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RI/RD93-125
Revision A

ROCKETDYNE DIVISION
ANNUAL SITE
ENVIRONMENTAL REPORT
SANTA SUSANA FIELD LABORATORY
AND DE SOTO SITES
1992

Rockwell International

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Prepared by the Staffs of
Radiation Protection and Health Physics Services
and
Environmental Protection

14 December 1993

Rockwell International

Rocketdyne Division
Rockwell International Corporation
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1.0 EXECUTIVE SUMMARY

Rocketdyne currently operates several facilities in the San Fernando Valley/Simi Valley area, for manufacturing, testing, and research and development (R&D). These operations include manufacturing liquid-fueled rocket engines, such as the Space Shuttle Main Engine (SSME); testing rocket engines, lasers, and heat-transfer systems; and R&D in a wide range of high-technology fields, such as the electrical power system for Space Station Freedom. Previously, this work included development, fabrication, and disassembly of nuclear reactors, reactor fuel, and other radioactive materials, but this work was terminated in 1987. Subsequently, all radiological work has been directed toward decontamination and decommissioning (D&D) of the previously used nuclear facilities and associated site areas.

The results of environmental monitoring indicate that there are no significant sources of unnatural radioactive material in the vicinity of the Rocketdyne sites. The atmospheric discharge of radioactive materials and direct radiation exposure are the only potential exposure pathways to the general public from Rocketdyne's radiological cleanup operations. All radioactive wastes are processed for subsequent disposal at Department of Energy (DOE) disposal sites. Liquid radioactive wastes are not released into the environment and do not constitute an exposure pathway. Groundwater and surface water are sampled and analyzed to assure detection of any artificial radioactivity. With the exception of low concentrations of tritium, well below Federal and State drinking water standards, only natural radioactivity has been found in this water.

Radioactivity in the facility ventilation exhausts, and in the environment, is analyzed to assess any impact of the remaining radiological-related operations on the public and the environment. Little radioactivity is dispersed by these operations and very little is released to the environment, due to highly effective filtration systems. Only small amounts of nonnatural radioactivity are found in the exhaust effluents and only low concentrations of tritium, below drinking water standards, are found in groundwater. With the exception of localized areas of facility and soil contamination, only natural radioactivity can be detected in soil and vegetation samples.

Calculated radiation doses to the public, due to airborne releases and direct radiation, are a factor of 10^5 to 10^6 lower than the applicable limits as well as natural background levels.

The radiological monitoring program, which had been developed, and had evolved, in response to nuclear reactor testing and reactor fuel fabrication and disassembly, has been correspondingly reduced to measuring facility exhaust effluent and specific or special environmental conditions.

The nonradiological monitoring program has increased in recent years, with more extensive sampling of the groundwater at Santa Susana Field Laboratory (SSFL), and at the De Soto sites. Extraction of volatile organic compounds from contaminated groundwater at SSFL is continuing and is effective in reducing remaining contamination levels and in impeding the migration of this contaminated water off-site. Surface discharges of water, after use in rocket-engine testing and other industrial purposes, are analyzed and show only minor exceedances related to turbidity and alkalinity, both of which seem to be natural effects.

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2.0 INTRODUCTION

This annual report discusses environmental monitoring at two manufacturing and test operations sites operated in the Los Angeles area by the Rocketdyne Division of Rockwell International Corporation. These are identified as the Santa Susana Field Laboratory (SSFL) and the De Soto site. These sites have been used for manufacturing, R&D, engineering, and testing in a broad range of technical fields, primarily rocket engine propulsion and nuclear reactor technology. The De Soto site is essentially light industry with some laboratory-scale R&D and has little potential impact on the environment. The SSFL site, because of its large size (2,668 acres), warranted comprehensive monitoring to assure protection of the environment.

SSFL consists of four administrative areas used for research, development, and test operations as well as a buffer zone. The arrangement of these areas is shown in Figure 2-1.

