Baseline Per Capita Income ($/Person)	$22,204	NA	$24,644	NA
Baseline Employment	1,047,492	NA	1,137,688	NA
Direct Jobs	958	0.09	3,740	0.33
Indirect Jobs	2, 569	0.25	5,818	0.51
In-Migrating Workforce	314	0.03	2,205	0.19
Total In-Migration	699	0.04	5,594	0.27

Population Increase				
Adams County	134	0.05	1,074	0.33
Arapahoe County	38	0.01	308	0.07
Boulder County	179	0.08	1,432	0.57
Boulder	46	0.05	369	0.40
Broomfield	36	0.14	28 5	1.04
Denver County	64	0.01	509	0.09
Jefferson County	283	0.06	2,266	0 .45
Arvada	117	0.13	940	0.95
Golden	40	0.28	319	2.13
Westminster	62	0.08	4 98	0.59
ROI (County Total)	699	0.04	5,594	0.27
E4 4001				
Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; CO DOL, 1991; FDI, 1993.				

Table 4.1.1.7-1.-Kansas City Plant Proposed Action Economic and Population Characteristics

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	710,129	NA	751,591	NA
Baseline Unemployment Rate	5.5%	NA	6.0%	NA
Baseline Personal Income (Thousands $)	$27,257,974	NA	$32,080,918	NA
Baseline Per Capita Income ($/Person)	$21,412	NA	$24,034	NA
Baseline Employment	671,291	NA	706,818	NA
Direct Jobs	80	0.01	425	0.06
Indirect Jobs	190	0.03	670	0.09

In-Migrating Workforce	26	0.00	220	0.03
Total In-Migration	58	0.00	558	0.04

Population Increase

Cass County	9	0.01	84	0.13
Belton	3	0.01	26	0.14
Harrisonville	2	0.02	17	0.21
Jackson County	37	0.0 1	358	0.05
Kansas City	17	0.00	165	0.04
Lee's Summit	7	0.01	67	0.13
Johnson County	10	0.00	101	0.03
Overland Park	4	0.00	41	0.03
Wyandotte County	2	0.00	15	0.01
ROI (County Total)	58	0.00	558	0.04

E44002
Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1991; KS DHR, 1991; MO DES, 1991; KC ASAC, 1993b; DOE, 1993c.

Table 4.1.2.7-1.-Savannah River Site Proposed Action Economic and Population Characteristics

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	271,832	NA	288,560	NA
Baseline Unemployment Rate	5.6%	NA	6.3%	NA
Baseline Personal Income (Thousands	$9,011,037	NA	$10,629,518	NA
Baseline Per Capita Income ($/Person)	$16,236	NA	$18,246	NA
Baseline Employment	256,49 5	NA	270,405	NA
Direct Jobs	100	0.04	45	0.02

Indirect Jobs	219	0.09	58	0.02
In-Migrating Workforce	33	0.01	24	0.01
Total In-Migration	74	0.01	60	0.01
Population Increase				
Aiken County	41	0.03	33	0.03
Aiken	20	0.10	17	0.08
North Augusta	11	0.07	9	0.05
Allendale County	1	0.01	1	0.01
Bamberg County	1	0.01	1	0.01
Barnwell County	6	0.03	5	0.02
Edgefield County	1	0.01	1	0.00
Orangeburg County	1	0.00	1	0.00
Columbia County	8	0.01	7	0.01
Richmond County	14	0.01	11	0.01
Augusta	11	0.02	9	0.02
ROI (County Total)	74	0.01	60	0.01

E4 4003
Source:Estimated from Census, 1977, 1983, 1991a; DOC, 1990a; GA DOL, 1991; SC ESC, 1991; DOE, 1993c.

Table 4.1.3.7-1.-Los Alamos National Laboratory Proposed Action Economic and Population Characteristics

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	91,191	NA	98,872	NA
Baseline Unemployment Rate	5.5%	NA	6.0%	NA
Baseline Personal Income (Thousands $)	$2,698,386	NA	$3,133,307	NA
Baseline Per Capita Income ($/Person)	$16,886	NA	$18,578	NA

Baseline Employment	86,139	NA	92,928	NA
Direct Jobs	60	.07	115	0.12
Indirect Jobs	144	0.17	179	0.19
In-Migrating Workforce	20	0.02	61	0.07
Total In-Migration	45	0.03	154	0.09
Population Increase				
Los Alamos County	25	0.12	84	0.38
Rio Arriba County	11	0.03	36	0.10
Española	5	0.08	17	0.25
Santa Fe County	10	0.01	33	0.03
Santa Fe	8	0.01	2 8	0.05
ROI (County Total)	45	0.03	154	0.09

E4 4004
Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; NM ESD, 1991; DOE, 1993c; LA DOE, 1992.

Table 4.1.4.7-1.-Yò12 Plant Proposed Action Economic and Population Characteristics

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	297,792	NA	319,419	NA
Baseline Unemployment Rate	5.8%	NA	7.0%	NA
Baseline Personal Income (Thousands $)	$10,779,496	NA	$12,862,302	NA
Baseline Per Capita Income	$18,070	NA	$20,547	NA
Baseline Employment	280,496	NA	297,032	NA
Direct Jobs	80	0.03	10	0.00
Indirect Jobs	167	0.06	13	0.00
In-Migrating Workforce	26	0.01	5	0.00
Total In-Migration	58	0.01	13	0.00

Population Increase				
Anderson County	21	0.03	5	0.01
Clinton	5	0.05	1	0.01
Oak Ridge	13	0.05	3	0.01
Blount County	2	0.00	0	0.00
Knox County	22	0.01	5	0.00
Knoxville	20	0.01	4	0.00
Loudon County	3	0.01	1	0.00
Roane County	10	0.02	2	0.00
ROI (County Total)	58	0.01	13	0.00

E4 4005
Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; TN DES 1991; DOE, 1993c.

Table 4.2.1.7-1.-Mound Plant Alternative Economic and Population Characteristics

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	501,291	NA	521,680	NA
Baseline Unemployment Rate	5.5%	NA	5.6%	NA
Baseline Personal Income (Thousands $)	$19,255,693	NA	$22,344,200	NA
Baseline Per Capita Income ($/Person)	$19,373	NA	$22,146	NA
Baseline Employment	473,813	NA	492,213	NA
Direct Jobs	775	0.16	3,120	0.63
Indirect Jobs	2,820	0.60	5,178	1.05
In-Migrating Workforce	256	0.05	1,634	0.33
Total In-Migration	570	0.06	4,143	0.41

Population Increase				

Butler County	60	0.02	435	0.15
Middletown	38	0.08	273	0.58
Montgomery County	421	0.07	3,062	0.51
Centerville	65	0.30	472	2.16
Dayton	113	0.06	824	0.44
Germantown	30	0.59	215	4.22
Miamisburg	99	0.54	717	3.87
West Carrolton	42	0.28	302	2.02
Warren County	89	0.08	646	0.56
Carlisle	37	0.76	271	5.46
ROI (County Total)	570	0.06	4,143	0.41

E4 4006
Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; OH BES, 1991; FDI, 1993.

Table 4.1.3.3-2.-Summary of Groundwater Quality Monitoring, Los Alamos National Laboratory

			1989-Existing Conditionsa		
Parameter	Unit of Measure	Water Quality Criteria	Test Well #3	Test Well #DT-5A	Test Well #8
Cesium-137	pCi/L	120c	62	40	30
Chloride	mg/L	250e	3	2	1
Fluoride	mg/L	4b	0.4	0.3	0.3
Nitrate	mg/L	10b	0.6	0.4	0.3
pH	pH units	6.5-8.5e	8.2	8.0	8.0
Plutonium-238	pCi/L	1.6c	0.004	0.008	0.019
Plutonium-239, 240	pCi/L	1.2c	0.009	0.008	0.028

Sulfate	mg/L	250e	3	2	2
Tritium	pCi/L	20,000b	<600	<200	100
Uranium (total) (mg/L)	mg/L	d	2.7	2.0	2.0
Total Dissolved Solids	mg/L	500e	179	132	132

E4 4007
a All data comes from groundwater from onsite stations. Samples were collected March-April 1989. Less than symbol (<) indicates concentration below the analysis detection limit. b Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations (40 CFR 141). c U.S. Department of Energy, 4 percent of Derived Concentration Guides (DCG) for water (DOE Order 5400.5). d No specified limit. e Secondary Maximum Contaminant Level (SMCL), National Secondary Drinking Water Regulations (40 CFR 143). Source: LANL, 1990b.

Table 4.1.8.3-2.-Summary of Groundwater Quality Monitoring, Rocky Flats Plant

			1991-Existing Conditionsc		
Parameter	Unit of Measure	Water Quality Criteria	Well No. 4986	Well No. 110889	Well No. 110989
1,1,1-Trichloroethane	mg/L	0.2a	NA	0.0050	0.0050
1,1,2-Trichloroethane	mg/L	0.005a	NA	0.0050	0.0050
1,2-Dichloroethane	mg/L	0.005a	NA	0.0050	0.0050
Beryllium	mg/L	0.004a	0.002-0.005	0.001	NA
Cadmium	mg/L	0.005a	0.002-0.005	0.005	NA
Copper	mg/L	1.0d	0.0056-0.02	0.0172	NA
Gross Alpha	pCi/L	15a	-0.05-7.4	-0.5-2.1	0.3-1.06
Gross BetapCi/L	50a	-0.19-8.3	0.5-2.9	1.7-3.3	
Leadmg/L	0.015a	0.0006-0.0007	0.0021	NA	
Radiumò229pCi/L	e	0.067	NA	NA	

Strontiumò89, 90pCi/L	e	0.08-0.26	0.2-0.38	0.46-0.56	
Total Dissolved Solids	mg/L	500d	10-430	170	160-190
Trichloroethylene	mg/L	0.005a	NA	0.0050	0.0050
Tritium	pCi/L	20,000a	-15-231	8-788	-116-271
Uraniumò233, 234	pCi/L	20b	0.075-2.0	0-4.6	0.11-0.38
Uraniumò235	pCi/L	24b	0-1.6	0-0.12	-0.01-0.03
Uraniumò238	pCi/L	24b	NA	0.03-0.48	0.07-0.25
Vinyl Chloride	mg/L	0.002a	NA	0.0100	0.0100

E4 4008

a Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
b U.S. Department of Energy Derived Concentration Guides (DCG) for Water (DOE Order 5400.5). DCG values are based on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
c Wells are located in the area of the proposed Mechanical Technology Building, Office Manufacturing Building, and surface parking sites.
d Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Regulations (40 CFR 143).
e No specified limit.

NA Not Available

Source: RF EG&G, 1991e.

Table 4.1.6.7-1.-Mound Plant Proposed Action Economic and Population Characteristics

Economics	2000 Peak Operation	Percent Under Baseline
Baseline Civilian Labor Force	521,680	NA
Baseline Unemployment Rate	5.6 %	NA
Baseline Personal Income (Thousands $)	$22,344,200	NA
Baseline Per Capita Income	$22,146	NA
Baseline Employment	492,213	NA

Direct Jobs Lost	1,070	0.22
Indirect Jobs Lost	1,776	0.36
Out-Migrating Workforce	560	0.11
Total Out-Migration	1,421	0.14

Population Decrease

Butler County	149	0.05
Middletown	94	0.20
Montgomery County	1,050	0.18
Centerville	162	0.74
Dayton	283	0.15
Germantown	74	1.45
Miamisburg	246	1.33
Warren County	222	0.19
Carlisle	93	1.87
ROI (County Total)	1,421	0.14

E4 4009

Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; OH BES, 1991; DOE, 1993c.

