DOE/EIS-0136

File Copy

Summary

FINAL
ENVIRONMENTAL IMPACT STATEMENT

SPECIAL ISOTOPE SEPARATION PROJECT

IDAHO NATIONAL ENGINEERING LABORATORY
IDAHO FALLS, IDAHO

November 1988

U.S. DEPARTMENT OF ENERGY

The enclosed Executive Summary has been taken from the Final Environmental Impact Statement, Special Isotope Separation Project, DOE/EIS-0136, dated November 1988. This Summary is not intended to preclude review of the complete Final Environmental Impact Statement. The entire Final Environmental Impact Statement can be obtained by contacting:

SIS Project Office
Idaho Operations Office
U.S. Department of Energy
785 DOE Place
Idaho Falls, Idaho 83402
(208) 526-0306

Lines in the margins of this Executive Summary indicate the areas where changes were made to the Draft Environmental Impact Statement.

DOE/EIS-0136
Summary

FINAL
ENVIRONMENTAL IMPACT STATEMENT

SPECIAL ISOTOPE SEPARATION PROJECT

IDAHO NATIONAL ENGINEERING LABORATORY
IDAHO FALLS, IDAHO

November 1988

U.S. DEPARTMENT OF ENERGY

SUMMARY

In accordance with Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended, this Environmental Impact Statement (EIS) addresses the potential environmental consequences of constructing and operating a Special Isotope Separation (SIS) Project. This EIS was prepared in accordance with the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 CFR 1500-1508) and the U.S. Department of Energy's (DOE) NEPA guidelines (52 FR 47662, December 15, 1987).

This Final EIS was prepared based on six public hearings, which were held at the request of interested organizations and individuals. The transcripts and accompanying exhibits from these hearings are available to the public as supplemental volumes (Volumes 3 through 6) to the Final EIS. Accompanying this Final EIS are DOE's responses to written comments received on the Draft EIS (Volume 2). Also included is a summary of the issues and concerns identified by the comments and how these are addressed in the Final EIS.

Volumes 1 and 2 of the Final EIS have been sent to those who commented on the Draft EIS and to those who received the Draft EIS, are available to members of the public, and have been filed with the U.S. Environmental Protection Agency (EPA). A notice of availability of the Final EIS has been published by EPA in the Federal Register. DOE will make its decision on whether to construct and operate the SIS Project and the selection of a site, if the SIS Project is to be constructed and operated, not earlier than 30 days after publication of the notice of availability. DOE will document its decision in a publicly available Record of Decision.

SUMMARY OF COMMENTS AND RESPONSES ON THE DRAFT EIS

During the 60-day public comment period on the Draft EIS, more than 1400 individuals and organizations provided DOE with comments and approximately 13,775 individuals signed petitions on its proposal to construct and operate the SIS Project. Approximately 58 percent of the individuals and organizations providing comments (i.e., about 810 commentors) were opposed to locating the SIS Project at the Idaho National Engineering Laboratory (INEL) or the DOE proposal to construct and operate the SIS Project (i.e., they supported No Action). Of the petitions received from the individuals and organizations providing comments, about 94 percent of the total number of names on the petitions (i.e., about 12,940) supported the DOE's Preferred Alternative of locating the SIS Project at the INEL. Only three commentors of the approximately 1400 providing comments identified a preference for locating or not locating the SIS Project at either the Hanford Site or the Savannah River Plant (SRP).

Numerous comments were submitted during the review period on the Draft EIS supporting the construction and operation of the SIS Project at the preferred location of the INEL and/or the need for the facility. Selected topics raised in support of the Preferred Alternative were centered on: Economic and Employment Benefits, Potential High-Technology Spinoffs, Project's Need for National Defense, Excellent INEL Safety Record, Existing

Infrastructure to Support Project, Labor/Management Relationship, and Openness of and Access to INEL Management.

DOE also received numerous comments on a wide range of topics, in written statements, letters, and oral testimony that opposed the Preferred Alternative of constructing and operating the SIS Project at the INEL. The following lists the main issues.

1. Need and Justification for the SIS Project
2. SIS Feed Material and Period of Operation
3. Geologic Hazards
4. Waste and Waste Management
5. Atmospheric Emissions
6. Facility Accidents
7. Transportation Safety
8. Emergency Preparedness
9. Health Effects
10. Socioeconomics
11. NEPA Process
12. INEL Mission
13. Independent Monitoring

For each of the topics listed above which did not support the Preferred Alternative, the following pages list the topic, specific comments under the topic, and a summary of DOE's response to the specific comments.

1. Nonsupportive Statements and Comments on Need and Justification for the SIS Project

- The SIS Project and the weapon-grade plutonium it would produce are not needed because (1) there are already enough plutonium and nuclear weapons, (2) reductions in nuclear weapons resulting from arms agreements would provide additional quantities of plutonium, and (3) plutonium, unlike tritium, does not have to be replaced.

- The SIS Project is contrary to efforts to reduce nuclear weapons.

- Construction and operation of the SIS Project would violate the Nuclear Non-Proliferation Treaty or would increase the potential proliferation risk.

- The Secretary of Energy stated that the nation is "awash" in plutonium.

- Other alternatives [blending, weapons recycling, restarting N-Reactor, and the Atomic Vapor Laser Isotope Separation (AVLIS) demonstration facility at the Lawrence Livermore National Laboratory (LLNL)] would provide the redundancy and flexibility DOE requires for plutonium production, and enriched uranium or fuel-grade plutonium rather than weapon-grade plutonium could be used directly in nuclear weapons.

- The EIS should have a classified appendix that supports the need for the Project.

DOE Summary Responses to the Previous Comments:

The national policy on nuclear weapons, their deployment, and their number is a policy decision which is made by the President of the United States and approved through the authorization and appropriation process of the United States Congress. Although DOE and the Department of Defense provide input to the President through the National Security Council on this national policy and implement such policy, approval of the policy is the responsibility of the President and the United States Congress. The quantities of weapon-grade plutonium from retired nuclear weapons and those dismantled as a result of nuclear weapon agreements are included in an annually prepared document known as the Nuclear Weapons Stockpile Memorandum (NWSM), and are accounted for in the determination of any new weapon-grade plutonium required for national defense. Plutonium, unlike tritium, does not decay rapidly; however, modernization programs approved by the President and Congress require replacing older warheads that used uranium enriched in the isotope uranium-235 with new warheads that use weapon-grade plutonium.

The SIS Project is needed by DOE to provide a prudent level of contingency, flexibility, and technological diversity, given the current age of and limitations on existing production facilities and reactor-based issues which have impacted the nation's capability to produce plutonium. It is not being proposed to satisfy a specific requirement for the production of new weapon-grade plutonium. Both the President and the United States Congress, as reflected by approved authorizations and appropriations, have supported the need for the contingency, flexibility, and technological diversity that the SIS Project would provide.

The United States will continue to pursue verifiable agreements to reduce nuclear weapons while maintaining the capability of producing special nuclear materials for national defense. Until verifiable agreements have been reached to eliminate nuclear weapons, the capability of producing special nuclear materials for national defense must be maintained as an integral part of the nation's nuclear deterrence policy.

Construction and operation of the SIS Project would not violate the Treaty on the Non-Proliferation of Nuclear Weapons or increase the potential proliferation risk. The SIS facility, like all United States facilities engaged in the production of special nuclear materials for national defense, would not be a candidate for International Atomic Energy Agency (IAEA) inspection, and sensitive nuclear technology would not be available to assist a foreign country in the design or operation of a facility for producing nuclear weapon material. All information contained within this EIS and its publicly available support documents has been reviewed to exclude sensitive nuclear technology and classified information.

Energy Secretary Herrington's statement that the nation is "awash in plutonium" was made during budget deliberations early in 1988. Secretary Herrington (in later testimony before the Senate Committee on Armed Services Subcommittee on Strategic Forces and Nuclear Deterrence) characterized his earlier comment as an "overstatement" and clarified the issue by stating that adequate supplies of plutonium are available in the short term, but over the longer term (i.e., by 1995) there is no assurance that plutonium needs can be met. It is important to note that a New Production Reactor would have the primary mission of tritium production and would not provide a technologically diverse source of weapon-grade plutonium. Such diversity is required as reflected in the need statement for the SIS Project.

Blending of fuel-grade plutonium with plutonium of higher-than-weapon-grade purity is entirely dependent on the existing SRP production reactors that were constructed in the early 1950s. The reactors at the SRP are currently the subject of several safety concerns and are also the nation's only source of tritium production. Although the N-Reactor could be restarted, the years of potential future operation are limited by the distortion of the reactor's graphite moderator. Recycling of weapon-grade plutonium from retired weapons has occurred and will continue to occur, and recovered material is accounted for in the need for new weapon-grade plutonium; however, recycling and recovery of material from weapons cannot provide a source of new weapon-grade plutonium and is dependent on approved schedules for retirements and uncertainties with respect to future agreements on nuclear weapons. The SIS demonstration facility at LLNL has been designed to demonstrate the AVLIS technology and system capabilities and is unsuitable for production. While fuel-grade plutonium or enriched uranium could be used directly in nuclear weapons, such use is contrary to the currently approved modernization programs for nuclear weapons. Potential national emergencies that might require the use of any of these alternatives are speculative and not within the scope of this EIS.

A discussion of the need and underlying purpose for which DOE is proposing the project was presented in Section 1.1.1 of the Draft EIS, in accordance with CEQ's regulations (40 CFR 1502.13), and has been expanded in the Final EIS in response to comments received. The SIS Project is not being proposed to meet identified requirements for weapon-grade plutonium, but rather is being proposed to provide a prudent level of contingency, flexibility, and technological diversity. A classified appendix on supply capability is, therefore, not considered to be needed.

2. Nonsupportive Statements and Comments on SIS Feed Material and Period of Operation

- DOE plans to use commercial spent fuel as a feed for the SIS Project.
- Sufficient feed material does not exist to justify the cost and operation of the SIS Project.
- The Draft EIS did not assess the environmental impacts of the processing of the Fast Flux Test Facility (FFTF) fuel.
- Impacts should be assessed for the 30-year life of the facility.

DOE Summary Responses to the Previous Comments:

DOE has not considered nor does it plan to use commercial spent fuel precluded by law as feed for the SIS Project. Current law (Hart-Simpson-Mitchell Amendment) prohibits the recovering of plutonium from spent U.S. commercial fuel for use in weapons. DOE complies with the law and has no intention of requesting Congress to change the law. The Draft EIS clearly identified in its "Foreword" that sources of SIS feed material would not include plutonium derived from such spent commercial fuel.

DOE has identified an initial quantity of feed material that would result in only several years of SIS operation (currently estimated as 8-10 years in contrast to the 6-8 years as previously reported), if the SIS Project were operated at maximum throughput capacity. This includes DOE-owned, Defense Program origin material in the FFTF located at the Hanford Site, were it to become available. Additional sources of DOE-owned feed material, but not including plutonium derived from spent commercial fuel precluded by law, may be available depending on additional DOE production initiatives and the limitations on existing production facilities. DOE believes that the feed material currently identified provides, without relying on the availability of material from the FFTF, a sufficient basis to proceed with the SIS Project to provide a prudent level of contingency, flexibility, and technological diversity. The specific quantities of fuel-grade material available are classified; however, Chapter 1 of the EIS has been updated to state that the current quantities identified provide for only several years (currently estimated as 8-10 years) of SIS operation assuming full throughput capacity.

Currently, DOE is preparing an Environmental Assessment (EA) analyzing the feasibility and environmental impacts of various fuel-decladding techniques that could be used to recover DOE-owned plutonium in the spent fuel from the FFTF. The Foreword to the Final EIS has been modified to reflect this consideration. The annual impacts of potentially transporting the processed FFTF fuel would be the same as those for transporting N-Reactor fuel-grade plutonium to SIS facilities. Section 4.5.1 and the Summary of the Final EIS have been modified to include the cumulative risk of transporting all FFTF fuel to the SIS facility from the Hanford Site, the preferred location for the decladding activity. However, it should be noted that in addition to its potential use as feed for SIS, the FFTF spent fuel could be blended to produce weapon-grade plutonium, and a decision to build the SIS Project does not foreclose options concerning use of FFTF fuel.

Consistent with current regulatory standards [e.g., the U.S. Environmental Protection Agency's (EPA's) National Emission Standards for Hazardous Air Pollutants (NESHAP)] and DOE Defense Program's practice of establishing production goals at its facilities commensurate with annually approved requirements for defense nuclear materials, the Draft EIS presented the potential environmental consequences of the SIS Project based on its maximum annual throughput or process rate. To bound (i.e., determine the maximum) potential cumulative consequences over the design life of the facility, an analysis of cumulative consequences of SIS operation for 30 years has been included in this Final EIS.