Table F-4.-Comparison of Toxic Air Pollutant Concentrations (mg/m3) to Exposure Limitsa (mg/m3) at Kansas City Plantb

Levelsd					No Action Alternative		Cumulative	
Boundary	RfC	PEL	TLV	Slope	Onsite	Site Boundary	Onsite	Site

Compound (8 Hr)	(Lifetime)	(8 Hr)	(8 Hr)	Factor	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)
1,4 Dioxane 0.00108	0.28	90.0	90.0	1.1 x 10-2c	0.00014	0.00286	0.00006	0.00108	0.00014	0.00286	0.00006
1,1,1-Trichloroethane 0.0371	1.0	1,910.0	1,910.0	---	0.00497	0.098	0.00188	0.0371	0.00497	0.098	0.00188
Acetone 0.01216	10.5	1,800.0	1,780.0	---	0.00154	0.03047	0.00059	0.01153	0.00162	0.03214	0.00062
Dimethylformamide 0.00036	0.03	30.0	30.0	---	0.00005	0.00095	0.00002	0.00036	0.00005	0.00095	0.00002
Isopropyl Alcohol 0.02673	24.15	980.0	983.0	---	0.00294	0.058	0.0012	0.022	0.00357	0.07051	0.00144
Methyl Ethyl Ketone 0.00108	1.0	590.0	590.0	---	0.00014	0.00286	0.00006	0.00108	0.00014	0.00286	0.00006
Methylene Chloride 0.00577	3.0	1,765.0	174.0	2.6 x 10-3e	0.00077	0.01523	0.00029	0.00577	0.00077	0.01523	0.00029
Nitric Acid 0.137	0.123	5.0	5.0	---	0.00183	0.03618	0.0007	0.137	0.00183	0.03618	0.0007
Toluene 0.00613	2.0	375.0	377.0	---	0.00082	0.0162	0.00031	0.00613	0.00082	0.0162	0.00031
Trichlorethylene 0.06414	0.046	270.0	269.0	4.6x10-3f	0.00858	0.16948	0.00325	0.06414	0.00858	0.16948	0.00325

E4 4010

a Levels below which there are no adverse health effects.
b All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.

c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of (mg/kg/day)-1.
d Cumulative levels reflect the amount of a compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

e   Oral value (mg/kg/day).
f   Slope factor calculated from unit risk where 1 µg/m3 of TCE in air is 1.3x10-6 (EPA, 1985); Calculation from Strenge and Peterson (1989) as cited by Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

Table F-5.-Comparison of Toxic Air Pollutant Concentrations (mg/m3) to Exposure Limits[a] (mg/m3) at Los Alamos National Laboratory[b]

					No Action Alternative				Cumulative Levels[d]			
	RfC	PEL	TLV	Slope	Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Lifetime)	(8 Hr)	(8 Hr)	Factor[c]	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.28	90.0	90.0	1.1 x 10-2	6.6 x 10-5	1.8 x 10-3	6.3 x 10-6	2.9 x 10-4	6.6 x 10-5	1.8 x 10-3	6.3 x 10-6	2.9 x 10-4
Acetone	10.5	1,800.0	1,780.0	---	0.006	0.165	0.0006	0.026	0.006	0.165	0.0006	0.026
Ammonia	0.1	27.0	17.0	---	0.002	0.058	0.0002	0.009	0.002	0.058	0.0002	0.009
Chromium Trioxide	1.23x10-2	0.1	0.05	---	5.5 x 10-7	1.5 x 10-5	5.2 x 10-8	2.4 x 10-6	5.5 x 10-7	1.5 x 10-5	5.2 x 10-8	2.4 x 10-6
Dimethylformamide	3.0x10-2	30.0	30.0	---	3.0 x 10-5	8.3 x 10-4	2.8 x 10-6	1.3 x 10-4	3 x 10-5	8.3 x 10-4	2.8 x 10-6	1.3 x 10-4
Formaldehyde	0.7	0.9	1.2	4.5x10-2	5.5 x 10-	1.5 x 10-4	5.2 x 10-7	2.4 x 10-5	5.5 x 10-6	1.5 x 10-4	5.23 x 10-7	2.4 x 10-4
Isopropyl Alcohol	24.15	980.0	983.0	---	0.0005	0.013	0.00004	0.002	0.0005	0.013	0.00004	0.002
Methyl Ethyl Ketone	1.0	590.0	590.0	---	0.002	0.049	0.0002	0.008	0.002	0.049	0.0002	0.008

Methylene Chloride	3.0	1,765.0	174.0	2.6 x 10-3	0.0004	0.011	0.00004	0.002	0.0004	0.011	0.00004	0.002
Nitric Acid	0.123	5.00	5.0	---	0.0009	0.026	0.00009	0.004	0.0009	0.026	0.00009	0.004
Trichloroethylene	0.046	270.0	269.0	4.6 x 10-	0.0007	0.019	0.00006	0.003	0.0007	0.019	0.00006	0.003

E4 4011

a Levels below which there are no adverse health effects.
b All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.
c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of (mg/kg/day)-1.
d Cumulative levels reflect the amount of a compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.
e Slope factor calculated from unit risk where lmg/m3 of TCE in air is 1.3x10-6 (EPA, 1985); Calculation from Strenge and Peterson (1989) as cited by Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

Table F–6.–Comparison of Toxic Air Pollutant Concentrations (mg/m3) to Exposure Limitsa (mg/m3) at Rocky Flats Plantb

					No Action Alternative				Cumulative Levels d			
	RfC	PEL	TLV	Slope	Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Lifetime)	(8 Hr)	(8 Hr)	Factorc	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.28	90.0	90.0	1.1x10-2	0	0	0	0	0.00014	0.00635	0.000003	0.00051
1,1,1,-Trichloroethane	1.0	1,910.0	1,910.0	---	0.02	0.873	0.0004	0.07	0.02005	0.87512	0.000401	0.07017
Acetone	10.5	1,800.0	1,780.0	---	0	0	0	0	0.00162	0.072	0.00004	0.00576

Ammonia	0.1	27.0	17.0	---	0.008	0.347	0.0002	0.028	0.008	0.347	0.0002	0.028
Carbon Tetrachloride	0.0025	12.6	31.0	5.3 x 10-2	0.035	1.567	0.0008	0.125	0.035	1.567	0.0008	0.125
Dimethylformamide	0.03	30.0	30.0	---	0	0	0	0	0.00005	0.00212	0.000001	0.00017
Isopropyl Alcohol	24.15	980.0	983.0	---	0	0	0	0	0.00319	0.142	0.00007	0.01135
Methyl Ethyl Ketone	1.0	590.0	590.0	---	0	0	0	0	0.00014	0.00635	0.000003	0.00051
Methylene Chloride	3.0	1,765.0	174.0	2.6 x 10-3	0.003	0.148	0.00007	0.012	0.00305	0.15012	0.000071	0.01217
Nitric Acid	0.123	5.0	---	---	0	0	0	0	0.00181	0.08047	0.00004	0.00644
Toluene	2.0	375.0	377.0	---	0	0	0	0	0.00081	0.036	0.00002	0.00288
Trichloroethylene	0.046	270.0	269.0	4.6 x 10-	0	0	0	0	0.0009	0.04024	0.00002	0.00322

E4 4012

a Levels below which there are no adverse health effects.

b All RfC, PEL, TLV and slope factor values in this table were presented in table F5—2.

c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of (mg/kg/day)-1.

d Cumulative levels reflect the amount of compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

e Slope factor calculated from unit risk where 1 µg/m3 of TCE in air is 1.3x10-6 (EPA, 1985); Calculation from Strenge and Peterson (1989) as cited by Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

Table F–7.–Comparison of Toxic Air Pollutant Concentrations (mg/m3) to Exposure Limitsa (mg/m3) at Mound Plantb

					No Action Alternative				Cumulative Levels d			
	RfC	PEL	TLV	Slope	Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Lifetime)	(8 Hr)	(8 Hr)	Factorc	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.28	90.0	90.0	1.1x10-2	0	0	0	0	0.00021	0.00358	0.000003	0.00021
1,1,1,-Trichloroethane	1.0	1,910.0	1,910.0	---	0.0002	0.004	0.000003	0.0002	0.00027	0.00519	0.000004	0.00027
Acetone	10.5	1,800.0	1,780.0	---	0.008	0.143	0.0001	0.008	0.01035	0.18352	0.00014	0.01037
Dimethylformamide	0.03	30.0	30.0	---	0	0	0	0	0.00007	0.00119	0.000001	0.00007
Isopropyl Alcohol	24.15	980.0	983.0	---	0.003	0.052	0.00005	0.003	0.00806	0.139	0.00013	0.00809
Methyl Ethyl Ketone	1.0	590.0	590.0	---	0	0	0	0	0.00021	0.00358	0.000003	0.00021
Methylene Chloride	3.0	1,765.0	174.0	2.6 x 10-3	0	0	0	0	0.00007	0.00119	0.000001	0.00007
Nitric Acid	0.123	5.0	---	---	0	0	0	0	0.00263	0.04529	0.00004	0.00265
Toluene	2.0	375.0	377.0	---	0	0	0	0	0.00118	0.02026	0.00002	0.00118
Trichloroethylene	0.046	270.0	269.0	4.6 x 10-3	0	0	0	0	0.00132	0.02264	0.00002	0.00132

E4 4013

a Levels below which there are no adverse health effects.

b All RfC, PEL, TLV and slope factor values in this table were presented in table F5—2.

c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of (mg/kg/day)-1.

d Cumulative levels reflect the amount of a compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

Table F-8.-Comparison of Toxic Air Pollutant Concentrations (mg/m3) to Exposure Limitsa (mg/m3) at Sandia National Laboratoriesb, New Mexico

					No Action Alternative				Cumulative Levelsd			
	RfC	PEL	TLV	Slope	Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Lifetime)	(8 Hr)	(8 Hr)	Factorc	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,1,1,-Trichloroethane	1.0	1,910.0	1,910.0	---	0.0007	0.014	0.00003	0.0007	0.002	0.047	0.0001	0.0025
Acetone	10.5	1,800.0	1,780.0	---	---	---	---	---	0.002	0.041	0.00008	0.002
Chromium Trioxide	1.23x10-2	0.1	0.05	---	1.3 x 10-6	2.7 x 10-5	5.5 x 10-8	1.4 x 10-6	1.26 x 10-6	2.75 x 10-5	5.49 x 10-8	1.4 x 10-6

Methylene Chloride	3.0	1,765.0	174.0	2.6 x 10-3	---	---	---	---	0.004	0.094	0.0002	0.005
Nickel Chloride	2.45x10-3	0.1	0.1	---	1.4 x 10-6	3.0 x 10-5	6.0 x 10-8	1.6 x 10-6	1.4 x 10-6	3.0 x 10-5	6.0 x 10-8	1.6 x 10-6
Toluene	2.0	375.0	377.0	---	0.0005	0.011	0.00002	0.0006	0.0005	0.011	0.00002	0.0006
Trichlorethylene	0.046	270.0	269.0	4.6 x 10-3e	---	---	---	---	0.002	0.051	0.0001	0.003

E4 4014

a Levels below which there are no adverse health effects.

b All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.

c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of (mg/kg/day)-1.

d Cumulative levels reflect the amount of compound releaseed from a site under No Action alternative operating levels, plus any additional compound projected to be releasedfollowing the reconfiguration of the plant site.

e Slope factor calculated from unit risk where 1µg/m3 of TCE in air is 1.3 x 10-6, see toxicity profile.

Table F-9.-Comparison of Toxic Air Pollutant Concentrations (mg/m3) to Exposure Limitsa (mg/m3) at Pinellas Plantb

					No Action Alternative				Cumulative Levelsd			
	RfC	PEL	TLV	Slope	Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Lifetime)	(8 Hr)	(8 Hr)	Factorc	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.28	90.0	90.0	1.1x10-2	0	0	0	0	0.00014	0.00241	0.00014	0.00221
1,1,1,-Trichloroethane	1.0	1,910.0	1,910.0	---	0.01646	0.27461	0	0.04	0.01651	0.27541	0.00005	0.04074
Acetone	10.5	1,800.0	1,780.0	---	0.01405	0.23447	0.04869	0.34	0.01559	0.26019	0.05017	0.36354
Ammonia	0.1	27.0	17.0	---	0.00017	0.00282	0.00062	0.00434	0.00017	0.00282	0.00062	0.00434

Dimethylformahide	0.03	30.0	30.0	---	0	0	0	0	0.00005	0.0008	0.00005	0.00074
Isopropyl Alcohol	24.15	980.0	983.0	---	0.00355	0.05915	0.01225	0.08573	0.00687	0.11461	0.01545	0.13649
Methyl Ethyl Ketone	1.0	590.0	590.0	---	0.00008	0.00141	0.00027	0.00187	0.00022	0.00382	0.00041	0.00408
Methylene Chloride	3.0	1,765.0	174.0	2.6 x 10-	0.04233	0.70622	0.002	0.06	0.04238	0.70702	0.00205	0.06074
Nickel Chloride	0.00245	0.1	0.1	---	0.00013	0.00211	0.00001	0.0003	0.00013	0.00211	0.00001	0.0003
Nitric Acid	0.123	5.0	---	---	0.00384	0.06407	0	0.005	0.00567	0.09461	0.00176	0.03295
Toluene	2.0	375.0	377.0	---	0.0019	0.03169	0.00657	0.04598	0.00272	0.04535	0.00736	0.05849
Trichlorethylene	0.046	270.0	269.0	4.6 x10-3e	0.00701	0.11688	0	0.014	0.00793	0.13215	0.00088	0.02798

E4 4015

a Levels below which there are no adverse health effects.

b All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.

c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of (mg/kg/day)-1.

d Cumulative levels reflect the amount of compound releaseed from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

e Slope factor calculated from unit risk where 1µg/m3 of TCE in air is 1.3 x 10-6 (EPA, 1985); Calculation from Strenge and Peterson (1989) as cited by Center for Risk Management, Oak Ridge National Laboratory (August 13, 1992).

Table F-10.-Comparison of Toxic Air Pollutant Concentrations (mg/m3) to Exposure Limits[a] (mg/m3) at Savannah River Site[b]

					No Action Alternative				Cumulative Levels[d]			
	RfC	PEL	TLV	Slope	Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Lifetime)	(8 Hr)	(8 Hr)	Factor[c]	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)

Trichlorotrifluoroethane	105	7,600	7,600	---	0.007	0.137	0.0001	0.006	0.007	0.137	0.0001	0.006

E4 4016

a Levels below which there are no adverse health effects.

b All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.

c Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of (mg/kg/day)-1.

d Cumulative levels reflect the amount of compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.