3. Nonsupportive Statements and Comments on Geologic Hazards

- The INEL area is geologically active and therefore unsuitable as a location for the SIS Project.
- The Draft EIS underestimated the frequency of volcanic activity on the Snake River Plain.

- Data suggest that volcanic eruptions could occur.

- The Draft EIS presented an unrealistically low estimate of the probability of the occurrence of high-magnitude earthquakes in the INEL area.

- The INEL should be designated as a seismic risk Zone 3 (major damage) area rather than a Zone 2 (moderate damage) area.

DOE Summary Responses to the Previous Comments:

Chapter 3 of the Final EIS has been expanded to include a detailed discussion of seismic and volcanic hazards in the INEL region. Although the Eastern Snake River Plain has a geologic history of volcanic activity, the potential threat from volcanic eruptions is considered low. During a period of eruptive activity at a particular fissure eruption zone, the interval between eruptions (once eruptions have begun) may be 2000 to 3000 years. The interval between the major eruptive cycles measured on the INEL is between 80,000 and 225,000 years.

Chapter 3 of the Final EIS has also been expanded to discuss predictions of future earthquake activity along potential faults (Arco and Howe segments) with magnitudes of 7.3 to 7.5 with a recurrence interval of approximately 30,000 years. Anticipated accelerations resulting from this postulated event indicate that the Design-Basis Earthquake (DBE) standards used for the Plutonium Processing Building and By-Product Storage Vault are appropriate and would not be exceeded.

The Uniform Building Code seismic zone map is frequently updated, normally every 3 years, based on new or additional earthquake data. In light of the 1983 Mt. Borah earthquake and other data, the area included in Zone 3 in the 1987 version of the map was expanded over the 1981 version. However, the INEL is still in Zone 2B, consistent with the data recorded from the 1983 Mt. Borah earthquake. Another approach of seismic hazard zoning is even more useful, as it takes into account earthquake frequency. The map developed for this approach shows the SIS site in the lowest zone of earthquake potential, based on historic data (Keller, E.A., 1987, Environmental Geology, 5th ed., Merrill Publishing Co., p. 157).

4. Nonsupportive Statements and Comments on Waste and Waste Management

- The availability and disposal capacity of the Waste Isolation Pilot Plant (WIPP) are uncertain and the Draft EIS did not assess alternatives if the WIPP is not available. The INEL would become a de facto storage location in the event that the WIPP is unavailable.

- Long-term storage of radioactive waste at the INEL is unacceptable.

- The INEL has already contaminated the Snake River Plain aquifer and is a candidate Superfund site.

- Storage of radioactive waste at the INEL poses a threat to the Snake River Plain aquifer.

DOE Summary Responses to the Previous Comments:

DOE plans to transport all stored and newly generated transuranic (TRU) waste to the WIPP in New Mexico, as stated in its Record of Decision prepared on the Final EIS for the WIPP (DOE/EIS-0026). DOE is currently working with the National Academy of Sciences (NAS) to address experimentation and research activities supporting the performance assessment being conducted to demonstrate compliance with EPA disposal standards for TRU waste (40 CFR 191). In addition, the WIPP will comply with all applicable requirements of the Resource Conservation and Recovery Act (RCRA). DOE is currently working with the EPA and the State of New Mexico to resolve uncertainties regarding the procedures for obtaining a RCRA permit for the WIPP.

Recent discussions on the storage capacity limitations of TRU waste at the WIPP have been focused on the amount of TRU waste that would be initially received by the WIPP for experimental purposes to support performance assessment studies prior to a decision to make the WIPP fully operational as a disposal facility. These discussions are unrelated to the design capacity for TRU waste emplacement at the WIPP. Reports of the WIPP's leaking involve the intertwining of two separate issues: (1) water that ran down the walls of shafts, before grouting was completed, from water-bearing strata in the rocks overlying the salt beds; and (2) brine migration within the salt beds themselves. With respect to water from overlying strata, the flow has been eliminated by grouting the shaft walls above the salt to seal off the water. When the facility is decommissioned, the shafts will be entirely backfilled and sealed at several locations with engineered materials designed to minimize any leakage. Inflow from this source will then be inconsequential. With respect to brine migration within the salt beds, actual measurements to date indicate that brine migration can be absorbed by backfill materials, preventing the accumulation of liquids. The amount of brine migration is less than originally contained in the salt mined out of the room. DOE will continue to coordinate with the NAS to resolve and conduct those studies required to initiate operations at the WIPP.

In the unlikely event that the WIPP performance assessment indicates that the WIPP is unsuitable for the disposal of TRU waste, DOE would undertake studies and evaluations to determine acceptable alternatives. These alternatives would be covered by a separate NEPA review as DOE would be faced with a general issue regarding disposal of TRU wastes from several sources, of which the TRU waste generated by SIS would be a small part. In summary, assessments of alternatives to the WIPP as part of the SIS Project are not considered appropriate, as (1) DOE has received no evidence, nor has it been made aware of any scientific study which negates continuing to plan for the disposal of TRU waste at the WIPP, and (2) the WIPP has been and would continue to be the subject of a separate NEPA review, as part of an independent decision-making process.

If the SIS Project were located at the INEL, the only radioactive wastes that would be stored or disposed of at the INEL would be low-level radioactive waste (LLW) and mixed wastes. The maximum amount of LLW that would be generated by the SIS Project and disposed of at the INEL would represent less than 1 percent of the quantities currently being disposed of at the INEL. A bounding (i.e., using extremely conservative assumptions) analysis of LLW included in the Draft EIS and Final EIS clearly indicates that the disposal of SIS-generated LLW would not result in contamination (i.e., concentration above drinking water standards) of the Snake River Plain aquifer beneath the disposal area. While the quantities of SIS-generated mixed waste that would be stored at the INEL represent a greater percentage of total mixed wastes (i.e., about 15 percent), all mixed waste would be stored in a facility meeting RCRA requirements. All storage facilities for mixed waste are subject to inspection by the EPA to ensure that storage practices are being followed which prevent potential contamination of ground water.

In addition to LLW and mixed waste, SIS by-product material, which is highly radioactive but not considered a waste, would be stored onsite in a specially designed storage vault. The storage vault is designed to contain canisters of the by-product material without releasing radioactive material.

Currently, only three sites at the INEL require corrective action under RCRA: the Test Reactor Area (TRA) Warm Waste Pond, Test Area North (TAN) ground water, and the Radioactive Waste Management Complex (RWMC). The Final EIS in Section 3.1.4.4 includes an expanded discussion of these three sites. Studies and corrective action plans for each of these sites are being prepared. In all cases, those practices which resulted in the need to undertake corrective action have been stopped or changed (e.g., the use of chromate-based algicide and corrosion inhibitors for the TRA Warm Waste Pond, which resulted in chromium being detected in perched ground water underneath the pond, was stopped after 1970). The construction and operation of the SIS Project would not affect the implementation of any required corrective action.

The primary source of radionuclide contamination in the Snake River Plain aquifer resulted from the previous practice of using an injection well. This practice, similar to those which resulted in hazardous contamination, has been stopped. DOE is planning to plug the well with cement in 1989 (this process is called abandonment in legal terms) and will meet the requirements set forth in the State of Idaho Rules and Regulations for Construction and Use of Injection Wells published in August of 1984.

Storage of SIS-generated radioactive waste and by-product would not pose a threat to the Snake River Plain aquifer, and corrective actions are being implemented to protect ground-water resources.

5. Nonsupportive Statements and Comments on Atmospheric Emissions

- Releases of Freon to the environment pose an unacceptable environmental and health risk, and recycling/reuse/substitution should be considered.

- The cumulative impact of radioactive releases into the environment on humans and the environment was not adequately assessed.

- The INEL has already contaminated wildlife and the EIS should assess the radioactive impacts on wildlife.

- The EIS should state that a Prevention of Significant Deterioration (PSD) permit will be required prior to the operation of the SIS Project.

DOE Summary Responses to the Previous Comments:

Section 4.1.2.2 of the Final EIS has been modified to include the estimated number of skin cancers that could potentially result from the emissions of Freon resulting from the refurbishment of laser electronic packages in the SIS. SIS emissions of Freon would represent only about 0.006 percent of the consumption of Freon in the United States (approximately 6.7×10^8 pound per year) and would result in an annual calculated increase in the risk of a fatal skin cancer to an individual in the United States of only about 2.7×10^{-12}. On-going engineering development is being pursued to further reduce Freon emissions through the use of chiller and condensate systems to reduce evaporation and vapor recovery systems for recycling Freon. In addition, the SIS Project personnel are working with commercial Freon manufacturers to identify and/or develop substitute dielectric coolants that will have no adverse impact on the environment. These potential substitutes are being evaluated and will be used when available.

Releases of radioactivity to the atmosphere from DOE facilities must comply with the EPA's NESHAP. The NESHAP standard is an annual standard applicable to the cumulative atmospheric releases of radioactive emissions from all sources at a particular DOE facility (e.g., the INEL). Sections 4.5.1.4 and 4.5.2 of the Final EIS discuss the cumulative radiological impacts (i.e., from the SIS Project, authorized projects, and existing facilities) and compare them to this standard. An analysis of accumulated releases and of risks of radioactive releases has been included in Section 4.5.1 of the Final EIS for 30 years (facility design lifetime).

The concentrations of radioactive materials in the wildlife near the Idaho Chemical Processing Plant (ICPP) have been studied. Although data indicate some levels of contamination in wildlife species, the levels of contamination are extremely low [e.g., using the highest cesium concentrations in pronghorn antelope collected within 10 kilometers (6 miles) of the ICPP, the resultant exposure was 10 percent of that from naturally occurring potassium-40 in their bodies and less than 2 percent of that from natural external sources in their surrounding environment]. The atmospheric emissions of radioactivity from the SIS Project would be less than 5.3×10^{-8} percent of the applicable EPA standards, and would not pose any radiological risk or threat to wildlife.

Section 5.4 of the Final EIS has been modified to include a brief discussion of 40 CFR 82 concerning stratospheric ozone protection, and Section 5.6.3 has also been modified to indicate that a PSD permit for the SIS Project is being developed, including any regulated emission for which there is not an EPA de minimis level under Idaho's PSD regulations.

6. Nonsupportive Statements and Comments on Facility Accidents

- Since the SIS Project is a unique facility and has yet to be demonstrated, designs or design criteria do not exist upon which to adequately assess safety.

- The Draft EIS did not sufficiently consider propagating accidents or externally initiated accidents.

- Assumptions used in the Draft EIS accident analysis were not conservative, and an independent analysis indicates that accident consequences would exceed Nuclear Regulatory Commission (NRC) standards.

- The costs of accidents such as losses in the value of agricultural products sold and to the tourism and recreation industries were not identified in the Draft EIS.

- The Draft EIS did not include a worst-case accident as required by NEPA.

DOE Summary Responses to the Previous Comments:

The AVLIS technology represents a new technology but one that has been demonstrated experimentally to verify the analytical design models at each step. Other systems and processes such as pyrochemical and aqueous processing, waste handling, and plutonium processing utilize proven technologies that are used in other DOE Defense Program facilities. While it is true, based on preliminary designs and safety evaluations, that not all values used can be precisely defined, bounding values (e.g., maximum quantities available for release) were used in the EIS to determine the upper range of potential environmental consequences. NEPA requires the assessment of potential environmental consequences early within the planning process for a project; preparation of an EIS after completion of a final design for a project would not allow or provide the opportunity for incorporation of environmental considerations into the potential implementation of the project.

The Draft EIS and the Final EIS discuss the potential environmental consequences from a DBE followed by fire, which is an externally initiated natural phenomenon. Other externally initiated natural phenomena such as tornado, tornado-driven missiles, and snow load would have lower consequences and were therefore not presented in the EIS. Propagating accidents (one accident which results from the consequence of a preceding accidental event) are normally considered to be those accidents which are initiated by a sequence of events that lead to an accidental release of radioactive material. The EIS addresses quantities of plutonium at risk (the amount of plutonium which could be dispersed as a result of a hypothetical accident) that maximize the potential release and consequences independent of whether the accident is initiated by a single event or a series of events. Whether the accident is of a propagating nature or not, it would not affect the maximum quantities of plutonium at risk.

Assumptions used in the Draft EIS, with two exceptions, were representative and/or conservative for the SIS Project. The major conservative assumptions include postulating releases based on maximum quantities of plutonium at risk; using degraded high-efficiency particulate air (HEPA) filter efficiencies (i.e., down to 0-percent efficiency); and postulating accident scenarios which do not take credit for engineered safety features and administrative controls. With respect to the assumptions made in the Draft EIS, two assumptions were either not representative or conservative and have therefore been revised for this Final EIS. These two assumptions were (1) the inclusion of a plateout reduction factor of 2 (a factor accounting for the fallout of plutonium in ductwork was inadvertently used) and (2) the quantities of plutonium at risk for the design-basis fire in a single area and uncontrolled chemical reaction events. For the Final EIS, the plateout reduction factor of 2 has not been used and the quantities of plutonium at risk for the design-basis fire in a single area and the uncontrolled chemical reaction have been increased. While the revisions resulting from these two changes result in higher calculated consequences for postulated accidents, the releases still do not result in any projected cases of early offsite fatalities or any early offsite injuries, and the calculated offsite maximum individual dose for locating the SIS Project at the INEL for the postulated severe accident with complete loss of filter efficiency is 0.28 rem to the whole body, or a small fraction of the NRC's siting criteria of 25 rem to the whole body (10 CFR 100) for commercial reactors.

Although an independent analysis of the potential consequences of the SIS Project was submitted as part of the comments received on the Draft EIS, the analysis provided was flawed with respect to several assumptions, the most significant of which was the utilization of inventories and source terms based on a pressurized water reactor. The processes, sources of dispersion energy, and quantities of plutonium that would be used at the SIS Project are much different from those of a reactor or other nuclear industry facilities and cannot be compared either directly or indirectly with respect to source terms or release fractions. The independent analysis was therefore considered as not providing "credible scientific evidence" and was not discussed in the Final EIS.

For those accidents considered in the EIS, including the postulated severe accident with complete loss of HEPA filtration, the resulting releases of radioactivity are not of sufficient magnitude to require costs for mitigation including costs of evacuation, milk and crop disposal, decontamination, and land-use prohibition. Potential economic costs, including economic losses to agriculture and tourism, were therefore not presented.

The severe facility accident presented in the EIS is considered to be a bounding impact analysis meeting the criteria set forth in CEQ regulations for implementing the procedural provisions of NEPA, as amended (40 CFR 1502.22). As stated in the Draft EIS, for the postulated severe accident to occur, five conditions are assumed: (1) facility-wide fire must in some fashion occur; (2) the building fire suppression system, which will be Design-Basis Accident (DBA) qualified, is assumed to be not effective; (3) the final filtration systems, including fire protection systems, both of which will be DBA-qualified, are not effective; (4) no mitigative action (such as immediately placing plutonium into protected storage upon detection of a fire) is taken; and (5) no response is made by the ICPP fire brigade and INEL fire department. The severe accident has an estimated probability of occurrence of less than 1×10^{-6} per year. (Note: estimated probabilities of the occurrence of accidents have been presented in the Final EIS to emphasize the remote chances of occurrence. Inclusion of these probabilities is not a CEQ requirement.) While other potential accident scenarios can be postulated, it is not believed that an accident, which is based on "credible scientific evidence" as required by 40 CFR 1502.22, can be postulated that would result in higher consequences.

7. Nonsupportive Statements and Comments on Transportation Safety

- The SIS Project would dramatically increase the number of local shipments required for plutonium.
- The Draft EIS did not adequately identify/assess many problems associated with the DOE transport containers.
- The transportation analysis within the Draft EIS did not contain a sensitivity analysis of the input parameters such as stop times, used nonconservative assumptions such as national accident statistics, and did not utilize route and location-specific accident data.
- The transportation analysis in the Draft EIS did not discuss the impacts of the transport of SIS-generated by-product material.

DOE Summary Responses to the Previous Comments:

The SIS Project would not dramatically increase the number of plutonium shipments. Although the number of shipments is classified, the Final EIS on the transportation of radioactive material by air and other modes (NUREG-0170) indicates that in 1975 more than 4200 packages of plutonium were transported by truck in Type B containers nationwide. The number of plutonium packages transported in Type B containers associated with the SIS Project would comprise only a very small fraction of those indicated in the referenced document.

Certified or approved Type B shipping containers would be used for the transport of feed, product, and by-product to and from the SIS Project; the TRUPACT II will be used for the shipment of TRU waste (in drums) and potentially by-product (in Type B containers) to the WIPP. Extensive testing of the Type B container presently in use by DOE (the model 1518 6M) is described in references that have been added to the Final EIS. The inner and outer containers of each Type B container are individually leak-tested during fabrication, and must be inspected prior to each shipment. The TRUPACT II is currently undergoing NRC certification tests.

An analysis of the sensitivity of RADTRAN risk calculations to variations in parameters was performed in 1986 for a sample truck transport case (SAND85-1001) by Sandia National Laboratories. The stop times used in the analysis presented in the Draft EIS and the Final EIS are based on actual operational requirements for safe secure transport (SST) shipments. The reference provided for this assumption was a personal communication with a DOE individual knowledgeable about SST requirements. The requirements are

classified. The decreased stop time results in a decrease in incident-free risk, but has no effect on accident risk calculations.

The transportation impact assessment in the Draft EIS and the Final EIS uses both route-specific and national average transportation data. The route-specific data include total distance, adjacent population, and fraction of the route on various types of roads (e.g., rural, urban, or suburban). The road-type fractions are combined with national average truck accident data for each road type. The national average data used in the analysis described in the Draft EIS and the Final EIS provide the most representative risk estimates for cross-country routes to which they were applied. Sandia National Laboratories has conducted a number of tests to demonstrate the validity of this conclusion. Data included in the Final EIS in Appendix A, Section A.3, indicate that the national average combination-truck accident rate on interstate highways is about 3.1×10^{-7} accident per kilometer. The average for only those states through which representative SIS shipments would pass is 3.2×10^{-7} accident per kilometer. State average accident rates along the nine separate representative routes for SIS shipments range from 2.0×10^{-7} to 4×10^{-7} accident per kilometer. These rates are for all property-damage accidents involving combination trucks and are much higher than the rates for severe accidents. The limited variability in accident rate supports the use of national average data for SIS shipments.

The transport analysis presented in the Draft EIS did not include the impacts of the transport of by-product material to the WIPP, as the Draft EIS indicated that the by-product material may be a resource applicable for other possible DOE missions. Although DOE intends to evaluate the usefulness of the by-product material for other possible missions, the analysis of SIS materials transport contained in this Final EIS has been modified to analyze the potential consequences of the transport of by-product material. The transport of all SIS-generated TRU waste for each of the potential SIS locations has also been included in the Final EIS. Inclusion of the transport of by-product materials and SIS-generated TRU waste to the WIPP results in higher routine and accident risks (e.g., for locating the SIS Project at the INEL, the annual radiological dose under routine conditions to the population sharing the road and residing along the transport routes increases from 0.2 person-rem to 12 person-rem, and the annual radiological risk of a latent cancer fatality and genetic effect increases from 4.4×10^{-5} to 4.9×10^{-3}, respectively).

8. Nonsupportive Statements and Comments on Emergency Preparedness

- The Draft EIS did not discuss the emergency preparedness plans that would be required in the event of a facility or transport accident.
- In the event of an accident, local and state agencies are inadequately trained and do not have sufficient resources.
- Local officials have not been informed of the types and quantities of hazardous materials for which they must be prepared pursuant to Title III of the Superfund Amendments and Reauthorization Act (SARA).

DOE Summary Responses to the Previous Comments:

Section 4.6 of the Final EIS has been expanded in its discussion of the responsibilities of DOE, the State of Idaho, and local counties for emergency preparedness response to potential offsite incidents, including those involved in the transport of materials. As stated in the Draft EIS and Final EIS, it is the responsibility of state and local emergency planning agencies to develop adequate emergency response plans that cover all natural and man-made disasters. The DOE Idaho Operations Office has provided the DOE-Idaho Emergency Planning, Preparedness, and Response Plan to the state and local agencies to assist them in developing plans as they relate to the INEL. DOE is willing to assist these agencies by reviewing existing plans as they interact with the INEL and is also willing to enter into negotiations to establish a stronger Memorandum of Understanding to delineate areas where assistance can be provided to the state and local response agencies by DOE and DOE emergency response teams.

The responsibility for training of state and local emergency response personnel also rests with the state and local agencies. To assist the state and local personnel, DOE has provided training to these groups on several occasions, as exemplified by training conducted by the DOE Albuquerque Operations Office on TRU waste shipments. Each year since 1983, the State of Idaho has participated in site-wide emergency preparedness exercises. During each of the previous years, DOE has also exercised its interface with one of the local Idaho counties to minimize the impact on the budgets of local emergency response planning agencies.

DOE has provided the State of Idaho with data on the quantities and types of hazardous materials used at the INEL in compliance with Title III of SARA. Information on hazardous materials associated with the SIS Project will also be provided where applicable as part of the on-going SARA Title III reporting process. Acknowledgment of this requirement has been included in Table 5-1 of the Final EIS.

9. Nonsupportive Statements and Comments on Health Effects

- Plutonium is one of the most deadly materials known to man and is pyrophoric.
- The Draft EIS underestimates the potential health effects from radioactive releases.
- The use of the National Academy of Sciences Committee on the Biological Effects of Ionizing Radiation (BEIR) III Report is outdated because of the issuance of BEIR IV.
- The EIS should discuss the results of existing health effects studies and the reported high number of cancers around the INEL and use these as a basis for the assessment of potential impacts.

DOE Summary Responses to the Previous Comments:

Plutonium is recognized as an extremely hazardous material; however, in recognition of its hazards, design safety features and extensive controls

are used to provide the highest level of safety to reduce potential health, safety, and environmental impacts. The pyrophoric character of plutonium has been fully considered in the design of the SIS Project.

The potential radiological dose and health effects (fatal cancers and genetic effects) presented in the Draft EIS and the Final EIS are based on scientifically accepted methods and studies. The health effects presented in the Draft EIS and the Final EIS are calculated using risk estimators based on the BEIR III Report. As discussed in Appendix A of the Draft EIS, by assuming all radiation from the SIS Project to be high-linear-energy-transfer (LET) radiation and using risk estimators associated with the linear extrapolation model, the number of health effects presented is conservative. At the low levels of radiation associated with the SIS Project, it is plausible that the potential health effects could be zero because the extrapolated potential cancer risks associated with the SIS Project were based on cancer risks for higher dose rates than those projected for the SIS Project.

Although the BEIR IV Report has been issued since the preparation of the Draft EIS, its primary focus is on health effects from radon. All of the health risk estimators for transuranics provided in the BEIR IV Report for fatal lung and liver cancers and for genetic effects are less than those presented for high-LET radiation based on the data presented in the BEIR III Report.

Counties surrounding the INEL demonstrate lower, not higher, cancer rates, based on the Idaho Tumor Registry, than do those in more remote locations. The small population and small number of specific cancer cases result in large statistical variations in yearly rates without any associated significance. Some investigators have selectively separated apparent increases in specific cancers without noting the overall low averages and the statistical variability to be expected. The EIS calculates potential health effects on the basis of widely accepted scientific information and does not utilize local health effects data because of their lack of statistical and control validity.

10. Nonsupportive Statements and Comments on Socioeconomics

- The potential economic gains (or number of jobs) do not outweigh the potential risks or costs of the Project, and personnel and financial resources should be put to a more productive or beneficial use.
- The Draft EIS did not assess impacts of the SIS Project on agriculture or tourism/recreation.
- The beneficial impacts of the SIS Project on the economy are overstated, and most of the workers for the Project will either be from out of state or will only receive low-paying service jobs.
- The EIS does not assess the impact of shutting down the SIS Project or the boom-bust impacts that would be associated with it.
- The Draft EIS was wholly inadequate with respect to assessment of socioeconomic impacts by not providing a detailed assessment of

impacts to local communities and services and should have used an impact model.

DOE Summary Responses to the Previous Comments:

The objective of an EIS is to assess the potential environmental consequences of the Proposed Action and the reasonable alternatives to the Proposed Action, including No Action. The EIS provides a basis upon which the responsible Federal official weighs the potential environmental consequences and risks in relation to the need to proceed with the project. The basis for the responsible Federal official's determination and reasons for proceeding or not proceeding are published in a publicly available Record of Decision. The use of personnel and financial resources for other Federal actions, including impacts on the Federal budget, is not within the scope of this EIS. The CEQ's regulations regarding the procedural provisions of NEPA exclude requests for appropriations.