Table F-11.-Comparison of Toxic Air Pollutant Concentrations (mg/m3) to Exposure Limitsa (mg/m3) at Y-12 Plantb

					No Action Alternative				Cumulative Levelsd			
	RfC	PEL	TLV	Slope	Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Lifetime)	(8 Hr)	(8 Hr)	Factorc	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
Beryllium	1.8x10-2	0.002	0.002	---	e	e	e	e	e	e	e	e
Trichlorotrifluoroethane	105	7,600	7,600	---	0.071	0.907	0.002	0.175	0.071	0.907	0.002	0.175

E4 4017

a Levels below which there are no adverse health effects.

b	All RfC, PEL, TLV and slope factor values in this table were presented in table F5-2.
c	Slope factor for compounds treated as carcinogenic or potentially carcinogenic are given in units of (mg/kg/day)-1.
d	Cumulative levels reflect the amount of compound released from a site under No Action alternative operating levels, plus any additional compound projected to be released following the reconfiguration of the plant site.
e	Information not available.

Table 4.1.8.7-1.-Rocky Flats Plant Proposed Action Economic and Population Characteristics

Economics	2000 Peak Operation	Percent Under Baseline
Baseline Civilian Labor Force	1,205,374	NA
Baseline Unemployment Rate	5.6%	NA
Baseline Personal Income (Thousands)	$51,753,781	NA
Baseline Per Capita Income	$24,644	NA
Baseline Employment	1,137,688	NA
Direct Jobs Lost	750	0.07
Indirect Jobs Lost	1,167	0.10
Out-Migrating Workforce	390	0.03
Total Out-Migration	989	0.05
Population Decrease		
Adams County	190	0.06
Arapahoe County	54	0.01
Boulder County	253	0.10
Boulder	65	0.07
Broomfield	50	0.18
Denver County	90	0.02
Jefferson County	401	0.08
Arvada	166	0.17

Golden	56	0.38
Westminster	88	0.10
ROI (County Total)	988	0.05

E4 4018
Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; CO DOL, 1991; DOE, 1993c.

Table 4.1.4.3-1.-Summary of Surface Water Quality Monitoring Near Y-12

Receiving Water: Clinch River-1990				
	Unit of	Water Quality	Existing Water Body Concentrationf	
Parameter	Measure	Criteria	Average	Maximum
Barium	mg/L	1b	0.033	0.33
Bicarbonate	mg/L	NA	99	99
Bis(2-Ethylhexyl)phthalate	mg/L	NA	<0.04	0.37
Boron	mg/L	NA	0.023	0.023
Calcium	mg/L	NA	29	29
Cesium-137	pCi/L	120d	0.827	8.01
Chemical Oxygen Demand	mg/L	NA	5.17	7
Chloride	mg/L	250c	3.7	3.7
Chromium	mg/L	0.05a	0.010	0.014
Copper	mg/L	1c	0.004	0.014
Cyanide	mg/L	0.2b	<0.091	0.1
Dissolved Solids	mg/L	500c	143.67	158
Fluoride	mg/L	4b	0.1	0.1
Magnesium	mg/L	NA	8.2	8.2
Irone	mg/L	0.3c	0.66	0.66

Manganesee	mg/L	0.05c	0.035	0.066
Neptunium-237	pCi/L	1.2d	0.0153	0.36
Nickel	mg/L	0.1b	0.02	0.05
Nitrate	mg/L	10b	0.458	0.7
pHe	pH units	6.5-8.5c	NA	8.8
Plutonium-238	pCi/L	1.6d	0.16	0.45
Plutonium-239	pCi/L	1.2d	0.0843	0.57
Plutonium-239, 240e	pCi/L	1.2d	0.306	1.67
Potassium	mg/L	NA	1.7	1.7
Sodium	mg/L	NA	4.18	5.2
Sulfate	mg/L	250c	20.83	23
Suspended solids	mg/L	NA	8.33	18
Technetium-99	pCi/L	4,000d	11.2	399
Temperature	Degrees Celsius	NA	16.88	22.1
Titanium	mg/L	NA	0.011	0.011
Zinc	mg/L	5c	0.008	0.02

E4 4019

a Tennessee state water quality standards.
b Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
c Secondary Maximum Contaminant Level (SMCL), EPA National Secondary Drinking Water Standards (40 CFR 143).
d U.S. Department of Energy Derived Concentration Guides (DCG) for Water (DOE Order 5400.5). DCG values are based on a committed effective dose of 100 mrem per year; however, because the drinking water MCL is based on 4 mrem per year, the number listed is 4 percent of the DCG.
e Concentration exceeded water quality criteria; however, these criteria are listed for the comparison only. Water quality standards do not affect plant activities until they are translated into end-of pipe effluent limitations imposed on discharges through the NPDES permitting process. Similarly, drinking water standards and DOE DCGs are listed to provide an understanding of an undesirable concentration for those parameters not covered by water quality standardsòthey do not constitute enforceable limits.
f Samples were analyzed for 120 parameters including radionuclides, volatile and semivolatile organic compounds, metals, and standard

water quality characteristics. Only those parameters having average maximum concentrations greater than the instrument detection level are presented. Less than symbol (<) indicates concentration below the analysis detection limit.

NA None applicable.

Source: Y-12 MMES, 1991b.

Table 4.1.5.7-1.òSandia National Laboratories, Albuquerque, Proposed Action Economic And Population Characteristics

Economics	1995 Peak Construction	Percent Over Baseline	2000 Peak Operation	Percent Over Baseline
Baseline Civilian Labor Force	343,299	NA	379,866	NA
Baseline Unemployment Rate	5.6%	NA	6.0%	NA
Baseline Personal Income (Thousands $)	$11,517,012	NA	$14,078,925	NA
Baseline Per Capita Income ($/Person)	$18,168	NA	$20,640	NA
Baseline Employment	323,981	NA	357,135	NA
Direct Jobs	95	0.03	385	0.11
Indirect Jobs	218	0.07	555	0.16
In-Migrating Workforce	31	0.01	203	0.06
Total In-Migration	70	0.01	515	0.08
Population Increase				
Bernalillo County	67	0.01	491	0.09
Albuquerque	63	0.02	463	0.10
Sandoval County	1	0.00	10	0.02
Valencia County	2	0.00	13	0.03
ROI (County Total)	70	0.01	514	0.08

E4 4020

Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; NM DES, 1991; FDI, 1993; DOE, 1993c.

Table 4.1.6.3-2.-Summary of Groundwater Quality Monitoring, Mound Plant

	Unit of	Water Quality	1990òExisting Conditionsa	
Parameter	Measure	Criteria	Average	Maximum
Plutoniumò238	pCi/L	1.6c	0.0044	0.044
Tritium	pCi/L	20,000b	3,300	4,600
Uraniumò233/234	pCi/L	20c	0.19	0.27
Uraniumò238	pCi/L	24c	0.17	0.23

E4 4021

a Samples were taken onsite at the Mound Plant.
b Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Regulations (40 CFR 141).
c U.S. Department of Energy 4 percent of Derived Concentration Guides (DCG) for Water (DOE Order 5400.5).

Source: MD DOE, 1991a.

Table 4.2.1.2-1.-Contribution to Air Quality from the Mound Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines
[Page 1 of 2]

Pollutant	Averaging Time	Most Stringent Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3)g	Proposed Action Concentration (µg/m3)	Total Concentration (µg/m3)
Carbon Monoxide (CO)	8-hour 1-hour	10,000b 40,000b	4,467 13,973	2.5 8.5	4,469.5 13,981.5
Lead (Pb)	Calendar	1.5b	d	f	d
Nitrogen Dioxide (NO2)	Annual	100b	_0.4	0.2	0.6
Ozone (O3)	1-hour	235b	d	f	d
Particulate Matter (PM10)	Annual 24-hour	50b 150b	29.6 98.5	0.01 0.01	29.6 98.6
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	80c 365c 1,300b	15.7 70.7 120.4	0.0003 0.004 0.02	15.7 70.7 120.4

Hazardous Air Pollutants and Other Toxic Compoundsa					
1,4-Dioxane	1-hour	2,143c	d	1.4	_1.4
1,1,1-Trichloroethane	1-hour	45,476c	_42.5	0.5	_43
Acetic Acid	1-hour	595c	d	0.9	_0.9
Acetone	1-hour	42,380c	_56.6	16.1	_72.7
Chlorodifluoroethane	1-hour	e	d	0.9	_0.9
Chlorodifluoromethane	1-hour	84,286c	d	0.5	_0.5
D'Limonene	1-hour	e	d	2.4	_2.4
Dichlorodifluoromethane	1-hour	117,857c	d	0.5	_0.5
Dimethyl Foramide	1-hour	714c	d	0.5	_0.5
Ethyl Benzene	1-hour	10,333c	d	0.9	_0.9
Fluorotelomer	1-hour	e	d	5.7	_5.7
Fluorine End-capped Homopolymers	1-hour	e	d	8.0	_8.0
Fluoboric Acid	1-hour	e	d	0.9	_0.9

Fluoroaliphatic Polymer Esters	1-hour	e	d	0.5	_0.5
Fluorobenzene	1-hour	e	d	0.6	_0.6
Fluoroteloner	1-hour	e	d	0.5	_0.5
Glycol Ethers	1-hour	571c	d	50.1	_50.1
Hexane	1-hour	4,190c	d	1.4	_1.4
Hydrogen Chloride	1-hour	179c	_16.5	6.1	_22.6
Isopropyl Alcohol	1-hour	23,405c	_20.9	34.5	_55.4
Methyl Alcohol	1-hour	6238c	d	0.5	_0.5
Methyl Ethyl Ketone	1-hour	14,048c	d	1.4	_1.4
Methyl Isobutyl Ketone	1-hour	4,881c	d	2.8	_2.8
Methylene Chloride	1-hour	4,143c	d	0.5	_0.5

E4 4022-1
Footnotes at end of table.

Table 4.2.1.2-1.-Contribution to Air Quality from the Mound Consolidation Alternative and Total Concentrations with Comparison to Applicable Regulations and Guidelines
Continued [Page 2 of 2]

		Most Stringent		Proposed Action	

Pollutant	Averaging Time	Regulation or Guideline (µg/m3)	Baseline Concentration (µg/m3)g	Concentration (µg/m3)	Total Concentration (µg/m3)
Hazardous Air Pollutants and Other Toxic Compoundsa					
Naptha/Mineral Spirits	1-hour	e	d	8.5	_8.5
Nitric Acid	1-hour	124c	d	17.9	_0.9
Phosphoric Acid	1-hour	24c	d	1.4	_1.4
Sulfuric Acid	1-hour	24c	d	11.3	_11.3
Tetrachloroethylene	1-hour	8,071c	d	0.9	_0.9
Toluene	1-hour	8,976c	d	8.0	_8.0
Trichloroethylene	1-hour	6,405c	d	9.0	_9.0
Trichlorotrifluoroethane	1-hour	182,619c	_17.5e	0.5	_18.0
Xylene	1-hour	10,333c	d	5.2	_5.2

E4 4022-2

a Compounds listed are the major pollutants of concern (FDI, 1993).
b Federal standard (40 CFR 50).
c State standard (Ohio EPA, 1991).
d Data unavailable.
e No state standard.
f Emissions of this pollutant would be less than 100 lb/yr (0.01 lb/hr) (FDI, 1993).
g Baseline Concentrations are from table 4.1.6.2-1.

Table 4.1.5.3-2.-Summary of Groundwater Quality Monitoring, Sandia National Laboratories, Albuquerque

			1990-Existing Conditionsc		
Parameter	Unit of Measure	Water Quality Criteria	Base Well No.1	Base Well No. 7	Base Well No. 11
Cesium-137	pCi/L	120b	<10	<13	<10
Gross Alpha	pCi/L	15a	5.13	<2.8	<5.6
Gross Beta	pCi/L	50a	3.26	3.58	5.25

Tritium	pCi/L	20,000a	<0.45	<0.45	<0.45

E4 4023
a Maximum Contaminant Level (MCL) EPA National Primary Drinking Water Regulations, (40 CFR 141). b U.S. Department of Energy, 4 percent of DOE Derived Concentration Guidelines (DCG) for Water (DOE Order 5400.5). c Less than symbol (<) indicates concentration below analysis detection Source: SNL, 1991.

Table 4.2.4.7-1.-Kansas City Plant Alternative Economic and Population Characteristics

Economics	2000 Peak Operation	Percent Under Baseline
Baseline Civilian Labor Force	751,591	NA
Baseline Unemployment Rate	6.0%	NA
Baseline Personal Income (Thousands	$32,080,918	NA
Baseline Per Capita Income	$24,034	NA
Baseline Employment	706,818	NA
Direct Jobs Lost	3,793	0.54
Indirect Jobs Lost	5,982	0.85
OutòMigrating Workforce	1,963	0.28
Total OutòMigration	4,980	0.37
Population Decrease		
Cass County	747	1.12
Belton	234	1.23
Harrisonville	149	1.85
Jackson County	3,197	0.45
Kansas City	1,474	0.39
Leeòs Summit	598	1.17
Johnson County	901	0.24

Overland Park	368	0.31
Wyandotte County	134	0.07
ROI (County Total)	4,980	0.37

E4 4024
Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; KS DHR, 1991; MO DES 1991.