The Final EIS in Chapter 3 and Appendix B includes indicators of the importance of agriculture and tourism/recreation to the economy in areas of the alternative locations for the SIS Project. The results of a recent study of travelers in Idaho, prepared by the University of Idaho, have also been referenced in the Final EIS. No adverse impacts from the SIS Project to either the tourism/recreation or agriculture sectors of the economy are expected to occur, as all releases are significantly below all applicable standards. Even in the event of an extremely unlikely severe facility accident, the release is not of sufficient magnitude to require offsite cleanup or mitigation including decontamination and destruction of milk and food crops. Based on the survey conducted by the University of Idaho in April 1988 of Idaho travelers, which indicates that about 33 percent of those coming to Idaho come to visit friends and relatives, the construction and operation of the SIS Project may have a small beneficial impact on the tourism industry in Idaho because of the employment opportunities associated with the Project.

The beneficial impacts associated with the SIS Project that were identified in the Draft EIS were the indirect employment opportunities associated with direct employment for the SIS Project and employee contributions to taxes. The beneficial impacts presented at best are understated, as they do not include induced employment opportunities that would arise from indirect and direct employment opportunities, direct and indirect expenditures for materials and services associated with the construction and operation of the SIS Project, or taxable revenues derived from the purchases of materials and services.

As discussed in the section entitled "SIS Feed Material and Period of Operation," DOE has identified an initial quantity of feed material that would result in only several years (currently estimated as 8-10 years) of SIS operation if the SIS Project were to be operated at maximum throughput capacity. Additional sources of DOE-owned feed material may be available but depend on future DOE production initiatives and the limitations on existing production facilities. Since the Proposed Action being considered in this EIS is the construction and operation of the SIS Project and the period of future operation is dependent on both the need for weapon-grade plutonium and the quantities of feed material that may be available in the

future, a specific assessment of shutdown impacts is not included. It is highly unlikely, however, that in the event the SIS Project were to be stopped, a "boom-bust" scenario would result, as total employment associated with the SIS Project would be only a small percentage of total INEL employment.

The Draft EIS referenced several specific documents that contained an extensive discussion of the regional infrastructure surrounding the INEL, the Hanford Site, and the SRP. The employment associated with the construction and operation of the SIS Project at the three alternative locations comprises only a very small percentage of existing employment at each of the regions and, as contained in the referenced documents, each region has an adequate infrastructure to absorb additional growth. The Final EIS provides an amplified discussion of existing infrastructure based on these referenced documents. The use of a socioeconomic impact model for the assessment of potential socioeconomic impacts is not considered appropriate because of the relatively small size of the workforce associated with the SIS Project as well as the existing infrastructure's abilities to accommodate additional growth.

11. Nonsupportive Statements and Comments on the NEPA Process

- The Draft EIS was inadequate and should be reissued.
- DOE mismanaged the hearing process, causing the citizens to miss the opportunity to submit verbal testimony, and refused to hold hearings in other locations as requested.
- The Draft EIS included an unprecedented disclaimer denying DOE's responsibility for the Draft EIS.
- The Draft EIS did not assess the moral consequences or psychological effects associated with the SIS Project.

DOE Summary Responses to the Previous Comments:

The Draft EIS was reviewed by the EPA in accordance with its responsibilities under NEPA. The EPA rating system concerning adequacy has three Categories: 1-adequate, 2-insufficient information, and 3-inadequate. The Draft EIS was given a rating of category 2 "with environmental concerns" which basically means that additional information, as specified by the EPA, needs to be incorporated in the Final EIS to fully address environmental impacts. EPA specifically requested that additional information on the accident analysis be included.

While a number of specific issues and concerns were raised on the Draft EIS as identified in the specific comments and responses, none of the issues or concerns have identified new reasonable alternatives requiring assessment or have directly resulted in a significant change in the analysis of the potential environmental consequences. DOE believes that it has fulfilled its obligations under NEPA for the preparation of a Draft EIS. Accordingly, DOE has determined that the Draft EIS does not need to be reissued.

Implementing regulations for NEPA require Federal agencies to encourage public input on a Draft EIS but do not require Federal agencies to conduct public hearings. For the SIS Project, however, DOE concluded that public hearings were appropriate. Three public hearings were originally scheduled, one each in Boise, Twin Falls, and Idaho Falls, Idaho. The decision to schedule hearings at these locations was based in part on the level of public participation from the alternative sites with respect to the EIS scoping process and in part on the proximity of areas to the INEL that would most likely be affected by the Project and their accessibility for the conduct of public hearings.

Because 504 persons preregistered to speak at the scheduled hearings, DOE investigated extending each of the scheduled hearings and announced extensions of each of the hearings at the originally scheduled locations to accommodate those persons who preregistered. A review of the individuals who provided oral testimony at the hearings indicates that only a limited number of individuals providing oral testimony did not also provide written comments as part of the public hearing record or directly to DOE. Every individual and organization had the opportunity to provide written comments directly to DOE. Because of this fact, DOE does not consider that it abrogated its responsibilities for public participation under NEPA when preregistered individuals or organizations could not provide oral testimony at the desired time.

Inclusion of the disclaimer in the Draft EIS was an error. Disclaimers are generally required by DOE to be included in technical reports prepared by DOE's contractors but are not included in reports prepared in compliance with NEPA. The DOE has no intention of asserting such a disclaimer with respect to its responsibilities under NEPA nor for this Final EIS. Recognizing that the disclaimer was an oversight, the Hearing Officer very early in the public hearings stated for the record that DOE considered the disclaimer's inclusion to be incorrect. The extensive public outreach program and publicity generated by DOE's seeking input from the public on the Draft EIS indicate DOE's responsibility for the Draft EIS.

Several commentors on the Draft EIS were concerned with the potential moral or psychological impacts of the potential construction and operation of the SIS Project or the potential use of nuclear weapons. While DOE is sympathetic to these concerns, moral and psychological impacts are not within the scope of the NEPA process and accordingly are not included in the Final EIS for the proposed SIS Project.

12. Nonsupportive Statement and Comment on the INEL Mission

- Locating the SIS Project at the INEL would change the INEL's mission or image from peaceful uses of the atom.

DOE Summary Response to the Previous Comment:

The first facilities at the INEL reflected both defense-related and non-defense-related activities. The percentage of the total effort dedicated to defense or non-defense activities at the INEL has changed in the past and will continue to change in the future. The ICPP, which is adjacent to the proposed location of the SIS Project at the INEL, has the mission of recovering uranium-235 from spent Government-owned fuel for use in defense programs. The SIS Project, while adding a new defense mission to the INEL, would not change the character/image of the INEL, as INEL's activities encompass both defense-related and non-defense-related activities.

13. Nonsupportive Statement and Comment on Independent Monitoring

- Independent monitoring should be performed by Idaho.

DOE Summary Response to the Previous Comment:

The State of Idaho has a working agreement with DOE whereby Idaho may obtain monitoring samples collected by the DOE or the U.S. Geological Survey (USGS) onsite or offsite. In addition, DOE, in consultation with the state, is establishing a contract with Idaho State University (ISU) to provide independent verification of the monitoring program at the INEL. The DOE will fund the contract, and the University will furnish the results simultaneously to the state and DOE. The data will be fully available to the regulatory bodies of the state and to the public.

NEED FOR AND PURPOSE OF SIS PROJECT

DOE, in accordance with the Atomic Energy Act of 1954, as amended, is responsible for developing and maintaining a capability to produce all SNM required for the defense programs of the United States. DOE's production of nuclear materials for national defense is based on the NWSM, the document by which the President approves the production and retirement of nuclear weapons, and on the subsequent authorization and appropriation of funds by Congress.

The SIS Project is needed by DOE to provide a prudent level of contingency, technological diversity, and flexibility in DOE's production complex for ensuring that approved needs for nuclear defense materials are met. The SIS Project would support this DOE mission by providing a reactor-independent plutonium isotope separation facility for purification of DOE-owned feedstocks of fuel-grade material into weapon-grade plutonium. These feedstocks include neither commercial fuel precluded by law nor fuel precluded by DOE policy. This capability would provide a contingent supply of weapon-grade plutonium in the event that the present source of material becomes unavailable for unanticipated reasons or in the event that the demand for plutonium increases beyond present projections.

At present, weapon-grade plutonium is produced at the SRP in South Carolina using three reactors (i.e., P-, K-, and L-Reactors). Another former supply of weapon-grade plutonium, the N-Reactor at the Hanford Site in Washington, has been placed in cold-standby. The reactors at the SRP are also the nation's only source of tritium which, because of its radioactive decay rate, is the highest priority for production by these reactors. Plutonium is only produced at the SRP after the tritium requirements have been met.

Providing the required production capacity and capability has been increasingly difficult in recent years. To produce or be able to produce nuclear materials for national security needs, the following criteria are considered essential:

- Contingent capacity, or contingency. It is fundamental that plutonium production capability be available when needed. The current production reactors are more than 30 years old and are nearing the end of their useful lives; therefore a prudent level of backup capacity must be provided.

- Technological diversity. While reactors have been and will remain the ultimate source of new plutonium, reactor-based issues, such as those which have disrupted defense material production in the past, must not be permitted to compromise national security. A reactor-independent technology is required for backup production capability during those periods when reactor production may not be available.

- Flexibility in facility utilization in case approved production requirements rapidly increase or other plutonium capacity is diverted to tritium production. Weapons material requirements often vary substantially from year to year as new requirements are identified. Redundant capacity that can be quickly activated is not currently available in the complex.

An SIS Plant is the only available option which meets all these criteria. In response to the above needs, SIS would (1) have the capability of providing weapon-grade plutonium at a time when no other capability may be available; (2) provide a reactor-independent technology and therefore not be vulnerable to reactor issues that include generic concerns which could conceivably impact even newly constructed reactors; and (3) provide a capability that can be activated rapidly. No other option or set of options can sufficiently meet all these criteria.

THE SIS PROJECT

The SIS Project would use the AVLIS process to separate the isotopes of plutonium to produce plutonium meeting specific isotopic concentrations. The AVLIS process relies on the differences in the unique light-absorption characteristics of each plutonium isotope. When specific plutonium isotopes absorb light of the correct energy, the isotopes become positively charged (ionized). The positively charged isotopes can then be separated from other isotopes by attracting the ionized isotopes by application of a small electric field.

The AVLIS process consists of two basic systems, a laser system and a separator system. The laser system provides the source of precisely tuned, monochromatic, visible laser-light beams for the selective photoionization of the undesired plutonium isotopes. The separator system forms a directed vapor stream of plutonium through electron beam vaporization of plutonium metal feed, and, after selective photoionization, collects the nonionized, or neutral, plutonium isotopes on a product collector and the ionized, or positively charged, isotopes on by-product collectors.

The SIS Project would require the construction of (1) a Laser Support Facility (LSF) consisting of a Laser Support Building (LSB), a Dye Pump

Building (DPB), and a Load Center Building (LCB); and (2) a Plutonium Processing Building (PPB). The SIS Project would also require either the use of an existing vault or the construction of a new vault for the interim storage of SIS-generated by-product material at the selected site. The SIS-generated by-product material, consisting principally of plutonium-239 and 240, with lesser quantities of plutonium-238, 241, and 242, would be stored until such time as DOE evaluates the applicability of the material for other potential missions (i.e., the by-product material would be treated as a potential resource). If no mission is identified for the by-product material, it would be rendered into a form that would meet the Waste Acceptance Criteria for the WIPP, and would be transported to the WIPP and appropriately managed as a TRU waste.

The LSB would contain the laser system for the generation of the precisely tuned, multi-wavelength light beams for selective photoionization. The laser system would use copper vapor lasers that convert electrical energy into fixed-wavelength green and yellow light. The light from the copper vapor lasers would then be used to excite, or pump, dye lasers that provide the source of the precisely tuned light beams. After amplification, the dye-laser light beams would be transported to separator units in the PPB through a beam tube.

In support of the laser system, the DPB would contain the equipment to supply an alcohol/dye mixture to the dye lasers, and the LCB would contain the electrical equipment to provide power for the equipment in the LSB.

The portion of the PPB that would contain plutonium would be a Category I structure. Category I structures are those whose continued integrity and/or operability are essential to achieve and maintain a safe condition during those accidents which could result in potentially significant offsite consequences. The PPB would contain the AVLIS separator system and the balance-of-plant (BOP) processes. The separator system would consist of four separator lines, each enclosed within a glove box. In each glove box would be independent separator units enclosed in vacuum chambers. Based on current design, the BOP processes would consist of the following:

1. Prepare plutonium metal as feed for AVLIS processing by converting plutonium oxide to metal through direct oxide reduction (DOR), removing americium-241 through a molten-salt-extraction (MSE) process, and casting the plutonium metal into suitable forms for processing;

2. Process the plutonium product (primarily plutonium-239) captured by the product collectors by reacting the product with hydrogen to form a hydride powder, heating the powder to decompose the hydride and provide a solid-metal button, purifying the resulting metal button by electrorefining as necessary, and packaging the plutonium product buttons for shipment;

3. Process the by-product material captured on the by-product extractors by oxidizing the by-product material to form a stable plutonium oxide and packaging the oxide by-product for storage in a vault;

4. Process salts by metal scrubbing, recover the plutonium from scrub metal and scrap materials by oxidation, dissolution, ion exchange, oxalate precipitation and finally, decomposition of the oxalate intermediate to recyclable plutonium dioxide; and

5. Process airborne, liquid, and solid wastes to forms meeting all applicable environmental, health, and safety standards.