Table 4.2.4.7-1.-Kansas City Plant Alternative Economic and Population Characteristics

Economics	2000 Peak Operation	Percent Under Baseline
Baseline Civilian Labor Force	751,591	NA
Baseline Unemployment Rate	6.0%	NA
Baseline Personal Income (Thousands $)	$32,080,918	NA
Baseline Per Capita Income ($/Person)	$24,034	NA
Baseline Employment	706,818	NA
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ROI (County Total)	4,980	0.37

E4 4024
Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; KS DHR, 1991; MO DES 1991.

Table 4.1.7.7-1.-Pinellas Plant Proposed Action Economic and Population Characteristics

	2000 Peak	Percent Under
Economics	Operation	Baseline
Baseline Civilian Labor Force	1,188,649	NA
Baseline Unemployment Rate	5.4%	NA
Baseline Personal Income (Thousands $)	$51,496,890	NA
Baseline Per Capita Income ($/Person)	$22,837	NA
Baseline Employment	1,124,772	NA
Direct Jobs Lost	1,050	0.09
Indirect Jobs Lost	1,988	0.18
Out-Migrating Workforce	545	0.05
Total Out-Migration	1,383	0.06
Population Decrease		
Hillsborough County	62	0.01
Pasco County	50	0.02
Pinellas County	1,271	0.13
Clearwater	318	0.28
Largo	246	0.33
Pinellas Park	145	0.29
Seminole	145	1.37
St. Petersburg	415	0.15

ROI (County Total)	1,383	0.06

E4 4025
Source: Estimated from Census, 1977, 1983, 1991a; DOC, 1990a and b, 1991; FL DOL, 1991; DOE, 1993c.

Table 4.1.7.3-2.-Summary of Groundwater Quality Monitoring, Pinellas Plant

	Unit	Water Quality	1990òExisting	
Parameter	Measure	Criteria	DOE 1b	DOE 2c
1,2-Dichloroethylene (total)	mg/L	e	<0.003	<0.003
Arsenic	mg/L	0.05a	0.001	0.001
Chloroform	mg/L	0.10d	<0.003	<0.001
Iron	mg/L	0.3a	4.6	3.9
Lead	mg/L	0.015a	<0.01	<0.01
Manganese	mg/L	0.05a	0.01	0.05
Methylene Chloride	mg/L	0.005d	<0.003	<0.003
Pesticides & Herbicides	mg/L	0.01-0.003a	<0.01	<0.01
pH	pH units	6.0-8.5a	6.6	6.8
Sodium	mg/L	160a	230	86
Total Organic Carbon	mg/L	e	130	56
Trichloroethylene	mg/L	0.005d	<0.003	<0.003

E4 4026

a Florida state water quality criteria.

b Well located in the area of the proposed Mechanical Technology Building.

c Well located in the area of the proposed Office/Manufacturing Building.

d EPA Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations (40 CFR 141).

e No specified limit.

f Less than symbol (<) indicates concentration below analysis detection limit.

Source: PI DOE, 1991a.

Table 5-4.-DOE Agreements with Federal and State Environmental Regulatory Agencies

Resource Area Date	Facility	Parties	Scope of Agreement
Air Resources 10/31/91	Savannah River Site	DOE/EPA	CAA-NESHAP
05/26/92	Oak Ridge/Y-12	DOE/EPA	CAA-NESHAP
Water Resources 01/03/84, 08/31/87	Savannah River Site	DOE/SC	CWA-Thermal discharge limitations
02/27/90, 01/16/91	Savannah River Site	DOE/SC	CWA-Construction of a wastewater treatment facility
06/05/90	Savannah River Site	DOE/SC	CWA-Thermal mitigation of minor discharges
06/05/90	Savannah River Site	DOE/SC	CWA-Fish kill mitigation
07/31/91	Savannah River Site	DOE/SC	CWA-NPDES
03/25/91	Rocky Flats Plant	DOE/EPA	CWA-NPDES
08/29/91	Los Alamos	DOE/EPA	CWA-NPDES permit violation
Land Resources 06/23/89	Kansas City Plant	DOE/EPA	RCRA-Groundwater cleanup primarily for VOCs and PCBs
10/06/86	Savannah River Site	DOE/SC	RCRA-Generator requirements

05/01/87, 06/14/89	Savannah River Site	DOE/SC	RCRA-Part A & B application deficiencies; groundwater monitoring
11/12/87, 05/10/91	Savannah River Site	DOE/SC	RCRA-Part B application deficiencies; groundwater monitoring
02/16/89	Savannah River Site	DOE/SC	RCRA-Management of salt-crete drums; 90-day accumulation
09/05/90	Savannah River Site	RCRA-Greater than 90-day storage violations	RCRA-Greater than 90-day storage violations
03/13/91, 04/24/92	Savannah River Site	DOE/EPA	RCRA-Land disposal restrictions
08/26/91	Savannah River Site	DOE/SC	RCRA-(Solvent rags)
04/13/92	Savannah River Site	DOE/SC	RCRA
04/29/92	Savannah River Site	DOE/SC	RCRA
01/01/92	Oak Ridge/Y-12	DOE/EPA/TN	CERCLA
06/12/92	Oak Ridge/Y-12	DOE/EPA	RCRA-Land disposal restrictions
12/29/89	Sandia (New Mexico)	DOE/NM	RCRA-Groundwater monitoring at chemical waste landfill
08/06/90	Mound Plant	DOE/EPA	CERCLA-RI/FS and RD/RA
7/31/86	Rocky Flats Plant	DOE/EPA/CO	CERCLA/RCRA-Cleanup permits, closure plans, waste analysis
07/14/89	Rocky Flats Plant	DOE/CO	RCRA-Part A for mixed waste
	Rocky Flats Plant	DOE/CO	RCRA-Classification of plutonium residues

11/03/89			
Rocky Flats Plant	DOE/EPA	CERCLA-RI/FS and RD/RA	
01/22/91			
Rocky Flats Plant	DOE/EPA	RCRA-Land disposal restrictions	
05/10/91			
E4 4046			

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
PCB	polychlorinated biphenyl
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigations/Feasibility Studies
VOC	volatile organic compounds

Table F-12a.-Hazard Quotients and Hazard Index for Kansas City Plant

	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.0005	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0002	0.0000
1,1,1-Trichloroethane	0.0050	0.0001	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0050	0.0001	0.0019	0.0000
Acetone	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0001	0.0000
Dimethylformamide	0.0017	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000		

											0.0007	0.0000
Isopropyl Alcohol	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0000
Methyl Ethyl Ketone	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000
Methylene Chloride	0.0003	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0001	0.0001	0.0000
Nitric Acid	0.0149	0.0072	0.0057	0.0274	0.0000	0.0000	0.0000	0.0000	0.0149	0.0072	0.0057	0.0274
Toluene	0.0004	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004	0.0000	0.0002	0.0000
Trichloroeythlene	0.1865	0.0006	0.0707	0.0002	0.0000	0.0000	0.0000	0.0000	0.1865	0.0006	0.0707	0.0002
Hazard Index	0.2096	0.0082	0.0795	0.0278	3.37x10-5a	1.37x10-5a	1.28x10-5a	5.18x10-6a	0.2096	0.0082	0.0795	0.0278

E4 4047

a The actual numbers given in the table are slightly greater than zero, resulting in the totals presented.

Table F-12b.-Cancer Risk to Workers and Public at Kansas City Plant

	No Action Alternative		Proposed Increment		Cumulative Levels	
Compound	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual
1,4 Dioxane	4.40x10-7	1.89x10-7	0.0000	0.0000	4.40x10-7	1.89x10-7

Methylene Chloride	5.72x10-7	2.15x10-7	0.0000	0.0000	5.72x10-7	2.15x10-7
Trichloroethylene	1.13x10-5	4.27x10-6	0.0000	0.0000	1.13x10-5	4.27x10-6
Total Risk	1.23x10-5	4.68x10-6	0.0000	0.0000	1.23x10-5	4.68x10-6

E4 4048

Table F-13a.-Hazard Quotients and Hazard Index for Los Alamos National Laboratory

	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
Acetone	0.000571	9x10-5	5.7x10-5	1.4x10-5	0	0	0	0	0.000571	9x10-5	5.7x10-5	1.4x10-5
Ammonia	0.02	0.0034	0.002	0.0005	0	0	0	0	0.02	0.0034	0.002	0.0005
Chromium Trioxide	4.4x10-5	0.0003	4x10-6	4.8x10-5	0	0	0	0	4.4x10-5	0.0003	4x10-6	4.8x10-5
Dimethylformamide	0.0010	3x10-5	9.3x10-5	4.2x10-5	0	0	0	0	0.0010	3x10-5	9.3x10-5	4.2x10-5
1,4 Dioxane	0.0002	2x10-5	2.2x10-5	3x10-6	0	0	0	0	0.0002	2x10-5	2.2x10-5	3x10-6

Formaldehyde	7x10-6	1.6x10-4	7x10-7	2.6x10-5	0	0	0	0	7x10-6	1.6x10-4	7x10-7	2.6x10-5
Isopropyl Alcohol	2x10-5	1.3x10-5	1x10-6	2x10-6	0	0	0	0	2x10-5	1.3x10-5	1x10-6	2x10-6
Methylene Chloride	0.0001	6.3x10-5	1x10-5	1.1x10-5	0	0	0	0	0.0001	6.3x10-5	1x10-5	1.1x10-5
Trichloroethylene	0.0152	6.9x10-5	0.0013	1.1x10-5	0	0	0	0	0.0152	6.9x-10-5	0.0013	1.1x10-5
Methyl Ethyl Ketone	0.002	8.3x10-5	0.0002	1.3x10-5	0	0	0	0	0.002	8.3x10-5	0.0002	1.3x10-5
Nitric Acid	0.0073	0.0050	0.0007	0.0008	0	0	0	0	0.0073	0.0050	0.0007	0.0008
Hazard Index	0.0464	0.0092	0.0044	0.0015	0	0	0	0	0.0464	0.0092	0.0044	0.0015

E4 4049

Table F-13b.-Cancer Risk to Workers and Public at Los Alamos National Laboratory

	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite	Site Boundary	Onsite	Site Boundary	Onsite	Site Boundary
Compound	Annual	Annual	Annual	Annual	Annual	Annual
1,4 Dioxane	2.08x10-7	1.98x10-8	0	0	2.08x10-7	1.98x10-8
Formaldehyde	7.10x10-8	6.72x10-9	0	0	7.10x10-8	6.72x10-9
Methylene chloride	1.83x10-7	1.83x10-8	0	0	1.83x10-7	1.83x10-8
Trichloroethylene	1.0x10-6	7.9x10-7	0	0	1.0x10-6	7.9x10-7
Total Risk	1.46x10-6	8.35x10-7	0	0	1.46x10-6	8.35x10-7

						E4 4050

Table F-14a.-Hazard Quotients and Hazard Index for Rocky Flats Plant

	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.0000	0.0000	0.0000	0.0000	0.0005	0.0001	0.0000	0.0000	0.0005	0.0001	0.0000	0.0000
1,1,1,-Trichloroethane	0.0200	0.0005	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0201	0.0005	0.0004	0.0000
Acetone	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
Ammonia	0.0800	0.0204	0.0020	0.0016	0.0000	0.0000	0.0000	0.0000	0.0800	0.0204	0.0020	0.0016
Carbon Tetrachloride	14.0000	0.1244	0.3200	0.0099	0.0000	0.0000	0.0000	0.0000	14.0000	0.1244	0.3200	0.0099
Dimethylformamide	0.0000	0.0000	0.0000	0.0000	0.0017	0.0001	0.0000	0.0000	0.0017	0.0001	0.0000	0.0000
Isopropyl Alcohol	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000
Methyl Ethyl Ketone	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000

Methylene Chloride	0.0010	0.0009	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0010	0.0009	0.0000	0.0001
Nitric Acid	0.0000	0.0000	0.0000	0.0000	0.0147	0.0161	0.0003	0.0013	0.0147	0.0161	0.0003	0.0013
Toluene	0.0000	0.0000	0.0000	0.0000	0.0004	0.0001	0.0000	0.0000	0.0004	0.0001	0.0000	0.0000
Trichloroethylene	0.0000	0.0000	0.0000	0.0000	0.0196	0.0001	0.0004	0.0000	0.0196	0.0001	0.0004	0.0000
Hazard Index	14.1010	0.1461	0.3224	0.0117	0.0373	0.0167	0.0008	0.0013	14.1383	0.1628	0.3232	0.0130