All plutonium processing in the PPB would be conducted in glove boxes. Exhausts from plutonium processing glove boxes would be passed through three stages of testable HEPA filters.

If a new storage vault for SIS-generated by-product material is required, it would also be a Category I structure. By-product material stored in the vault would be placed in sealed containers on storage pallets. The pallets would be placed in racks designed to remain in place during a DBE.

Construction of the SIS Project would require land for the new facilities as well as a peak workforce of 788 personnel (about 440 construction and 348 operating personnel) that would occur during the construction period. Construction would generate atmospheric emissions, liquid effluents, and solid wastes typical of those for construction of any major industrial facilities. All atmospheric emissions and liquid effluents would be well below environmental standards, and mitigative measures would be taken for fugitive-dust suppression and erosion and spill control.

Operation of the SIS Project would require an operating workforce of about 750 personnel and would, as a result of normal operations, generate radioactive and nonradioactive atmospheric emissions, nonradioactive and nonhazardous liquid effluents, and solid wastes including TRU waste, LLW, and hazardous and mixed (i.e., radioactive waste having hazardous characteristics) wastes. Normal nonradioactive atmospheric emissions would be below applicable PSD de minimis levels. All solid wastes would be handled and managed in accordance with applicable environmental requirements including the requirements of the RCRA, as amended, for hazardous and mixed wastes.

During operation of the SIS facilities, accidents could occur that would result in atmospheric emissions of radioactivity. The postulated accidents involving SIS facilities that have the greatest potential for offsite consequences involve the PPB and include a postulated single-process-area fire, a DBE followed by a fire, a nuclear criticality, and an uncontrolled chemical reaction. The potential accidents not involving the SIS facilities that would have the greatest potential for offsite consequences would be the transport of SIS feed, product, by-product, and TRU waste.

PROPOSED ACTION AND ALTERNATIVES

The DOE's Proposed Action and Preferred Alternative is to construct and operate the SIS Project at DOE's INEL near Idaho Falls, Idaho. The alternatives to this action are to construct and operate the SIS Project at the Hanford Site near Richland, Washington; construct and operate the SIS

Project at the SRP near Aiken, South Carolina; and take No Action, or not construct the SIS Project.

CONSTRUCT AND OPERATE THE SIS PROJECT AT THE IDAHO NATIONAL ENGINEERING LABORATORY (PREFERRED ALTERNATIVE)

The proposed SIS Project site at the INEL is located within the existing security fence of the ICPP in the south-central portion of the approximately 2300-square-kilometer (890-square-mile) INEL. The site is about 14 kilometers (9 miles) from the nearest INEL boundary. No humans permanently reside on the INEL, and no population center larger than 5000 persons is located within a 60-kilometer (37-mile) radius of the ICPP. The estimated 1980 population within an 80-kilometer (50-mile) radius of the SIS Project site was about 110,270 persons and is forecast by the year 2010 to be about 230,129 persons, based on 1970 to 1980 population increases, or 151,922 persons based on Bureau of Economic Analysis projections.

The vegetation community at the INEL consists primarily of sagebrush with other shrubs, grasses, and forbs. The sagebrush community supports a diverse wildlife population characteristic of open Western desert rangelands. Endangered species occasionally observed on the INEL site are the bald eagle and the peregrine falcon.

Construction of the SIS Project at the INEL would directly impact a total of about 0.2 square kilometer (49.8 acres) of land area. Land area for construction of a transmission line (0.05 square kilometer or 11.2 acres) and for use as a borrow area would also be involved. During construction, plant and animal habitats associated with a sagebrush vegetation community would be lost or displaced from areas not previously disturbed. Approximately 92 percent of the previously undisturbed land area (i.e., areas outside the ICPP area) would not be affected by operation and would be planted with a protective cover and would eventually revert to a sagebrush vegetation community through natural plant succession. No known critical habitats or known habitats for rare or endangered species would be directly impacted. No historic sites would be directly impacted by construction.

A large in-migrating construction workforce for the project is not expected due to the availability of construction workers in the surrounding INEL region. Construction employment would have a beneficial economic impact in the region and would create indirect employment opportunities as well as contributions to the regional tax base. The projected number of in-migrating construction workers (116 personnel) is not expected to adversely impact the local infrastructure, as there is adequate capacity for continued growth.

During normal operation, atmospheric emissions of radioactive materials would not measurably increase radiation doses to the population surrounding the INEL. The calculated whole-body doses from SIS operation to a hypothetical individual residing at the nearest INEL boundary and the collective whole-body dose to the offsite population within an 80-kilometer (50-mile) radius of the INEL would be 1.3×10^{-8} millirem and 2.3×10^{-8} person-rem per year (based on a population of 230,129 persons). Calculated annual health effects to the population are 2.5×10^{-12} genetic disorder and 3.5×10^{-11} latent cancer fatality. The normal atmospheric emissions of radioactivity when added to those from present and planned INEL emissions would be well below the EPA's NESHAP of 25 and 75 millirem to the whole body and critical organ, respectively.

Normal operation of the SIS Project would also generate atmospheric emissions of nonradioactive materials. These emissions would consist of (1) argon, helium, hydrogen, nitrogen, and water vapor, which are not regulated pursuant to the Clean Air Act, as amended; (2) organic vapors that include Freon R-11 and R-113; and (3) nonradioactive process emissions and incremental atmospheric emissions from the burning of coal for steam generation that are below PSD de minimis levels. Emissions of Freon would result in a negligible increase in the risk of skin cancer; substitutes will be used when available.

Service waste and treated sanitary effluents would be discharged to the soil column through one or more new percolation ponds, which would be constructed as part of improvements to the ICPP waste management system, and infiltration beds. Service waste discharges would primarily consist of process steam condensate and cooling tower blowdown. All liquid waste streams would be monitored prior to discharge to ensure that the discharge would be nonhazardous and nonradioactive as defined by 40 CFR 261 and Chapter XI of DOE Order 5480.1, would comply with the current draft revision of DOE Order 5480.1B (Chapter XI), and would be nonhazardous as defined by the RCRA.

Solid wastes generated annually as a result of SIS operations would represent a small increment in relation to the amount of these wastes currently being received and managed at the INEL. All solid radioactive wastes would be handled as part of ongoing waste management activities at the INEL. Hazardous wastes would be handled in accordance with all RCRA requirements and would be transported to a RCRA-approved treatment, storage, disposal (TSD) facility as with currently generated hazardous waste. TRU waste is planned to be packaged, certified, and transported to the WIPP near Carlsbad, New Mexico. LLW would be disposed of at the INEL at the RWMC as with currently generated LLW. Mixed wastes would either be stored at the INEL in a RCRA-approved storage facility, as with currently generated mixed wastes, or would be transported to an approved TSD facility.

During SIS operations, fuel-grade plutonium (i.e., processed N-Reactor fuel and scrap) from DOE's Hanford Site and a small quantity of fuel-grade plutonium (i.e., scrap) from the SRP would be transported to the INEL, and plutonium metal product would be transported to Rocky Flats. By-product material, which would be treated as a potential resource until DOE evaluates its potential applicability for other missions, would be stored in a new Stand-Alone Storage Vault that would be constructed near the PPB. Feed and product materials would be transported in Type B containers certified by the NRC or approved for use by the U.S. Department of Transportation (DOT), aboard SSTs operated by DOE couriers. The TRU waste and potentially the by-product material that could be rendered into a form for emplacement at the planned WIPP would be transported by truck in a TRUPACT II cask. The annual radiological dose to the population sharing the roads with the SST and trucks transporting TRU waste and those living near the roads for (1) transporting feed from the Hanford Site and SRP to the INEL, (2) transporting product from the INEL to Rocky Flats, (3) transporting LLW onsite, and (4) transporting TRU waste and potentially by-product to the WIPP was calculated to be less than 12 person-rem, resulting in 3.5×10^{-3} latent cancer fatality and 1.6×10^{-3} genetic disorder.

For postulated SIS facility accidents, there are no cases of early offsite fatalities and no early offsite injuries. The highest dose at the site boundary to an organ of an individual and the highest offsite whole-body dose from an accident in which the filtration system would function at full efficiency are 2.7 millirem to the thyroid and 0.5 millirem to the whole body, both as a consequence of a postulated nuclear criticality accident. For accidents other than the criticality accident, the highest dose to an organ to the bone surface is .007 millirem from a postulated DBE and fire. The numbers of latent cancer fatalities and genetic disorders for these accidents range from 1.2×10^{-8} to 7.3×10^{-6} latent cancer fatality and 1.1×10^{-8} to 6.7×10^{-6} genetic disorder, conditional upon the occurrence of the particular accident. In addition to the above cases with full filter efficiency, a spectrum of filter efficiencies down to zero was considered. The maximum whole-body dose to an individual at the site boundary from the extreme case with 0-percent filter efficiency is 2.8×10^{-1} rem (280 millirem), which is a small fraction of the 25-rem criterion used by the NRC in the siting of a commercial power reactor (10 CFR 100). None of these facility accidents, including the postulated severe accident with complete loss of filters, results in an offsite release that would require costs for offsite mitigation.

For postulated accidents involving the transport of all SIS materials (i.e., feed, product, potentially by-product, TRU waste, and onsite LLW), the radiological risk per year of health effects was calculated to be 1.3×10^{-4} latent cancer fatality and 5.9×10^{-5} genetic disorder.

During construction and operation of the SIS Project, potential impacts could occur to INEL workers. Construction workers would be exposed to elevated background levels of radiation from gamma radiation in the vicinity of the SIS site and from inhalation of radionuclides emitted to the atmosphere from current INEL operations and earthwork activities. The estimated construction dose of about 30 millirem would be significantly below the DOE occupational exposure standard of 5000 millirem (5 rem). During operation of the SIS Project, workers within the ICPP area and other INEL areas would be exposed to normal radiological releases from the SIS facilities. The committed whole-body dose to a worker at the main processing building in the ICPP area was calculated to be 3×10^{-5} millirem, which is significantly below the DOE occupational exposure standard. Worker exposures to radioactive, hazardous, and/or toxic materials within the SIS facilities would be limited, in compliance with all applicable occupational safety requirements, and maintained at as-low-as-reasonably-achievable (ALARA) levels.

As a result of postulated accidents, high exposures, injuries, and fatalities could occur to SIS workers. INEL workers external to (i.e., outside of) the SIS facilities would be exposed to the atmospheric emissions of the postulated accident release. The highest whole-body dose to a worker at the main processing building in the ICPP area, assuming filter efficiency degraded to 0 percent and no evacuation, was calculated to be 6.5 rem (6500 millirem). Within the SIS facilities, potential fatalities might occur to workers within a few feet of the postulated criticality event or to workers in proximity to an explosion. Administrative controls are expected to limit the number of SIS operating personnel in areas of high potential exposure.

CONSTRUCT AND OPERATE THE SIS PROJECT AT THE HANFORD SITE

Construction of the SIS Project at the Hanford Site would affect a sagebrush vegetative community similar to the vegetative community and wildlife habitats found at the INEL. Previous planning for locating the SIS Project at the Hanford Site using a design of the SIS Project that has since undergone revision indicated that construction of the SIS Project might involve less land area for facilities than the present designs for locating the SIS Project at the INEL, while more land area would be affected temporarily by the construction of a transmission line. Because of the elevation of the proposed SIS Project site above a potential Probable Maximum Flood (PMF), less SIS site grading at the Hanford Site could be anticipated than at the INEL, as well as fewer emissions and effluents associated with grading.

Construction of the SIS Project at the Hanford Site would not affect known critical habitats or known habitats for rare or endangered species. No known historic sites would be directly impacted by construction. A large in-migrating construction workforce for the project is not expected because of the availability of construction workers formerly involved in the construction of commercial nuclear power plants at the Hanford Site. Construction of the SIS Project at the Hanford Site would provide job opportunities at a time when many jobs have been lost due to suspension of the characterization studies for a geologic repository for commercial nuclear wastes, and due to the placement of N-Reactor in cold-standby status.

During normal operation, atmospheric emissions of radioactive materials would not measurably increase radiation doses to the population surrounding the Hanford Site. The calculated annual whole-body dose to a hypothetical maximum individual from normal atmospheric emissions of radioactivity would be 7.3×10^{-9} millirem and the calculated collective annual whole-body dose to the offsite population surrounding the Hanford Site would be 1.4×10^{-7} person-rem based on a year-2010 population of 709,147 persons, or 9.7×10^{-8} person-rem for a year-2010 population of 500,000 persons. Calculated annual health effects to the population are 1.5×10^{-11} genetic disorder and 2.2×10^{-10} latent cancer fatality. The normal SIS atmospheric emissions of radioactivity when added to present and planned Hanford Site emissions would be well below EPA's NESHAP. Compared to locating the SIS Project at the INEL, the calculated dose to the hypothetical maximum individual at the Hanford Site is lower because of the greater distance from the SIS site to the nearest Hanford Site boundary, and the calculated collective dose to the offsite population surrounding the Hanford Site is higher because of the larger population surrounding the Hanford Site (i.e., for both the high and low year-2010 population forecasts). Nonradiological emissions during operation would be similar to those estimated if the SIS were located at the INEL and would be below PSD de minimis levels. Substitutes for Freon will be used when available.

Only nonradioactive and nonhazardous liquid effluents would be discharged to the soil column. Sanitary waste water would be treated through use of a septic tank and discharged to a tile field. Service waste water would also be discharged to a tile field. Solid wastes generated during SIS operation would be handled in the same manner as at the INEL (i.e., hazardous wastes transported to an approved TSD facility, LLW disposed of by shallow ground burial, mixed wastes stored or transported to an approved TSD facility, and TRU waste transported to the WIPP). All applicable requirements and standards would be met as previously discussed for locating the SIS Project at the INEL.

During SIS operations, shipments of plutonium product from the SIS would be routinely transported from the Hanford Site to DOE's Rocky Flats Plant in Colorado. The fuel-grade plutonium at the Hanford Site that would be processed by the SIS Project would only be transported onsite, compared to transporting the fuel-grade plutonium to the INEL if the SIS Project were located at the INEL. Only a small quantity of fuel-grade plutonium scrap from the SRP would be transported to the Hanford Site. TRU waste and potentially by-product material rendered into a form for emplacement at the WIPP would be transported by truck in a TRUPACT II cask. The annual radiological dose to the population from routine shipments of SIS materials (i.e., feed, product, by-product, TRU waste, and onsite LLW) was calculated to be less than 16 person-rem, resulting in 4.4×10^{-3} latent cancer fatality and 2.0×10^{-3} genetic disorder.

For postulated facility accidents, there are no cases of early offsite fatalities and no early offsite injuries. The highest dose at the site boundary to an organ and the highest offsite whole-body dose from an accident in which there would be full filter efficiency are 1.8 millirem to the thyroid and 0.3 millirem, respectively, both as a consequence of the postulated nuclear criticality accident. For accidents other than the criticality accident, the highest dose to an organ is .005 millirem to the bone surface from a postulated DBE and fire. The numbers of latent cancer fatalities and genetic disorders for the accidents considered range from 3.1×10^{-7} to 2.8×10^{-4} latent cancer fatality and 2.8×10^{-7} to 2.4×10^{-4} genetic disorder. The primary differences in the calculated facility accident consequences of locating the SIS Project at the Hanford Site versus locating it at the INEL are that site-boundary doses for the Hanford Site would be lower than at the INEL and offsite societal consequences (i.e., population doses and health effects) would be higher than those at the INEL. The lower site-boundary doses are attributable to the longer distance from the proposed SIS Project site to the Hanford Site boundary compared to that at the INEL. The higher offsite societal consequences (i.e., population doses and health effects) at Hanford are due to the larger population estimated to reside within an 80-kilometer (50-mile) radius of the SIS Project at the Hanford Site compared to the 80-kilometer (50-mile) population surrounding the project at the INEL.

Locating the SIS Project at the Hanford Site would not require significant offsite shipments of fuel-grade plutonium, but would result in greater distances in the shipment of TRU waste, product, and potentially by-product. The calculated annual radiological risk of health effects in the event of a transport accident is slightly higher than that for locating the SIS Project at the INEL, or 1.6×10^{-4} latent cancer fatality and 7.5×10^{-5} genetic disorder.

During construction and operation of the SIS Project, potential impacts could occur to Hanford Site workers. The potential impacts to Hanford Site workers would not differ significantly from those discussed for the INEL, except for construction-worker exposures, as the SIS facility and its releases during normal and accident events would be the same as that for locating the SIS Project at the INEL. The construction-worker exposure for locating the SIS Project at the Hanford Site is calculated to result in a dose of about 2 millirem compared to a 30-millirem dose to a construction worker at the INEL, almost entirely due to differences measured in external radiation.

CONSTRUCT AND OPERATE THE SIS PROJECT AT THE SAVANNAH RIVER PLANT

Construction of the SIS Project at the SRP would affect vegetative communities of monotypic stands of loblolly pine and admixtures of hardwoods. Unlike locating the SIS Project at either the INEL or the Hanford Site, the reference SIS site at the SRP is not located within an existing operating area because of land area availability; therefore, the reference site area, which is not considered to have been disturbed by prior operations (although it has been logged) would be lost, and wildlife would be permanently lost or displaced. Because of the reference site's elevation above a PMF, less grading and fewer construction emissions and effluents associated with grading are expected compared to the SIS site at the INEL. All other potential environmental consequences of constructing the SIS Project at the SRP would be similar to those for constructing the SIS Project at the INEL.

Compared to locating the SIS Project at the INEL, the calculated annual whole-body dose to a hypothetical maximum individual from routine radiological releases to the atmosphere is slightly lower (i.e., 8.9×10^{-9} millirem) at the SRP because of meteorological dispersion characteristics, and the calculated annual collective whole-body dose to the offsite population surrounding the SRP (i.e., 2.0×10^{-7} person-rem based on comparably projected year-2010 populations) is greater at the SRP because of the larger population surrounding the SRP. Calculated health effects to the population would be 3.2×10^{-10} latent cancer fatality and 2.3×10^{-11} genetic disorder. Nonradiological emissions during operation would be similar to those emitted if the SIS Project were located at the INEL and would be below PSD de minimis levels. Nonradioactive and nonhazardous liquid effluents would be discharged to a stream in accordance with National Pollutant Discharge Elimination System (NPDES) permit limitations.

Hazardous and mixed wastes would either be stored or disposed of at the SRP in new storage or disposal facilities meeting all RCRA requirements. LLW would either be disposed of or stored onsite. TRU waste would be transported to the WIPP.

During SIS operations, shipments of fuel-grade plutonium would routinely be transported between the Hanford Site and the SRP, and plutonium product would be transported from the SRP to DOE's Rocky Flats Plant. The annual radiological dose to the population from routine shipments of SIS material (feed, product, potentially by-product, TRU waste, and onsite LLW) was calculated to be less than 19 person-rem, resulting in 5.3×10^{-3} latent cancer fatality and 2.4×10^{-3} genetic disorder.

For postulated facility accidents, there are no cases of early offsite fatalities and no early offsite injuries. The highest dose at the site boundary to an organ and the highest offsite whole-body dose from an accident in which there would be full filter efficiency are 5.1 millirem to the thyroid and 0.8 millirem, respectively, both as a consequence of the postulated nuclear criticality accident. For accidents other than the criticality accident, the highest dose to an organ is .005 millirem to the bone surface from a postulated DBE and fire. The numbers of latent cancer fatalities and genetic effects for the accidents considered range from 4.3×10^{-7} to 5.9×10^{-4} latent cancer fatality and 3.9×10^{-7} to 5.4×10^{-4} genetic disorder. The primary difference in the calculated accident consequences of locating the SIS Project at the SRP versus locating it at the INEL is that offsite societal consequences (i.e., population doses and health effects) of locating the SIS Project at the SRP would be higher than at the INEL because of the larger forecast year-2010 population residing within an 80-kilometer (50-mile) radius of the SRP. Although the SIS Project site at the SRP is closer to the SRP boundary compared to the site at the INEL, the SRP site-boundary doses are only slightly higher than those of the INEL because of different meteorological dispersion characteristics.

Because of the longer distances associated with the transport of SIS materials compared to locating the SIS Project at the INEL, the calculated annual radiological risk of health effects in the event of a transport accident is larger, or 2.9×10^{-4} latent cancer fatality and 1.3×10^{-4} genetic disorder.

During construction and operation of the SIS Project, potential impacts could occur to SRP workers. The potential impacts to SRP workers would not differ significantly from those discussed for the INEL, except for construction-worker exposures, as the SIS facility and its releases during normal and accident events would be the same as that for locating the SIS Project at the INEL. The construction-worker exposure for locating the SIS Project at the SRP is calculated to result in a dose of about 15 millirem compared to a 30-millirem dose to a construction worker at the INEL, almost entirely due to differences measured in external radiation.

NO ACTION

The No-Action Alternative is not to construct and operate the SIS Project. If the SIS Project is not constructed and operated, the flexibility, contingency, and technological diversity in the production of weapon-grade plutonium that would be provided by the SIS Project would not be achieved. The operation of DOE's nuclear materials production complex for weapon-grade plutonium would continue to be delineated on an annual basis. The No-Action Alternative would not result in changes to continuing operations at the Hanford Site, the SRP, or any other DOE site. Blending fuel-grade plutonium with newly produced plutonium of higher-than-weapon-grade purity will continue to provide an option for the production of weapon-grade plutonium irrespective of whether the SIS Project is constructed and operated.

ALTERNATIVES CONSIDERED BUT NOT EVALUATED IN DETAIL

In proposing to proceed with the SIS Project commensurate with its responsibility for maintaining the capability to produce the nuclear materials required for national defense, DOE has previously considered technology alternatives for plutonium isotopic separation and other weapon-grade plutonium production alternatives. Based on a Technical Readiness Review and an Environmental Assessment and Finding of No Significant Impact (FONSI) of the AVLIS and Molecular Laser Isotope Separation (MLIS) technologies, DOE has concluded that the AVLIS process should be the technology for the proposed SIS.

The production alternatives considered were increased blending, use of a new fuel lattice in the reactors at the SRP, restart of the N-Reactor at the Hanford Site, construction and operation of a New Production Reactor (NPR), and conversion of the Washington Nuclear Project Unit 1 (WNP-1), which is located within the Hanford Site, to a DOE production reactor. Alternatives not involving new weapon-grade sources (i.e., weapon recycle and enhanced scrap recovery) were also considered. The production of weapon-grade plutonium by blending requires the production of new plutonium, of a higher purity than weapon-grade plutonium, to blend with fuel-grade plutonium. Increased blending by producing plutonium with a plutonium-240 content of less than 3 percent, or "super blending," would require excessively high throughput (i.e., more frequent changing of targets) in the production reactors at the SRP to control the buildup of plutonium-240 in the irradiated targets. The more frequent changes in the targets would lead to increased reactor downtime, resulting in a reduction in the quantities of material produced and in the need for additional reactor availability to compensate for the loss of material. Increased blending through greater SRP production of new plutonium with a plutonium-240 content of 3 percent would similarly require greater production reactor availability. Because increased blending, either through "super blending" or greater production, would require additional SRP reactor availability, which is limited both by the higher priority need for the production of tritium and by current or potential operational constraints, it is not considered a reasonable alternative to SIS.

Currently, the SRP reactors use a Mark-16-31 lattice for plutonium production. The implementation of this initiative is not considered to be a reasonable alternative to the SIS Project because, similar to blending, implementation would not significantly alter the current dependency on reactor availability. Also, the production complex requires the flexibility to use these reactors for tritium production while still maintaining plutonium production capacity.

In the past, another source of new weapon-grade plutonium was the N-Reactor at the Hanford Site. During 1987, this reactor was placed in stand-down for the application of safety modifications. Later, prior to its restart, this reactor was placed in cold-standby because of sufficient near-term plutonium supply and the high cost of continuing to operate the reactor. The N-Reactor has a limited service life that is governed by distortion of the graphite moderator and is potentially subject to problems of aging similar to those of the SRP reactors. The restart of the

N-Reactor, while possible, does not meet the requirement of technological diversity, nor does it promise a reliable contingency supply for the period of most-needed performance.

Studies have also been performed with respect to the construction and operation of an NPR and the potential conversion of WNP-1 to a DOE production reactor. Implementation of either initiative was considered unreasonable because neither would provide the flexibility and technological diversity of a reactor-independent source as represented by the SIS Project. Currently, new reactor capacity has been planned to meet long-term tritium needs and would not be operated until after the year 2000.