E4 4051

Table F-14b.-Cancer Risk to Workers and Public at Rocky Flats Plant

	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite	Site Boundary	Onsite	Site Boundary	Onsite	Site Boundary
Compound	Annual	Annual	Annual	Annual	Annual	Annual
1,4 Dioxane	0.0000	0.0000	4.40x10-7	9.43x10-9	4.40x10-7	9.43x10-9
Carbon Tetrachloride	5.30x10-4	1.21x10-5	0.0000	0.0000	5.30x10-4	1.21x10-5
Methylene Chloride	2.23x10-6	5.20x10-8	3.71x10-8	7.43x10-10	2.27x10-6	5.27x10-8
Trichloroethylene	0.0000	0.0000	1.18x10-6	2.63x10-8	1.18x10-6	2.63x10-8
Total Risk	5.32x10-4	1.22x10-5	1.66x10-6	3.65x10-8	5.34x10-4	1.22x10-5
						E4 4052

Table F-15a.-Hazard Quotients and Hazard Index for Mound Plant

	No Action Alternative	Proposed Increment
Cumulative Levels		

Compound	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
1,4 Dioxane	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000
1,1,1-Trichloroethane	0.0002	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0003	0.0000	0.0000	0.0000
Acetone	0.0008	0.0001	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0010	0.0001	0.0000	0.0000
Dimethylformamide	0.0000	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000
Isopropyl Alcohol	0.0001	0.0001	0.0000	0.0000	0.0002	0.0001	0.0000	0.0000	0.0003	0.0001	0.0000	0.0000
Methyl Ethyl Ketone	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
Methylene Chloride	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitric Acid	0.0000	0.0000	0.0000	0.0000	0.0214	0.0091	0.0003	0.0005	0.0214	0.0091	0.0003	0.0005
Toluene	0.0000	0.0000	0.0000	0.0000	0.0006	0.0001	0.0000	0.0000	0.0006	0.0001	0.0000	0.0000
Trichloroeythlene	0.0000	0.0000	0.0000	0.0000	0.0287	0.0001	0.0004	0.0000	0.0287	0.0001	0.0004	0.0000
Hazard Index	0.0011	0.0001	0.0000	0.0000	0.0545	0.0094	0.0008	0.0006	0.0556	0.0095	0.0008	0.0006

E4 4053

Table F-15b.-Cancer Risk to Workers and Public at Mound Plant

	No Action Alternative		Proposed Increment		Cumulative Levels	
Compound	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual
1,4 Dioxane	0.0000	0.0000	6.60x10-7	9.43x10-9	6.60x10-7	9.43x10-9
Methylene Chloride	0.0000	0.0000	5.20x10-8	7.43x10-10	5.20x10-8	7.43x10-10
Trichloroethylene	0.0000	0.0000	1.73x10-6	2.63x10-8	1.73x10-6	2.63x10-8
Total Risk	0.0000	0.0000	2.45x10-6	3.65x10-8	2.45x10-6	3.65x10-8

E4 4081

Table F-16.-Hazard Quotients and Hazard Index for Savannah River Site

	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)

Trichlorotrifluoroethane	6.67x10-5	1.80x10-5	9.52x10-7	7.89x10-7	0	0	0	0	6.67x10-5	1.80x10-5	9.52x10-7	7.89x10-7
Hazard Index	6.67x10-5	1.80x10-5	9.52x10-7	7.89x10-7	0	0	0	0	6.67x10-5	1.80x10-5	9.52x10-7	7.89x10-7

E4 4054

Table F-17.-Hazard Quotients and Hazard Index for Y-12 Plant

	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
Chlorine	0.0179	0.00638	5.13x10-4	0.00133	0	0	0	0	0.0179	0.00638	5.13x10-4	0.00133
Trichlorotrifluoroethane	6.76x10-4	1.19x10-4	1.90x10-5	2.30x10-5	0	0	0	0	6.76x10-4	1.19x10-4	1.90x10-5	2.30x10-5
Hazard Index	0.0186	0.0065	5.32x10-4	0.0014	0	0	0	0	0.0186	0.0065	5.32x10-4	0.0014

E4 4055

Table F-18a.-Hazard Quotients and Hazard Index for Sandia National Laboratories, New Mexico

	No Action Alternative	Proposed Increment	Cumulative Levels

	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
Acetone	0	0	0	0	0.0002	2.3x10-5	7x10-6	1x10-6	0.0002	2.3x10-5	7x10-6	1x10-6
Chromium Trioxide	0.0001	5.5x10-4	4x10-6	2.8x10-5	0	0	0	0	0.0001	5.5x10-4	4x10-6	2.8x10-5
Methylene Chloride	0	0	0	0	0.0013	0.0005	6.6x10-5	2.8x10-5	0.0013	0.0005	6.6x10-5	2.8x10-5
Nickel Chloride	0.0006	2.9x10-5	2.4x10-5	1x10-6	0	0	0	0	0.0006	2.9x10-5	2.4x10-5	1x10-6
Toluene	0.0003	2.9x10-5	1x10-5	1x10-6	0	0	0	0	0.0003	2.9x10-5	1x10-5	1x10-6
1,1,1òTrichloroethane	0.0007	7x10-6	3x10-5	3.7x10-7	0.0013	1.7x10-5	7x10-5	9.4x10-7	0.002	2.4x10-5	0.0001	1x10-6
Trichlorethylene	0	0	0	0	0.0435	0.0002	0.0022	1.1x10-5	0.0435	0.0002	0.0022	1.1x10-5
Hazard Index	0.0017	6.2x10-4	6.8x10-5	3.0x10-5	0.0463	7.4x10-4	0.0023	4.1x10-5	0.0479	0.0014	0.0024	7.1x10-5

E4 4056

Table F-18b.-Cancer Risk to Workers and Public at Sandia National Laboratories, New Mexico

	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite	Site	Onsite	Site	Onsite	Site

Compound	Annual	Boundary Annual	Annual	Boundary Annual	Annual	Boundary Annual
Methylene Chloride	0	0	3.0x10-6	1.5x10-7	3.0x10-6	1.5x10-7
Trichlorethylene	0	0	2.7x10-6	1.3x10-7	2.7x10-6	1.3x10-7
Total Risk	0	0	6.0x10-6	3.0x10-7	6.0x10-6	3.0x10-7

E4 4057

Table F-18a.-Hazard Quotients and Hazard Index for Sandia National Laboratories, New Mexico

	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)
Acetone	0	0	0	0	0.0002	2.3x10-5	7x10-6	1x10-6	0.0002	2.3x10-5	7x10-6	1x10-6
Chromium Trioxide	0.0001	5.5x10-4	4x10-6	2.8x10-5	0	0	0	0	0.0001	5.5x10-4	4x10-6	2.8x10-5
Methylene Chloride	0	0	0	0	0.0013	0.0005	6.6x10-5	2.8x10-5	0.0013	0.0005	6.6x10-5	2.8x10-5
Nickel Chloride	0.0006	2.9x10-5	2.4x10-5	1x10-6	0	0	0	0	0.0006	2.9x10-5	2.4x10-5	1x10-6
Toluene	0.0003	2.9x10-5	1x10-5	1x10-6	0	0	0	0	0.0003	2.9x10-5	1x10-5	1x10-6
1,1,1-Trichloroethane	0.0007	7x10-6	3x10-5	3.7x10-7	0.0013	1.7x10-5	7x10-5					

								9.4x10-7	0.002	2.4x10-5	0.0001	1x10-6
Trichlorethylene	0	0	0	0	0.0435	0.0002	0.0022	1.1x10-5	0.0435	0.0002	0.0022	1.1x10-5
Hazard Index	0.0017	6.2x10-4	6.8x10-5	3.0x10-5	0.0463	7.4x10-4	0.0023	4.1x10-5	0.0479	0.0014	0.0024	7.1x10-5

E4 4056

Table F-18b.-Cancer Risk to Workers and Public at Sandia National Laboratories, New Mexico

	No Action Alternative		Proposed Increment		Cumulative Levels	
	Onsite	Site Boundary	Onsite	Site Boundary	Onsite	Site Boundary
Compound	Annual	Annual	Annual	Annual	Annual	Annual
Methylene Chloride	0	0	3.0x10-6	1.5x10-7	3.0x10-6	1.5x10-7
Trichlorethylene	0	0	2.7x10-6	1.3x10-7	2.7x10-6	1.3x10-7
Total Risk	0	0	6.0x10-6	3.0x10-7	6.0x10-6	3.0x10-7

E4 4057

Table F-19a.-Hazard Quotients and Hazard Index for Pinellas Plant

	No Action Alternative				Proposed Increment				Cumulative Levels			
	Onsite		Site Boundary		Onsite		Site Boundary		Onsite		Site Boundary	
Compound	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)	(Annual)	(8 Hr)

1,4 Dioxane	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0005	0.0000	0.0005	0.0000	0.0005	0.0000
1,1,1-Trichloroethane	0.0165	0.0001	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0165	0.0001	0.0001	0.0000
Acetone	0.0013	0.0001	0.0046	0.0002	0.0001	0.0000	0.0001	0.0000	0.0015	0.0001	0.0048	0.0002
Ammonia	0.0017	0.0002	0.0062	0.0003	0.0000	0.0000	0.0000	0.0000	0.0017	0.0002	0.0062	0.0003
Dimethylformamide	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0017	0.0000	0.0017	0.0000	0.0017	0.0000
Isopropyl Alcohol	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003	0.0001	0.0006	0.0001
Methyl Ethyl Ketone	0.0001	0.0000	0.0003	0.0000	0.0001	0.0000	0.0001	0.0000	0.0002	0.0000	0.0004	0.0000
Methylene Chloride	0.0141	0.0041	0.0007	0.0003	0.0000	0.0000	0.0000	0.0000	0.0141	0.0041	0.0007	0.0003
Nickel Chloride	0.0531	0.0211	0.0041	0.0030	0.0000	0.0000	0.0000	0.0000	0.0531	0.0211	0.0041	0.0030
Nitric Acid	0.0312	0.0128	0.0000	0.0010	0.0149	0.0061	0.0143	0.0056	0.0461	0.0189	0.0143	0.0066
Toluene	0.0010	0.0001	0.0033	0.0001	0.0004	0.0000	0.0004	0.0000	0.0014	0.0001	0.0037	0.0002
Trichloroeythlene	0.1524	0.0004	0.0000	0.0001	0.0200	0.0001	0.0191	0.0001	0.1724	0.0005	0.0191	0.0001
Hazard Index	0.2715	0.0390	0.0196	0.0051	0.0379	0.0063	0.0365	0.058	0.3094	0.0453	0.0561	0.0109

E4 4058

Table F-19b.-Cancer Risk to Workers and Public at Pinellas Plant

	No Action Alternative		Proposed Increment		Cumulative Levels	
Compound	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual	Onsite Annual	Site Boundary Annual
1,4 Dioxane	0.0000	0.0000	4.40x10-7	4.40x10-7	4.40x10-7	4.40x10-7
Methylene	3.14x10-5	1.49x10-6	3.71x10-8	3.71x10-8	3.15x10-5	1.52x10-6
Trichloroethylene	9.21x10-6	0.0000	1.21x10-6	1.16x10-6	1.04x10-5	1.16x10-6
Total Risk	4.07x10-5	1.49x10-6	1.69x10-6	1.63x10-6	4.23x10-5	3.12x10-6

E4 4059

Table F-20.-Excess Cancer Mortality Estimates from a Single Exposure of 10 Rem; Lifetime Risks per 100,000 Exposed Persons

	Type of Cancer		
Sex	Leukemia a	Cancers Other Than Leukemia	Total Cancers
Male	220	660	880
Female	160	730	890
Average	190	695	885

E4 4061

a These are the linear estimates, and are double the linear-quadratic estimates provided in BEIR V for leukemia at low doses and dose-rates.

Table 4.1.2.9-1.-SRS Comparison of Consequences and Risks of SRS Tritium Accidents with Radiation from Natural Sources

Event	Maximum Offsite Individual Dose Consequences (Rem)	Event Frequency Events/yr	Risk (Rem/yr) (Fatal Cancers/yr) c
Severe accident-gas transfer function	9x10-1	a	a
Design Basis Earthquakeb	4	2x10-4	8x10-4 7x10-7
Tritium leak in Product Evacuation	3x10-8	8.8	3x10-7 3x10-10
Radiation from natural sources	3x10-1	1	3x10-1 1x10-4

E4 4062

a A release of the total tritium inventory is postulated for only the tritium inventory in the Gas Transfer System without consideration for a release mechanism or frequency of occurrence and without credit for mitigating factors such as secondary containment and the tritium stripper system.
b The dose and fatal cancer consequences shown are as postulated for existing tritium facilities without the new tritium functions.
c A factor of 8.85x10-4 fatal cancers/rem is assumed for accidents and one-half that value for exposure to natural sources of radiation.