None of the alternatives discussed above are technologically diverse from reactor-based plutonium production. In addition, flexibility in meeting potential requirements for rapid increases in plutonium production is not provided by these alternatives.

The nation's stockpile of weapon-grade plutonium physically resides either in the weapons or in inventories associated with manufacture, processing, and storage. When warheads are returned, the material can be reclaimed; however, the numbers and frequencies of return are determined based on national security considerations. During the chemical and physical processing of both new and returned material, scrap is generated. Evaluations of need for new weapon-grade plutonium fully consider the availability of material from returns and scrap. While accelerated processing of these materials can relieve short-term shortages, it adds no weapon-grade material to the stockpile. The recovery and recycling of existing weapon-grade plutonium from retired weapons as well as the acceleration of scrap recovery are, therefore, not reasonable alternatives to the SIS Project because they provide no contingency source material.

COMPARISON OF THE PROPOSED ACTION AND ALTERNATIVES

Each of the alternatives, except No Action, would provide the needed contingency and flexibility in the DOE defense nuclear materials production complex for approved needs for weapon-grade plutonium. No Action, while continuing to provide weapon-grade plutonium, would not meet the same needs as represented by the SIS Project.

The emissions and effluents resulting from SIS construction and operation would be within all applicable environmental standards. The major differences in the expected environmental consequences between the construction and operation of the SIS Project at the INEL (the preferred location) compared to the other locations considered are primarily related to the different geographic settings/locations (e.g., the different distances involved in the transport of materials, different distances of the location of the SIS relative to the nearest INEL/Hanford Site/SRP boundaries, and the estimated population surrounding each of the alternative sites).

Compared to locating the SIS Project at the INEL, the construction and operation of the SIS Project at the Hanford Site would involve the loss or displacement of similar vegetation communities and ecological habitats, and potentially a smaller amount of land area for SIS facilities. Locating the

SIS Project at the SRP would affect a more diverse ecosystem of monotypic pine and admixtures of hardwoods.

Construction of the SIS Project at each of the three alternative locations is not expected to result in major socioeconomic impacts because of the availability of construction workers in each of the three surrounding regions. Socioeconomic impacts resulting from in-migrating operating workers are also expected to be small as the number of in-migrating workers would constitute a small percentage of the average annual increase in population in the regions surrounding the alternative sites. Economic benefits as a result of the construction and operation of the SIS Project are expected to be similar for each of the alternative sites.

The INEL, with the smallest population surrounding the proposed SIS Project site, has a calculated collective whole-body dose to the surrounding population that is slightly less than the other two sites for normal operating releases. The calculated maximum individual dose for locating the SIS Project at the INEL is slightly higher than for locating the project at either the SRP or the Hanford Site, because of differences in the distance from the SIS Project to the nearest site boundary and meteorological dispersion characteristics. Calculated consequences of postulated SIS facility accidents generally parallel the differences in consequences from normal operating releases (i.e., mean site-boundary doses for locating the SIS Project at the INEL and the SRP are higher than for locating the SIS Project at the Hanford Site, and the offsite societal consequences for locating the SIS Project at the INEL are less than those for locating the SIS Project at the Hanford Site and the SRP).

Because of the semiarid climate at the INEL, water required for construction and operation would be withdrawn from ground water, and liquid effluents meeting all applicable standards including safe drinking water standards for radioactivity would be discharged to the soil column. The Hanford Site, lying in a similar semiarid climate but close to the Columbia River, would meet SIS water requirements through the withdrawal of water from the Columbia River and would discharge treated liquid effluents to the soil column. The SRP, lying within the less arid climate of the southeastern United States, would withdraw ground water for meeting SIS water requirements, but would discharge liquid effluents to an onsite stream.

Another geographic difference between the INEL and the other potential sites for the SIS Project is the location of each of the sites relative to the origins and destinations of SIS shipments of feed, product, by-product, and TRU waste. Because locating the SIS Project at the INEL would involve fewer annual shipment-kilometers of TRU waste and potentially by-product than would locating the SIS Project at either the Hanford Site or SRP, this alternative has lower calculated routine exposures and risk in the event of a transport accident.

The impacts from the construction and operation of the SIS Project at the INEL, the Hanford Site, or the SRP would not measurably increase the existing or planned cumulative impacts at these locations. The effective dose equivalent and highest organ dose from SIS operation, when added to the existing radiological doses as a result of on-going operations at any of the alternative sites, would be well below NESHAP requirements. Annual

generation of SIS solid wastes, including low-level radioactive, TRU, mixed, and hazardous wastes, would comprise only a small percentage of the same categories of waste currently being generated, received, and managed at each of the alternative sites. Nonradioactive atmospheric emissions resulting from SIS operation, which would be below PSD de minimis levels, would also not measurably increase the total amount of nonradioactive emissions from current operations at each of the SIS alternative locations. Nonradioactive and nonhazardous SIS liquid effluent discharges would neither increase nor accentuate potential water-quality impacts, and the cumulative withdrawal of water, whether from surface water or ground water, would be well within the capabilities of the existing water resources at each of the alternative sites.

Table S-1 provides a summary comparison of each of the alternatives and their environmental consequences based on the maximum annual production capability of the SIS Project. Table S-2 provides a summary of environmental consequences of 30 years of SIS operation at each of the alternative locations.

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
		PROGRAMMATIC IMPACTS		
Need	Would provide DOE with needed contingency, flexibility, and technological diversity in the DOE nuclear materials production complex.	Same as PA.	Same as PA.	Would continue to provide plutonium but would not provide needed contingency, flexibility, and technological diversity.
		CONSTRUCTION IMPACTS		
Land area required	26.9 acres within the ICPP area and about 34.1 acres outside existing ICPP area, of which 11.2 acres would be temporarily disturbed for a substation distribution line, and additional acreage for borrow area.	18 acres within the 200-East Area and 29 acres outside 200-East Area, of which 25 acres would be temporarily disturbed for a transmission line, and additional acreage for borrow area.	20 acres outside existing F-Area and additional acreage for borrow area and other support facilities.	Not applicable--facilities currently in place and operating.
Socioeconomic impacts	No large in-migrating construction workforce or major adverse impacts expected; beneficial impacts would include a stable INEL workforce, indirect job opportunities,	Same as PA. No large in-migrating construction workforce or major adverse impacts expected; beneficial economic impacts similar to those for PA.	Same as PA. No large in-migrating construction workforce or major adverse impacts expected; beneficial economic impacts similar to those for PA.	Not applicable--facilities currently in place and operating.

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
		CONSTRUCTION IMPACTS (continued)		
Socioeconomic impacts (continued)	and contributions to tax base.			
Ecological habitat	Habitats and wildlife associated with sagebrush vegetation community would be lost or displaced; successional recovery of all but 2.9 acres outside ICPP area and minor areas for transmission line; no critical habitats, wetland habitats, or habitats for rare or endangered species would be affected.	Same as PA, except a smaller amount of acreage (i.e., about 9 acres) might be affected during construction.	Habitats and wildlife associated with 20 acres of pine and admixtures of hardwoods would be lost; no wetlands impacted.	Not applicable--facilities currently in place and operating.
Effluents and emissions	Typical of those associated with a large construction project; effluents and emissions would be well below applicable environmental standards, and mitigative measures would be	Same as PA.	Same as PA.	Not applicable--facilities currently in place and operating.

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
	CONSTRUCTION IMPACTS (continued)			
Effluents and emissions (continued)	implemented for fugitive dust, erosion, and spills.			
Archeologic/historic resources	No sites would be impacted. Periodic inspections of excavations and excavated material will determine whether frequency of paleontological finds requires mitigation.	Same as PA.	Same as PA.	Not applicable--facilities currently in place and operating.
	ROUTINE NONRADIOLOGICAL OPERATIONAL IMPACTS			
Socioeconomic impacts	Potential in-migrating operating personnel would be a small percentage of average population increases; no significant impacts to community facilities; beneficial impacts would include indirect job opportunities and contributions to local tax base.	In-migrating operating personnel would be a small percentage of average population increases; no significant impacts to community facilities; beneficial economic impacts are expected to be similar to those for PA.	In-migrating operating personnel would be a small percentage of average population increases; no significant impacts to community facilities; beneficial economic impacts are expected to be similar to those for PA.	Not applicable--facilities currently in place and operating.

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
	ROUTINE NONRADIOLOGICAL OPERATIONAL IMPACTS (continued)			
Atmospheric emissions	Additional burning of coal for steam generation and nonradiological process emissions would be well below PSD de minimis levels; Freon emissions would be below PSD de minimis levels for volatile organic compounds; on-going studies examining Freon emission reduction measures; substitute coolants to be used when available.	Same as PA.	Same as PA.	Atmospheric emissions within air quality permit limitations would continue.
Liquid effluents	Only nonhazardous and nonradioactive liquid effluents would be discharged to new percolation pond(s); sanitary effluents would be treated by existing ICPP Sewage Treatment Plant.	Same as PA, except service wastes would be discharged to a tile field and sanitary waste water would be treated through use of a septic tank.	Same as PA, except service wastes and treated sanitary waste water would be discharged to surface water (Four Mile Creek) in accordance with applicable permit requirements.	Liquid effluents associated with current practice would continue; improvements to existing facilities would continue to be undertaken to comply with permit requirements.

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
	ROUTINE NONRADIOLOGICAL OPERATIONAL IMPACTS (continued)			
Nonhazardous solid waste	Nonradioactive and nonhazardous solid waste would be disposed of in onsite sanitary landfill.	Same as PA.	Same as PA.	Nonradioactive and nonhazardous waste generated as a result of current practice would continue to be disposed of in sanitary landfills.
Hazardous waste	Hazardous wastes would be handled in accordance with applicable RCRA requirements, and would be transported to an approved RCRA TSD facility.	Same as PA.	Hazardous wastes would be stored or disposed of on the site in new facilities meeting RCRA requirements.	Hazardous wastes associated with current practice would continue to be generated; improvements to existing facilities and new TSD facilities would be implemented to comply with RCRA requirements.
	ROUTINE RADIOLOGICAL OPERATIONAL IMPACTS			
Atmospheric emissions[a]	Small quantities would be released to atmosphere, resulting in negligible offsite increases; calculated	Same as PA, except calculated annual whole-body doses to maximum individual	Same as PA, except calculated annual whole-body doses to maximum individual	Annual radiological consequences of current practice would continue; doses to

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
	ROUTINE RADIOLOGICAL OPERATIONAL IMPACTS (continued)			
Atmospheric emissions[a] (continued)	annual increase in whole-body dose to maximum individual and surrounding population would be 1.3×10^{-8} millirem and 2.3×10^{-8} person-rem, respectively; calculated population health effects of 2.5×10^{-12} genetic disorder and 3.5×10^{-11} latent cancer fatality; atmospheric emissions in combination with other emissions would be well below NESHAP standards.	and surrounding population would be 7.3×10^{-9} millirem and 1.4×10^{-7} person-rem, respectively; and slightly higher health effects.	and surrounding population would be 8.9×10^{-9} millirem and 2.0×10^{-7} person-rem, respectively, and slightly higher health effects.	maximum individuals and populations from existing operations are a small fraction of background radiation and are well below NESHAP standards.
Solid waste	Radioactive solid wastes that would be generated include LLW, TRU waste, and mixed waste; TRU waste would be certified and transported to the planned WIPP; LLW would be disposed of in existing land burial facility; mixed waste would either	Same as PA.	LLW would be disposed of onsite and mixed wastes would either be stored or disposed of on the site in RCRA-approved facilities; TRU waste would be certified and transported to the planned WIPP.	LLW, TRU waste, and mixed waste associated with current practice would continue to be generated and managed in the same manner as for the SIS Project; high-level radioactive waste would also

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
		ROUTINE RADIOLOGICAL OPERATIONAL IMPACTS (continued)		
Solid waste (continued)	be stored in RCRA-permitted storage facilities separate from hazardous waste or transported to approved TSD facility. Quantities generated would be a small percentage of the quantities currently managed and would result in small exposures.			be generated that would be immobilized at the SRP and the Hanford Site.
Routine transport of materials	All materials would be transported in accordance with appropriate DOE, DOT, and EPA requirements. Annual offsite shipments of SIS feed, product, potentially by-product, and TRU waste and on-site shipments of LLW would result in less than 12 person-rem and 3.5×10^{-3} latent cancer fatality and 1.6×10^{-3} genetic disorder.	Compared to PA, only a few shipments of feed from the SRP would occur, while the transport of TRU waste and potentially by-product would occur over a longer distance. Annual offsite shipments of SIS materials would result in less than 16 person-rem, and slightly higher health effects.	Compared to PA, feed, product, TRU waste, and potentially by-product would be transported longer distances. Annual offsite shipments of SIS material would result in less than 19 person-rem, and slightly higher health effects.	Materials would continue to be transported on and off the site in accordance with appropriate requirements. Radiological exposures for shipments of radioactive materials would continue to be below applicable DOE and DOT criteria and standards.