Table D2.1.1-1.-Ambient Air Quality Standards (mg/m3) [Page 1 of 2]

Pollutant	Averaging Time	Primary NAAQSa	Secondary NAAQSa	Florida Standards	Colorado Standards	Missouri Standard	South Carolinaand Georgia Standardsa	New Mexico Standardsc	Tennessee Standards
Asbestos	30-day	b	b	b	b	b	b	0.01	b
Beryllium	24-hour 30-day	b 0.011	b b	0.01 b	b 0.01	b b	b b	b 0.01	b 0.01
Carbon Monoxide (CO)	8-hour 1-hour	10,000 40,000	b b	10,000 40,000	10,000 40,000	10,000 40,000	10,000 40,000	9,667 14,971	10,000 40,000

Heavy Metals30-day	b	b				b		b	
Hydrogen Fluoride (HF)	30-day 7-day 24-hour 12-hour	b b b b	b b b b	b b b b	b b b b	b b b b	0.8 1.6 2.9 3.7	b b b b	1.2 1.6 2.9 3.7
Hydrogen Sulfide (H2S)	5-day 1-hour 1/2 -hour	b b b	b b b	b b b	b 142 b	42h b 70g	b b b	b 112 b	b b b
Lead (Pb)	Calendar Quarter 30-day	1.5 b	1.5 b	1.5 b	b 1.5	1.5 b	1.5 b	1.5 b	1.5 b
Nitrogen Dioxide (NO2)	Annual 24-hour	100 b	100 b	100 b	100 b	100 b	100 b	100 472	100 b
Nonmethane Hydrocarbons	3-hour	b	b	b	b	b	b	600f	b
Ozone (O3)	1-hour	235	235	235	160	235	235	117.8	235
Particulate Matter (PM10)Annual 24-hour	50 150	50 150	50 150	50 150	50 150	50 150	b b	50 150	

E4 4063-1
Footnotes at end of table.

Table D2.1.1-1.-Ambient Air Quality Standards (mg/m3)-Continued [Page 2 of 2]

Pollutant	Averaging Time	Primary NAAQSa	Secondary NAAQSa	Florida Standards	Colorado Standardsc	Missouri Standards	South Carolina and Georgia Standardsd	New Mexico Standardsc	Tennessee Standards
Sulfur Dioxide (SO2)	Annual 24-hour 3-hour	80 365 b	b b 1,300	60 260 1,300	80 365 700	80 365 1,300	80 365 1,300	52 262 1,300	80 365 1,300
Total Reduced Sulfur (S)	1-hour	b	b	b	b	b	b	3.9	b
Total Suspended Particulates (TSP)	Annuale 30-day 7-day 24-hour	b b b b	b b b b	b b b b	b b b b	b b b b	75 b b b	60 90 110 150	60k b b 150k
Sulfuric Acid (H2 SO4)	24-hour 1-hour	b b	b b	b b	b b	10i 30j	b b	b b	b b

E4 4063-2

a Ohio state standards are the same as the NAAQS. The NAAQS, other than those for O3, PM10, and those based on annual averages, are not to be exceeded more than once per year. The O3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is less than or equal to one. The 24-hour PM10 standard is attained when the expected number of days with a 24-hour average concentration above the standard is less than or equal to one. The annual arithmetic mean PM10 standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard.

b There is no standard.

c The Colorado and New Mexico annual standards are never to be exceeded; short-term standards are not to be exceeded more than once per year, unless otherwise noted.

d The Federal TSP standards have been replaced by the PM10 standards, but the annual TSP standard is retained in South Carolina.

e Geometric mean; all other means are arithmetic.

f Assumed to be benzene.

g 1/2-hour average not to be exceeded more than 2 times per year.

h 1/2-hour average not to be exceeded more than 2 times per year in any 5 consecutive days.

i 24-hour average not to be exceeded more than once in any 90 consecutive days.

j 1-hour average not to be exceeded more than once in any 2 consecutive days.

k TSP standards listed are secondary standards. Primary standards are 75 and 260 µg/m3, respectively.

l NESHAP for beryllium. Beryllium emissions also limited to 10 grams over a 24-hour period.

Source: 40 CFR 50; FL DER, 1992; CO DOH, 1989; MO DNR, 1992; SC DHEC, 1989; LANL, 1990b; TN DH&E, 1991a.

Table D2.1.1-5-Emission Rates and Maximum Site Boundary Concentration of Hazardous/Toxic Air Pollutants at KCP

	Emission Rate (lb/hr) a		Maximum Concentration (mg/m3)		Missouri State Standards and Guidelines
Hazardous/Toxic Air Pollutant	Current e	Projected f	Current e	Projected f	(mg/m3)
1,4-Dioxane	0.03	0.03	0.6	0.6	24.5d
1,1,1-Trichloroethane	1.18	0.01	20.3	0. 2	1,040d
Acetic Acid	0.02	0.02	0.7	0.7	b
Acetone	0.37	0.37	6.3	6.3	161d
Chlor odifluoroethane	0.02	0.02	0.7	0.7	b
Chlorodifluoromethane	0.01	0.01	0.2	0.2	b
D'Limonene	0.00	0.06	0.0	1.8	b
Dichlorodifluoromethane	0.28	0.01	9.0	0.2	b
Dimethyl Formamide	0.01	0.01	0.2	0.2	8.13d

Ethanol	0.01	a	0.4	a	118d
Ethylbenzene	0.02	0.02	0.4	0.4	118d
Fluorine End-Capped Homopolymers	0.19	0.19	6. 1	6.1	b
Fluorboric Acid	0.02	0.02	0.7	0.7	b
Fluoroaliphatic Polymeric Esters	0.01	0.01	0.4	0.4	b
Fluorobenzene	0.14	0.14	4.3	4.3	b
Fluorotelomer	0.0 1	0.01	0.4	0.4	b
Glycol Ethers	0.82	1.20	26.0	37.8	b
Hexane	0.03	0.03	1.1	1.1	2,4 00c
Hydrochloric Acid	0.15	0.15	2.6	2.6	2.03d
Isopropanol	0.70	0.70	22.0	22. 0	13,066.7c
Methanol	0.01	0.01	0.2	0.2	7.13d
Methyl Ethyl Ketone	0.03	0.03	0 .6	0.6	32.1d
Methyl Isobutyl Ketone	0.07	0.07	1.2	1.2	55.7d
Methylene Chloride	0.18	0.01	5.8	0.4	b
Naphtha (mineral spirits)	0.17	0.17	5.4	5.4	b
Nitric Acid	0.43	0.43	13.7	13.7	66.67c
Phosphoric Acid	0.03	0.03	0.6	0.6	0.27 d
Sulfuric Acid	0.27	0.27	4.7	4.7	2.72d
Tetrachloroethylene	0.02	0.02	0.4	0. 4	922d
Toluene (methylbenzene)	0.19	0.19	3.3	3.3	10.2d
Trichloroethylene	2.03	0.22	34.9	3.7	36.5d
Trichlorotrifluoroethane	1.29	0.01	40.9	0.2	101,3 33c
Xylene (dimethylbenzene)	0.13	0.13	4.0	4.0	5,800c

E4 4064
a Only those emitted at rates greater than or equal to 100 lb/yr
(0.01 lb/hr) are listed.

b No state standard.
c 8-hour average standard.
d 24-hour average standard.
e Estimated for 1991 (KC ASAC, 1993b).
f Projected for 1995 (FDI, 1993).

Table C1-2.-Mound Alternative: Additional Liquid Hazardous/Toxic Wastes (ft3/yr) a

Waste Stream	Kansas City	Rocky Flats	Pinellas	Total c
Acid Liquid, Bulk	380	40	b	420
Alkaline Liquid	970	b	b	970
Oil/Coolants	750	1,060	b	1,810
Halogenated & Nonhalogenated Solvent	1,510	20	20	1,550
Resin, Paint, Curing Agent, Adhesive &	1,510	b	b	1,510
Toluene Diisocyanate	70	b	b	70
Cyanide, Liquid	40	b	b	40
Total	5,230	1,120	20	6,370
				E4 4107

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

Table C1-1.-Mound Alternative: Waste Management of Additional Hazardous/Toxic Waste

	Disposal	Volume (ft3/yr)a			
Waste Stream	Method	Kansas City	Rocky Flats	Pinellas	Total c
Acid Liquid Bulk	Incineration/Recovery	380	40	b	420
Alkaline	Incineration/Recovery	970	b	b	970

Oil/Coolants	Incineration	750	1,060	b	1,810
Halogenated & Nonhalogenated Solvent	Incineration	1,510	20	20	1,550
Resin, Paint, Curing Agent, Adhesive & Rubber	Incineration	1,510	b	b	1,510
Toluene Diisocyanate	Incineration	70	b	b	70
Cyanide, Liquid	Cyanide Destruction	40	b	b	40
Cyanide Salts	Recovery	10	b	b	10
Mercury Contaminated Debris	Landfilled	20	b	b	20
F006, F009 Sludge	Landfilled	4,200	b	b	4, 200
Batteries (others)	Recovery/Landfilled	100	b	b	100
Classified Hazardous	Declassified/Landfilled	10	b	b	10
Acid/Chromate Contaminated Debris	Incineration	160	b	b	160
Cyanide/Alkaline Contaminated Debris	Incineration	100	b	b	100
Miscellaneous Lab Reagent/Off Spec. Product	Incineration/Landfilled	70	b	b	70
Non-Empty Aerosol Cans	Incineration	590	b	b	590
Solvent/Oil Contaminated Debris & Miscellaneous	Incineration	6,830	80	50	6,960
Compressed Gas Cylinders	Destruction/Incineration	30	b	b	30
Total		17,350	1200	70	18,620
					E4 4108

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

Table C3-2.-Rocky Flats Alternative: Additional Liquid Hazardous/Toxic Wastes (ft3/yr) a

Waste Stream	Kansas City	Mound	Pinellas	Total c
Acid Liquid, Bulk	380	40	b	420
Alkaline Liquid	970	30	b	1,000
Oil/Coolants	750	400	b	1,150
Halogenated & Nonhalogenated	1,510	70	20	1,600
Resin, Paint, Curing Agent, Adhesive & Rubber	1,510	b	b	1 ,510
Toluene Diisocyanate	70	b	b	70
Cyanide, Liquid	40	b	b	40
Total	5,23 0	540	20	5,790
				E4 4109

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

Table C2-2.-Pinellas Alternative: Additional Liquid Hazardous/Toxic Wastes (ft3/yr) a

Waste Stream	Kansas City	Mound	Rocky Flats	Total c
Acid Liquid, Bulk	380	40	40	460
Alkaline Liquid	970	30	b	1,000
Oil/Coolants	750	400	1,060	2,210
Halogenated & Nonhalogenated	1,510	70	20	1,600

Solvent				
Resin, Paint, Curing Agent, Adhesive& Rubber	1,510	b	b	1,510
Toluene Diisocyanate	70	b	b	70
Cyanide, Liquid	40	b	b	40
Total	5,230	540	1,120	6,890
				E4 4110

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

Table C3-3.-Rocky Flats Alternative: Additional Solid Hazardous/Toxic Wastes (ft3/yr) a

Waste Stream	Kansas City	Mound	Pinellas	Total c
Cyanide Salts	10	b	b	10
Mercury Contaminated	20	b	b	20
F006, F0019 Sludge	4,200	b	b	4,200
Batteries	100	b	b	100
Classified Hazardous	10	b	b	160
Acid/Chromate Contaminated	160	b	b	100
Cyanide/Alkaline Contaminated	100	b	b	100
Misc. Lab Reagent/Off Spec. Product	70	b	b	70
Non-Empty Aerosol Cans	590	b	b	59 0

Solvent/Oil Contaminated Debris & Misc.	6,830	110	50	6,990
Compressed Gas Cylinders	30	b	b	30
Total	12,120	110	50	12,280
				E4 4111

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

Table C2-3.-Pinellas Alternative: Additional Solid Hazardous/Toxic Wastes (ft3/yr) a

Waste Stream	Kansas City	Mound	Rocky Flats	Total c
Cyanide Salts	10	b	b	10
Mercury Contaminated Debris	20	b	b	20
F006, F0019	4,200	b	b	4,200
Batteries (Others)	100	b	b	100
Classified Hazardous	10	b	b	10
Acid/Chromate Contaminated	160	b	b	160
Cyanide/Alkaline Contaminated	100	b	b	100
Misc. Lab Reagent/Off Spec. Product	70	b	b	70
Non-Empty Aerosol Cans	590	b	b	590
Solvent/ Oil Contaminated Debris & Misc.	6,830	110	80	7,020
Compressed Gas	30	b	b	30

Cylinders				
Total	12,120	110	80	12,310
				E4 4112

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

Table C1-3.-Mound Alternative: Additional Solid Hazardous/Toxic Wastes (ft3/yr)a

Waste Stream	Kansas City	Rocky Flats	Pinellas	Total c
Cyanide Salts	10	b	b	10
Mercury Contaminated	20	b	b	20
F006, F0019	4,200	b	b	4,200
Batteries	100	b	b	100
Classified Hazardous	10	b	b	10
Acid/Chromate Contaminated	160	b	b	160
Cyanide/Alkaline Contaminated	100	b	b	100
Misc. Lab Reagent/Off Spec. Product	70	b	b	70
Non-Empty Aerosol Cans	590	b	b	590
Solvent/ Oil Contaminated Debris & Misc.	6,830	80	50	6,960
Compressed Gas Cylinders	30	b	b	30
Total	12,120	80	50	12,250
				E4 4113

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

Table C2-1.-Pinellas Alternative: Waste Management of Additional Hazardous/Toxic Waste

	Disposal	Volume (ft3/yr)a			
Waste Stream	Method	Kansas City	Mound	Rocky Flats	Total c
Acid Liquid Bulk	Incineration/ Recovery	380	40	40	460
Alkaline	Incineration/ Recovery	970	30	b	1,000
Oil/Coolants	Incineration	750	400	1,060	2,210
Halogenated & Nonhalogenated Solvent	Incineration	1,510	70	20	1,600
Resin, Paint, Curing Agent, Adhesive & Rubber	Incineration	1,510	b	b	1,510
Toluene Diisocyanate	Incineration	70	b	b	70
Cyanide, Liquid	Cyanide Destruction	40	b	b	40
Cyanide Salts	Recovery	10	b	b	10
Mercury Contaminated Debris	Landfilled	20	b	b	20
F006, F009 Sludge	Landfilled	4,200	b	b	4,200
Batteries (others)	Recovery/ Landfilled	100	b	b	100
Classified Hazardous	Declassified/ Landfilled	10	b	b	10
Acid/Chromate Contaminated Debris	Incineration	160	b	b	160
Cyanide/Alkaline Contaminated Debris	Incineration	100	b	b	100

Miscellaneous Lab Reagent/Off Spec. Product	Incineration/ Landfilled	70	b	b	70
Non-Empty Aerosol Cans	Incineration	590	b	b	590
Solvent/Oil Contaminated Debris & Miscellaneous	Incineration	6,830	110	80	7,020
Compressed Gas Cylinders	Destruction/ Incineration	30	b	b	30
Total		17,350	650	1,200	19,200
					E4 4114

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

Table C3-1.-Rocky Flats Alternative: Waste Management of Additional Hazardous/Toxic Waste

	Disposal	Volume (ft3/yr) a			
Waste Stream	Method	Kansas City	Mound	Pinellas	Total c
Acid Liquid Bulk	Incineration/ Recovery	380	40	b	420
Alkaline	Incineration/ Recovery	970	30	b	1,000
Oil/Coolants	Incineration	750	400	b	1,150
Halogenated & Nonhalogenated Solvent	Incineration	1,510	70	20	1,600
Resin, Paint, Curing Agent, Adhesive & Rubber	Incineration	1,510	b	b	1,510
Toluene Diisocyanate	Incineration	70	b	b	70
Cyanide, Liquid	Cyanide Destruction	40	b	b	40

Cyanide Salts	Recovery	10	b	b	10
Mercury Contaminated Debris	Landfilled	20	b	b	20
F006, F009 Sludge	Landfilled	4,200	b	b	4, 200
Batteries (others)	Recovery/ Landfiled	100	b	b	100
Classified Hazardous	Declassified/ Landfilled	10	b	b	10
Acid/Chromate Contaminated Debris	Incineration	160	b	b	160
Cyanide/Alkaline Contaminated Debris	Incineration	100	b	b	100
Miscellaneous Lab Reagent/Off Spec. Product	Incineration/ Landf	70	b	b	70
Non-Empty Aerosol Cans	Incineration	590	b	b	590
Solvent/Oil Contaminated Debris & Miscellaneous	Incineration	6,830	110	50	6,990
Compressed Gas Cylinders	Destruction/ Incineration	30	b	b	30
Total		17,350	650	70	18,070
					E4 4115

a Projected for 1995 workload.
b Not significant quantities (less than 10 ft3/yr).
c Total does not include quantities noted in b.

Source: FDI, 1993.

Table 1.8-1.-Nonnuclear Consolidation Plan Performance Measures

Categories	Performance Measures
Minimization of ES&H Risks	New Hazardous Chemicals Additional Hazardous Operations New Regulated Waste Streams
Minimization of Technical Risks	New Parts to Manufacture

	New Parts to Procure Jobs to Transfer Availability of Technical Personnel
Minimization of Cost	Capital Cost Operating Cost
Minimization of Time	Payback Time

E4 4156

Table 3.4-1.-Total Nonnuclear Space Requirements (ft2)

	Mound Alternative	Pinellas Alternative	Rocky Flats Alternative
Total space required	2,936,000	2,936,000	2,936,000
Space at other sites	126,000	49,000	143,000
Space needed at alternative site	2,810,000	2,887,000	2,793,000
Current nonnuclear space	1,400,000	700,000	445,000
Additional space required	1,410,000	2,187,000	2,348,000

E4 4194
Source: DOE, 1993b.

Table A4-2.-Rocky Flats Plant: Hazardous/Toxic and Radioactive Waste Storage Facilities [Page 1 of 4]

Facility	EPA Hazardous Waste Number	Capacity
Main Hazardous Waste Storage Area	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	39,160 gallons and 4,050 ft3
Chip Drum Storage Area: Bldg. 447 Rm 501	D001, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, and F003	160 ft3

Drum Storage Area: Bldg. 561	D001, D002, D003a, D004, D005, D006, D007, D008, D009, D010a, D011a, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F007, F009, P Seriesa, and U Seriesa	17,600 gallons
Drum Storage Area: Bldg. 776, Rm 134	D001, D005a, D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005a, F006, F007, F008, F009, P Series, and U Series	7,000 gallons and 8,100 ft3
Drum Storage Area: Bldg. 776, Rm 237	D001, D005a, D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005a, P Series, and U Series	10,101 gallons and 9,450 ft3
Mixed Waste Storage: Bldg. 884	D001, D003, D006, D007, D008, D009, D010a, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, P Series, and U Series	55,440 gallons and 7,425 ft3
Mixed Waste Storage Area: 904 Pad Outside b	D001, D002, D003, D004a, D005a, D006, D007, D008, D009a, D010a, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Seriesa, and U Seriesa	288,900 ft3
Mixed Waste Storage Area: 904 Pad Cargo Containers b	D001, D002, D003, D004a, D005a, D006, D007, D008, D009a, D010a, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Seriesa, and U Seriesa	4,785 gallons and 28,350 ft3
Mixed Waste Storage: Bldg. 777, Rm 432C	D001, D008, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, and U239	44 ft3
Remedial Action Decontamination Pad	D004, D005, D006, D007, D008, D009, D011, D019, D022, F001, F002, F003, and F005	12,500 gallons
Granular Activated Carbon Treatment	D004, D005, D006, D007, D008, D009, D011, D019, D022, F001, F002, F003, and F005	5,000 gallons
Environmental Waste Drum Storage - Tent 1	D004, D005, D006, D007, D008, D009, D011, D019, D022, F001, F002, F003, and F005	145,200 gallons or 17,280ft3
Environmental Waste Drum Storage Unit	D004, D005, D006, D007, D008, D009, D011, D019, D022, F001, F002, F003, and F005	110,000 gallons or 13,500 ft3
		E4 4220-1
Footnotes at end of table.		

Table A4-2.-Rocky Flats Plant: Hazardous/Toxic and Radioactive Waste Storage FacilitiesòContinued [Page 2 of 4]

Facility	EPA Hazardous Waste Number	Capacity
Mixed Waste Storage Area: Bldg. 374, Rm 3813	D002, D004, D005b, D006, D007, D008, D009, D010b, D011b, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Seriesb, and U Seriesb	6,372 ft3
Shipping Storage Area: Bldg. 684	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010c, D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Seriesc, and U Seriesc	67,500 ft3
Pondcrete Storage Area: Bldg. 788	D002, D003, D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, and F009	32,400 ft3
Gas Cylinder Storage: Bldg. 952	D001, D002, D003, P Series, and U Series	6400 cylinders
Mixed Waste Storage: Bldg. 964	D004, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, (vacuum filter sludge)	16,470 ft3
Mixed Waste Storage Area: 750 Pad	D002, D003, D004b, D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, (Pondcrete and Saltcrete)	378,000 ft3
Mixed Waste Storage: Bldg. 776, Rm 201	D001, D005a, D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, and F005a	2,750 gallons or 356 ft3
Storage Area: Bldg. 889 b	D001, D003, D006, D007, D008, D009, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, and P015	4,050 ft3
Low-Level Mixed Waste Baler: Bldg. 776	D004, D006, D007, D008, D009, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, and F005	1,350 ft3
Process Waste Transfer and Collection System	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F007, F008, F009, P Series, and U Series	150,000 gallons

Process Waste Storage Tanks: Bldg. 774	D001, D002, D004, D005, D007, D008, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, and F009	21,000 gallons
Process Waste Treatment Facility: Bldg.374	D001, D002, D003b, D004, D005, D006b, D007, D008, D009, D010b, D011, D018, D019, D022b, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005b, F007, F008, F009, P Seriesb, and U Seriesb	116,160 gallons
Process Wastewater Tanks	D001, D002, D003, D004, D005, D006b, D007, D008, D009b, D010, D011b, D018, D019, D022b, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F007, F008, F009, P Seriesb, and U Seriesb	1,200,000 gallons
		E4 4220-2
Footnotes at end of table.		

Table A4-2.-Rocky Flats Plant: Hazardous/Toxic and Radioactive Waste Storage FacilitiesòContinued [Page 3 of 4]

Facility	EPA Hazardous Waste Number	Capacity
Oil Storage Tanks: Bldg. 776	D001, D006, D007, D008, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, and F005	750 gallons
Aqueous Process Waste Treatment: Bldg. 774	D001, D002, D003b, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005b, F007, F008, F009, P Seriesb, and U Seriesb	122,060 gallons
Organic Waste Immobilization: Bldg. 774	D001, D006b, D007b, D008b, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002b, F003, F005, P Seriesb, and U Seriesb	2,400 gallons
Drum/Crate Storage Area: Bldg. 774, Rm 154	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F008, F009, P Series, and U Series	2,700 ft3
Drum Storage Area: Bldg. 774, Rm 41	D001b, D002b, D003b, D004, D005b, D006, D007, D008, D009, D010, D011, D018, D019, D022, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005b, F007, F008, F009, P Seriesb, and U Seriesb	4,000 gallons or 459 ft3

Passive/Active Drum Counter: Bldg. 371, Rm 2202 a	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	221 ft3
Container Storage Area: Bldg. 371, Rm 3189 a	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	221 ft3
Container Storage Area: Bldg. 371, Rm 3187B a	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft3
Container Storage Area: Bldg. 371, Rm 2325 a	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft3
Container Storage Area:Bldg. 771 Annex a	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft3
		E4 4220-3
Footnotes at end of table.		

Table A4-2.-Rocky Flats Plant: Hazardous/Toxic and Radioactive Waste Storage FacilitiesòContinued [Page 4 of 4]

Facility	EPA Hazardous Waste Number	Capacity
Container Storage Area: Bldg. 371, Rm 3189 a	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	221 ft3
Container Storage Area: Bldg. 371, Rm 3187Ba	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft3
Container Storage Area: Bldg. 371, Rm 2325 a	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft3

Container Storage Area:Bldg. 771 Annex a	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D028, D029, D035, D038, D040, D043, F001, F002, F003, F005, F006, F007, F009, P Series, and U Series	8 ft3

E4 4220-4

a Indicates that a permit modification request has been

submitted. However, this unit or waste code has been granted temporary authorization.

b A request for change to interim status has been submitted for this unit or waste code.

c Reflects approval to store waste for the purpose of real-time radiography as stated in a

letter from Colorado Department of Health to DOE on October 24, 1990.

Source: RF DOE, 1992a.

Table A4-1.-Rocky Flats Plant: Hazardous Waste Quantities
Shipped Offsite in 1992

Waste	EPA Waste Code	Quantity (yd3)
Benzene	D018	4.90
Chromium (Contaminated)a	D007, D008, D018	10.89
Flammable Liquidsb	D001, F002, F003, F005	9.26
Flammable Liquids, (PCB Contaminated)c	D001	0.27
Halogenated Solventsd	F001, F002, D008	32.41
Lead (Contaminated)	D008	2.72
Mercury (Contaminated)	D009	2.45
Polychlorinated Biphenyls, Liquid	-----------	37.31

Polychlorinated Biphenyls, Solid	-----------	12.53
Waste, Sodium Nitrate Mixture, Oxidizer (ChromiumContaminated)	D001, D007	13.07

E4 4221
a Also contaminated with lead and benzene. b Consists of isopropyl alcohol and toluene. c Consists of hexane. d Consists of 1,1,1-trichloroethane, methyl chloride, methylene chloride, trichlorotrifluoroethane.

Source: RF DOE, 1992a.