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
		ACCIDENTS		
SIS facility accidents[b]	For all accidents considered, there would be no offsite cases of early fatalities or injuries. For the accidents in which the filtration system would function as designed, the highest dose at the INEL site boundary to an organ would be 2.7 millirem to the thyroid and the highest whole-body dose would be 0.5 millirem, both from the postulated criticality accident. The numbers of potential offsite latent cancer fatalities and genetic disorders for Design-Basis Accidents having the highest consequences range from 1.2×10^{-8} to 7.3×10^{-6} cancer fatality and 1.1×10^{-8} to 6.7×10^{-6} genetic disorder. In addition to the above cases with full	For all accidents considered, there would be no offsite cases of early fatalities or injuries. For the accidents in which the filtration system would function as designed, site-boundary doses would be lower than PA (e.g., 1.8 millirem to the thyroid from the postulated criticality accident) and offsite societal consequences would be higher than PA (e.g., number of offsite latent cancer fatalities for accidents ranges from 3.0×10^{-7} to 2.8×10^{-4}). Although a full spectrum of filter efficiency calculations has not been done for the Hanford Site, the whole-body and	For all accidents considered, there would be no offsite cases of early fatalities or injuries. For the accidents in which the filtration system would function as designed, site-boundary doses would be higher than PA (e.g., 5.1 millirem to the thyroid from the postulated criticality accident) and offsite societal consequences would be higher than PA (e.g., number of offsite latent cancer fatalities for accidents ranges from 4.3×10^{-7} to 5.9×10^{-4}). Although a full spectrum of filter efficiency calculations has not been done for the SRP, the whole-body and	SIS accidents not directly comparable to continuation of current practice.

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
		ACCIDENTS (continued)		
SIS facility accidents[b] (continued)	filter efficiencies, a full spectrum of filter efficiencies down to zero was considered. The maximum whole-body dose at the site boundary from the extreme case with zero filter efficiency is 2.8×10^{-1} rem and the maximum dose to the bone surface 3.6×10^{0} rem.	bone-surface doses calculated at the INEL boundary approximate the doses at the Hanford Site boundary because the distances are reasonably close.	bone-surface doses calculated at the INEL boundary approximate the doses at the SRP boundary because the distances are reasonably close.	
Transport of SIS feed, product, and by-product	Annual radiological risk for transport of all SIS radioactive materials would be 1.3×10^{-4} latent cancer fatality and 5.9×10^{-5} genetic disorder; annual nonradiological risk of a fatality would be 1.8×10^{-2}.	Annual radiological risk would be higher than PA, or 1.6×10^{-4} latent cancer fatality and 7.5×10^{-5} genetic disorder; annual nonradiological risk of a fatality would also be higher than PA, or 2.2×10^{-2}.	Annual radiological risk would be higher than PA, or 2.9×10^{-4} latent cancer fatality and 1.3×10^{-4} genetic disorder; annual nonradiological risk of a fatality would also be higher than PA, or 2.1×10^{-2}.	Compared to PA, annual risk of current practice would be higher because of longer distances associated with feed shipments for blending and product shipments.

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action--continuation of present practice
		OTHER IMPACTS		
Occupational safety	Construction-worker exposure of about 30 millirem per year would be well within exposure limits for uncontrolled areas; operation exposures would be kept to ALARA levels and below permissible DOE standards; injuries, exposures, and fatalities could potentially occur as a result of accidents; the routine dose to an ICPP worker (i.e., less than 3.0×10^{-8} rem) and doses as a result of postulated accidents, including those filtration systems degraded to 90 percent, would both be below the DOE standard of 5 rem; for the severe accident with 0-percent filtration, the calculated dose is 6.5 rem.	Construction-worker exposure of about 2 millirem would be well within exposure limits and below those expected for PA; operational exposures would be kept to ALARA levels and below permissible DOE standards; routine and accident doses to onsite workers would be similar to those for the INEL, including that as a result of a severe accident.	Construction-worker exposure of about 15 millirem would be well within exposure limits and below those expected for PA; operational exposures would be kept to ALARA levels and below permissible DOE standards; routine and accident doses to onsite workers would be similar to those for the INEL, including that as a result of a severe accident.	Facilities are currently in place and no construction-worker impacts would occur; worker exposures kept to ALARA levels and below permissible DOE standards.

Table S-1. Consequences of the Proposed Action (PA), Alternatives, and Continuation of Present Practice (continued)

Category	Proposed Action (PA) and Preferred Alternative-- construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP	No Action-- continuation of present practice
		OTHER IMPACTS (continued)		
Resource impacts	Ground-water withdrawals would be an insignificant percentage of annual discharge of Snake River Plain aquifer; no significant use of scarce or strategic material would be required for construction and operation.	Surface-water withdrawals would be an insignificant percentage of annual average flow of Columbia River; use of scarce or strategic material would be same as for PA.	Ground-water withdrawals would be an insignificant percentage of current SRP ground-water withdrawals; use of scarce or strategic material would be same as for PA.	Surface- and ground-water withdrawals would continue and would be a small percentage of the capability of ground- and surface-water resources; scarce or strategic material would not be required for continuing current practice.

[a]Collective (i.e., population) doses presented use a forecast year-2010 population based on a population growth rate for each of the areas as experienced between 1970 and 1980. Collective doses based on local estimates of population for the year 2010 are: INEL, 1.5×10^{-8} person-rem; Hanford Site, 9.7×10^{-8} person-rem; SRP, 1.4×10^{-7} person-rem.

[b]The ranges of potential offsite latent cancer fatalities using year-2010 local population estimates are: INEL, 7.9×10^{-9} to 4.8×10^{-6}; Hanford Site, 1.9×10^{-7} to 1.8×10^{-4}; SRP, 2.8×10^{-7} to 3.9×10^{-4}.

Table S-2. Consequences of 30 Years of SIS Project Operations at the Alternative Sites

Category	Proposed Action (PA) and Preferred Alternative-- construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP
	ROUTINE NONRADIOLOGICAL OPERATIONAL IMPACTS		
Socioeconomic impacts	Workforce would contribute to stabilizing workforce and benefits to regional economy.	Same as for PA.	Same as for PA.
Atmospheric emissions	Nonradiological emissions would continue to be below annual standards; substitute coolants expected to be available for Freon emissions. Less than 2160 metric tons of SO_2, particulates, NO_x, CO, and organic vapors emitted.	Same as for PA.	Same as for PA.
Liquid effluents	Only nonradioactive and nonhazardous liquid effluents would be discharged to percolation pond(s). Total SIS liquid discharges would approximate 7.2×10^8 liters of treated sanitary effluent and 7.8×10^7 liters of nonradioactive and nonhazardous process steam condensate and cooling tower blowdown to service waste system.	Same as for PA except discharges would be to tile fields.	Same as for PA except discharges would be to a stream (i.e., Four Mile Creek).

Table S-2. Consequences of 30 Years of SIS Project Operations at the Alternative Sites (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP
	ROUTINE NONRADIOLOGICAL OPERATIONAL IMPACTS (continued)		
Nonhazardous solid waste	Total amount of nonhazardous waste would be less than 27,000 metric tons, which would be disposed of in an onsite sanitary landfill.	Same as for PA.	Same as for PA.
Hazardous waste	Would continue to be handled in accordance with applicable RCRA requirements and would be transported offsite to an approved RCRA TSD facility. Total amount requiring handling, management, and offsite transport less than 990,000 liters.	Same as for PA.	Hazardous waste would be stored or disposed of onsite in compliance with RCRA. Quantity same as for PA.
	ROUTINE RADIOLOGICAL OPERATIONAL IMPACTS		
Atmospheric emissions	Maximum accumulated whole-body dose of 4.0×10^{-7} millirem and accumulated whole-body dose to surrounding population of less than 6.8×10^{-7} person-rem. Total calculated health effects to population of 7.5×10^{-11} genetic disorder and 1.1×10^{-9} latent cancer fatality.	Maximum accumulated individual whole-body dose of 2.2×10^{-7} millirem and accumulated whole-body dose to surrounding population of less than 4.2×10^{-6} person-rem. Total calculated health effects to population of 4.5×10^{-10} genetic disorder and 6.6×10^{-9} latent cancer fatality.	Maximum accumulated individual whole-body dose of 2.7×10^{-7} millirem and accumulated whole-body dose to surrounding population of less than 6.1×10^{-6} person-rem. Total calculated health effects to population of 6.9×10^{-10} genetic disorder and 9.6×10^{-9} latent cancer fatality.

Table S-2. Consequences of 30 Years of SIS Project Operations at the Alternative Sites (continued)

Category	Proposed Action (PA) and Preferred Alternative--construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP
	ROUTINE RADIOLOGICAL OPERATIONAL IMPACTS (continued)		
Solid waste	Total quantities of radioactive waste generated would be: LLW, less than 900 metric tons; TRU waste, less than 12,000 metric tons; mixed waste, less than 300 metric tons. All wastes managed and stored or disposed of as listed in Table S-1.	Same as PA. All wastes managed and stored or disposed of as listed in Table S-1.	Same as PA. All wastes managed and stored or disposed of as listed in Table S-1.
Routine transport of materials	Routine transport of radioactive materials would result in an accumulated exposure of less than 360 person-rem. Total calculated health effects to population of 4.8×10^{-2} genetic disorder and 1.1×10^{-1} cancer fatality.	Routine transport of radioactive materials would result in an accumulated exposure of less than 480 person-rem. Total calculated health effects to population of 6×10^{-1} genetic disorder and 1.2×10^{-1} cancer fatality.	Routine transport of radioactive materials would result in an accumulated exposure of less than 570 person-rem. Total calculated health effects to population of 7.2×10^{-1} genetic disorder and 1.6×10^{-1} cancer fatality.
SIS facility accidents[a]	Risk of offsite genetic disorder and cancer fatality for design-basis accident having highest consequence would be less than 5.7×10^{-7} for a genetic disorder and 6.3×10^{-7} for a latent cancer fatality; because of the extremely low probability of occurrence of the postulated severe accident, the risk to the offsite population would not significantly increase.	Risk of genetic disorder and offsite cancer fatality would be less than 1.5×10^{-6} for a genetic disorder and 1.6×10^{-6} for a latent cancer fatality; postulated severe accident would not significantly increase risk.	Risk of genetic disorder and offsite cancer fatality would be less than 2.2×10^{-6} for a genetic disorder and 2.3×10^{-6} for a latent cancer fatality; postulated severe accident would not significantly increase risk.

Table S-2. Consequences of 30 Years of SIS Project Operations at the Alternative Sites (continued)

Category	Proposed Action (PA) and Preferred Alternative-- construct and operate SIS Project at the INEL	Construct and operate SIS Project at the Hanford Site	Construct and operate SIS Project at the SRP
	ROUTINE RADIOLOGICAL OPERATIONAL IMPACTS (continued)		
Transport accidents[a]	Radiological risk of a single health effect from the transport of feed, product, (potentially) by-product, TRU waste, and onsite transport of LLW, less than 1.8×10^{-3} genetic disorder and 3.9×10^{-3} latent cancer fatality.	Radiological risk of a single health effect from the transport of feed, product, (potentially) by-product, TRU waste, and onsite transport of LLW, less than 2.3×10^{-3} genetic disorder and 4.8×10^{-3} latent cancer fatality.	Radiological risk of a single health effect from the transport of feed, product, (potentially) by-product, TRU waste, and onsite transport of LLW, less than 3.9×10^{-3} genetic disorder 8.7×10^{-3} latent cancer fatality.
Occupational safety	Accumulated whole-body dose to a worker in ICPP would be about 9.0×10^{-7} millirem.	Same as for PA.	Same as for PA.
Resource impacts	Less than 30 times the quantities of materials and energy required for annual operation; no significant use of scarce or strategic material required.	Same as for PA.	Same as for PA.

[a]Risks are the product of the consequences (i.e., potential cancer fatalities), the annual probability of the occurrence of the accident, and the number of years of operation.

UNITED STATES
DEPARTMENT OF ENERGY
WASHINGTON, D.C. 20545

DP-2.3
OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

FIRST CLASS MAIL