Table 5-3.-State Permit and Notification Requirements-Alternatives [Page 1 of 2]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirements	Potential Applicability
Air Resources	Ohio Air Pollution Control Law	OH Code, Title 37, Chapter 3704	OH Environmental Protection Agency	Permit	Required prior to the construction ormodification of an air contaminant source.
Water Resources	Ohio Water Pollution Control Act	OH Code, Title 61, Chapter 6111	OH Environmental Protection Agency	Permit	Required prior to the construction or modification of a water discharge source.
	Ohio Water Quality Standards	OH Admin. Code, Title 3745	OH Environmental Protection Agency	Permit	Required prior to the construction or modification of a water discharge source.
Waste Managemen t	Ohio Solid Waste Disposal Regulations	OH Admin. Code, Title 3745	OH Environmental Protection Agency	Permit	Required prior to the construction or modification of a solid waste disposal facility.
	Ohio Hazardous Waste Management Regulations	OH Admin. Code, Title 3745	OH Environmental Protection Agency	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
Chemical and Material	Ohio Underground Storage Tank Law	OH Admin. Code, Title 37	OH Fire Marshal/Burea uof	Permit	Required to comply with tank requirements prior to the construction or

Storage			UndergroundSt orage Tanks		modification of an underground storage tank.
Air Resources	Florida Air PollutionRules	FL Rules/ Regulations ,Title 17	FL Department of Environ. Regs.	Permit	Required prior to the construction or modification of an air contaminant source.
Water Resources	Florida Air and WaterPollution Control Act	FL Stat., Title 29, Chapter 403	FL Department of Environ. Regs.	Permit	Required prior to the construction or modification of a water discharge source.
Waste Management	Florida Solid and Hazardous Waste Management Act	FL Stat., Title 29, Chapter 403	FL Department of Environ. Regs.	Permit	Required prior to the construction or modification of a solid/hazardous waste disposal facility.
					E4 4222-1

Table 5-3.-State Permit and Notification Requirements-Alternatives-Continued [Page 2 of 2]

Resource Area	Legislation	Citation	Responsible Agency	Permit or Requirement	Potential Applicability
Waste Management (continued)	Florida Statewide Multipurpose Hazardous Waste Facility Citing Act	FL Stat., Title 29, Chap. 403	FL Department of Environ. Regs.	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
Chemical and Material Storage	Florida Underground Storage Tanks Regulations	FL Rules/ Regulations, Title 17	FL Department of Environ. Regs.	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.
Air Resources	Colorado Air Quality Act	CO Stat., Title 25, Article 7	CO Air QualityControl Com.	Permit	Required prior to the construction or modification of an air contaminant source.
Water Resources	Colorado Discharge Permit System Regulations	CO Code, Title 5	CO Water Quality Control Com.	Permit	Required prior to the construction or modification of a water discharge source.
	Colorado Primary Drinking Water Regulations	CO Code, Title 5, Chapter 1003	CO Water Quality Control Com.	Permit	Required prior to the construction or modification of a water discharge source.
Waste Management	Colorado Solid Waste Disposal Sites and Facilities Law	CO Stat., Title 20, Article 20	CO Department of Health	Permit	Required prior to the construction or modification of a solid waste disposal facility.

	Colorado Hazardous Waste Notification and PermitRules	CO Code, Title 6, Chapter 1007	CO Department of Health	Permit	Required prior to the construction or modification of a hazardous waste disposal facility.
Chemical and Material Storage	Colorado Underground Storage Tanks Law	CO Stat., Title 24, Article 18	CO Department of Waste	Permit	Required to comply with tank requirements prior to the construction or modification of an underground storage tank.
					E4 4222-2

Table 4.1.1.3-1.-Combined Sanitary Sewer Effluent Monitoring at Kansas City Plant

	Regulatory Standards (mg/L)				Total Estimated Quantity	
		Metal Finishing			(lb) Released in:	
Parameter	Kansas City, MO Ordinance	Averageb	Daily Maximum	KCP Annual Average (mg/L)	1991	1990
Cyanide (G)	2.0	0.65	1.2	0.014	35	68
Cadmium	2.0a	0.005	0.009	0.004	9	11
Chromium (T)	10.0a	0.12	0.20	0.002	4	51
Copper	2.0a	0.15	0.25	0.009	22	161
Lead	0.1a	0.05	0.07	0.012	28	64
Mercury	*	*	*	0.0005	<2.2	2.2
Nickel	3.0a	0.18	0.29	<0.050	0	40
Silver	None	0.03	0.04	<0.030	2	18
Zinc	2.0a	0.22	0.29	0.040	99	374
Total Toxic Organics	None		0.23	0.033	79	528
pH (G)	6.0-10.0 units	*	*	8.2	NA	NA
Temperature (G)	150òF	*	*	75	NA	NA

Biochemical Oxygen Demand (5 day)	300	*	*	110	267,258	467,199
Chlorinated Solvents (G)	0.160	*	*	0.042	101	431
Phenol (G)	10.0	*	*	0.023	55	123
Soluble Oil (G)	100.0	*	*	12.41	30,032	54,351
Total Suspended Solids	360.0	*	*	57	138,389	494,578
Boron	1.0a	*	*	0.181	264	1,258
Chromium (H)	5.0a	*	*	<0.010	4	0
Iron	15.0a	*	*	0.358	867	2,642
Sulfides	10.0a	*	*	0.1	242	0
PCBs	<0.0001b	*	*	0.0004	<2.2	NA

E4 4629

a No city ordinance limit is available. Limit given is from the Missouri Effluent Guidelines for Municipal Control of Industrial Wastes.
b Metal finishing standards are recalculated every six months (40 CFR 433). Therefore, three different standards are applied to each parameter. The limits provided are the average of the three standards applicable to KCP during 1991.

* Standard has not been established.
NA Not Applicable
(G) Grab sample
(T) Total
(H) Hexavalant

Source:KC ASAC, 1991a, 1992c.

Table B1-3.-Kansas City Plant: Waste Minimization Scenario for Processes Being Transferred To Kansas City Plant

Incoming Process to KCP	Waste Minimization Activity
Lithium Ambient Batteries (LAMB)-cleaning processes using trichloroethylene for removal of flux from solder	Alternate cleaning agents that would eliminate the use of trichloroethylene are being investigated. Similar processes in Department 855,

joints. cleaning	where LAMB is slated to transfer, have been successfully converted to with d'limonene for flux removal.
Lightning Arrester Connector (LAC)-The connector assemblies are potted with a polyurethane potting compound containing toluene diisocyanate (TDI). being	Alternate potting materials that do not contain TDI are being investigated. An alternative potting material has been identified and is qualified for use in the LAC. Should the alternate potting not be qualified, LAC will be potted with TDI in the existing Department 65 cable potting area.
Neutron Detectors-Hand soldering process and stripping and tinning of electrical wires using trichloroethylene for flux removal.	Alternate cleaning agents that would eliminate the use of trichloroethylene are being investigated.
Optoelectronics-Metal piece parts are cleaned using methylene chloride in an ultrasonic cleaner to prepare them for subsequent plating operations. Soldering operations require removal of flux using trichloroethylene in an ultrasonic cleaner.	Alternate aqueous and semiaqueous solvents and processes for cleaning metal piece parts will replace methylene chloride. Trichloroethylene is being replaced with d'limonene, a new, environmentally safe, terpene-based solvent, for cleaning electrical and electronic

	assemblies.
Support Pads-Equipment used in preparation of a polyurethane foam mixture is cleaned using methylene chloride.	Alternate cleaning agents will be qualified for use in cleaning of foam-mixing equipment.
Transducers-Trichloroethylene used for flux removal following hand soldering operations, and for surface preparation of wires during a stripping and tinning operation.	Alternate cleaning solutions for transducer fabrication are beinginvestigated; at this time, it appears that d-limonene will replace trichloroethylene.
Transducer assemblies are potted using an epoxy encapsulating material to add mechanical strength. One of the components of this material is "Z" Hardener, which contains methylene dianiline (MDA).	Alternative potting materials that do not contain MDA are being investigated. If an alternate cannot be qualified, potting of transducers will be performed in a dedicated MDA potting area (D/59).
Round Wire Detonator Cables/Plastic Headers-Trichloroethylene is used as a cleaning agent.	Alternative aqueous-based cleaning processes will be substituted.
Reservoir Production-Trichloroethylene and methylene chloride are used in cleaning processing.	Alternative aqueous-based cleaning processes will be substituted.

E4 4630

Source: KC ASAC, 1993b.

Table 4.1.1.8-1.-Kansas City Plant: Waste Reduction Progress 1989-91

Category	1989	1990	Reduction	1991	Reduction Over 1990
Chlorinated Flurocarbon Solvent Usage (lb)	229,415	77,607	-66%	30,524	-61%
Chlorinated Hydrocarbon Solvent Usage (gal)	31,460	18,420	-41%	5,530	-70%
Cyanide Waste (lb)	6,000	5,800	-3%	0	-100%
Alkaline Waste (lb)	255,000	83,220	-67%	63,400	-24%
Acid Waste (lb)	42,000	32,000	-23%	0	-100%
F006 sludgea (lb)	299,050	364,560	+18%	197,320	-54%

E4 4631
a Wastewater treatment sludges from electroplating operations. Source:KC ASAC, 1992c.

Table 4.1.7.3-1.-Summary of Liquid Effluent Monitoring, Pinellas Plant

Industrial Wastewater Neutralization Facility, 1991			
Parameter	Unit of Measure	Criteria	Average Concentration
Cadmium	mg/L	0.2a	<0.01
Chromium	mg/L	2.6a	<0.03
Copper	mg/L	1.0a	0.30
Cyanide	mg/L	1.0a	<0.02
Lead	mg/L	0.6a	<0.05
Mercury	mg/L	0.1a	<0.0002
Nickel	mg/L	1.0a	<0.05

Silver	mg/L	0.4a	<0.01
Total Suspended Solids	mg/L	250a	50.8
Biological Oxygen Demand	mg/L	250a	34.5
Zinc	mg/L	1.9a	0.17
Total Toxic Organics	mg/L	0.85a	0.036
pH	pH units	5.5ò9.5a	6.6
Tritium	pCi/L	100,000,000b	8,240

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a Industrial Wastewater Discharge Permit #018-IE and Sewer User Ordinance 88.4. b Florida Department of Health and Rehabilitative Services. Source: PI DOE, 1992a.

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Nonnuclear Consolidation EA Preapproval Review Commenters		
Document Number	Commenter Information	Page Number
EA-S-001	Lois Pohl Coordinator Missouri Clearinghouse Office of Administration Jefferson City, MO	G-43
EA-S-002	Andreas Mager, Jr. Assistant Regional Director Habitat Conservation Division National Marine Fisheries Service, SE Region St. Petersburg, FL	G-43
EA-S-003	Ian Hill Intergovernmental Review Coordinator South Carolina Department of Archives and History State Historic Preservation Office Columbia, SC	G-44
EA-S-004	Walter Dasheno Governor	G-44

	Santa Clara Indian Pueblo Española, NM	
EA-S-005	Coordinator Ohio Clearinghouse Columbus, OH	G-46
EA-S-006	Donald R. Schregardus Director Hazardous Waste Facility Board Environmental Protection Agency Columbus, OH	G-56
EA-S-007	David K. Coburn Director Office of Planning and Budgeting Office of the Governor Tallahassee, FL	G-58
EA-S-008	Shirley D. Gooding Florida Department of Labor and Employment Security Office of the Secretary Tallahassee, FL	G-59
EA-S-009	Greg Farmer Secretary of Commerce Florida Department of Commerce Tallahassee, FL	G-60
EA-S-010	Estus Whitfield Deputy Director Florida State Clearinghouse Executive Office of the Governor Tallahassee, FL	G-61

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Nonnuclear Consolidation EA Preapproval Review Commenters

Document Number	Commenter Information	Page Number
EA-S-011	Margaret Dubas Staff Assistant Colorado State Clearinghouse Denver, CO	G-61
EA-S-012	Robert W. King, Jr. Assistant Deputy Commissioner	G-62

	South Carolina Department Health and Environmental Control Columbia, SC	
EA-S-013	Larry Weaver State/Federal Fund Coordinator State Clearinghouse Budget and Management Office Columbus, OH	G-62
EA-S-014	Julie Quinlan Ohio Historic Preservation Office Ohio Historical Center Columbus, OH	G-63
EA-S-015	Roger Suppes Chief Health Department Environmental Health Division Columbus, OH	G-64
EA-S-016	Linda Nusbaum Ohio Department of Education Columbus, OH	G-64
EA-S-017	John Zemp, Jr. Supervisor Office of the Governor Grant Services Unit Columbia, SC	G-65
EA-S-018	Bruce A. Swanton Program Manager Hazardous and Radioactive Materials Bureau Environment Department Santa Fe, NM	G-70
EA-S-019	Roy Romer Governor State of Colorado Denver, CO	G-71

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4	Water Resources
5	Geology and Soils
6	Biotic Resources
7	Cultural Resources
8	Socioeconomics and Community
9	Waste Management
10	Human Health: Facility Operation and Accidents
11	Decontamination and Decommissioning
12	Intersite Transportation
13	General/Miscellaneous Environmental Comments
14	NEPA Process and Regulatory
15	National Nuclear Weapons Policies
16	Relationship to Other DOE Programs and Activities
17	Public Involvement and Community Relations
18	Conflicts with Social Issues
19	Editorial Comments
20	General/Miscellaneous Comment
21	Support Of or Opposition To DOE

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