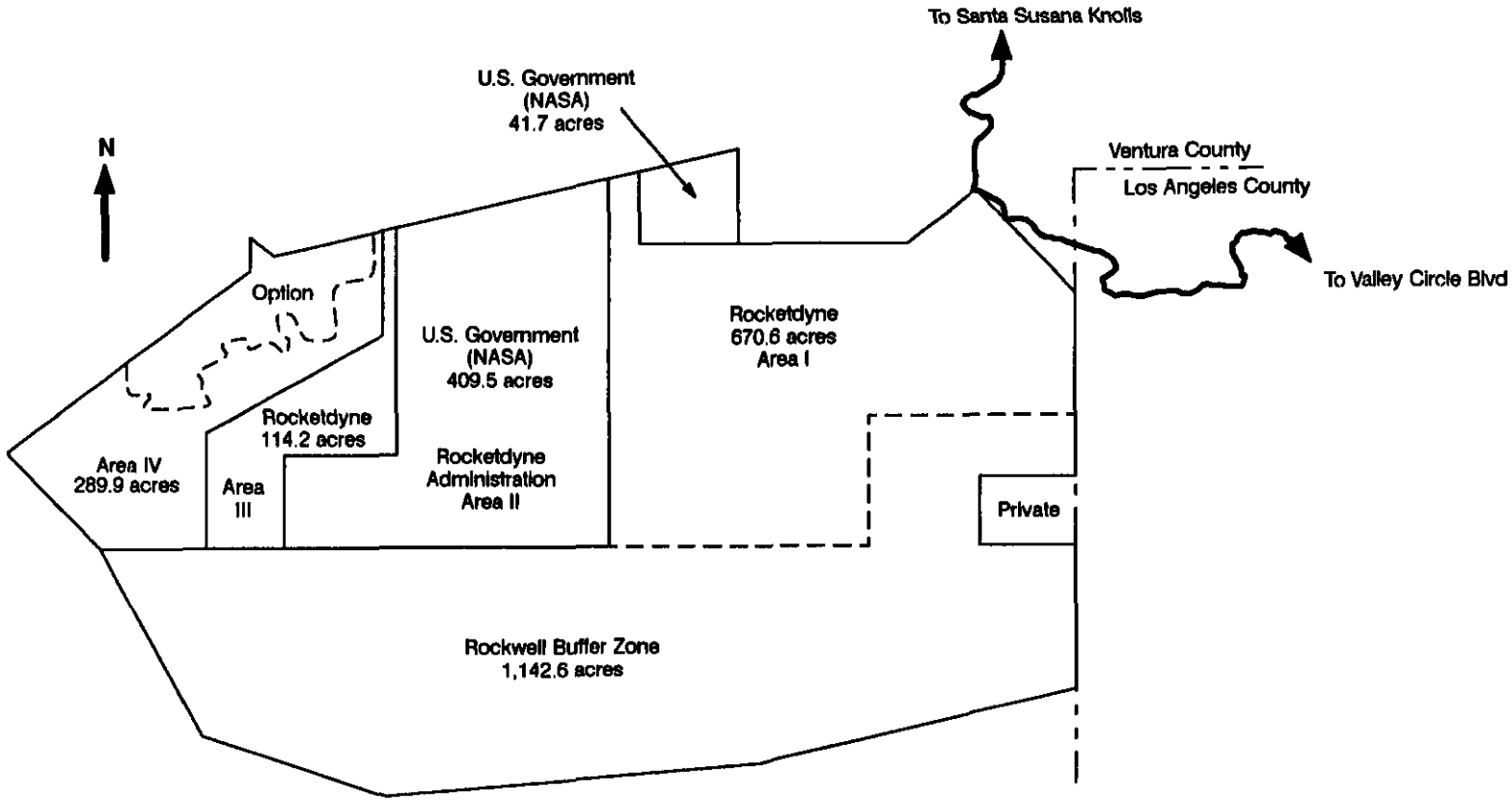
A portion of Area I and all of Area II are owned by the U.S. Government and assigned to the National Aeronautics and Space Administration (NASA). A portion of Area IV is optioned to the Department of Energy (DOE).

The purpose of this report is to present information on environmental and effluent monitoring primarily for the regulatory agencies involved in controlling environmental remediation, i.e., the U.S. DOE, the Nuclear Regulatory Commission (NRC), and the California State Department of Health Services (DHS) Radiologic Health Branch (RHB). For that reason, information concentrates on Area IV at SSFL as this is the site of the former nuclear operations. While the major area of interest is radiological, this report also includes a discussion of nonradiological monitoring at SSFL.

Areas I, II, and III have been used for developing and testing rocket engines and propellants, lasers, and other energy technologies since 1954. No operations with nuclear fuel or nuclear reactors were conducted in those areas. Since 1956, Area IV has been used for work with nuclear materials, including fabricating nuclear reactor fuels, testing nuclear reactors, and disassembling used fuel elements. This work ended in 1987 and subsequent efforts have been directed toward D&D of the former nuclear facilities.

Work in nuclear energy R&D in what has become the Rocketdyne Division of Rockwell International Corporation began in 1946. During the evolution of these operations, small test and demonstration reactors and critical assemblies were built and operated, reactor fuel elements were fabricated, and used reactor fuel elements were disassembled and declad. These projects have been completed and terminated over the past 30 years. Most of this work was performed at SSFL and is described in detail in "Nuclear Operations at Rockwell's Santa Susana Field Laboratory—A Factual Perspective" (refer to the bibliography, Appendix B). No work with nuclear materials has been conducted since 1987, and the only work related to these operations during 1992 was the ongoing cleanup and decontamination of the remaining inactive nuclear facilities.

The nuclear operations have been conducted under State and Federal licenses and under contract to DOE and its predecessors. In October 1989, the NRC Special Nuclear Materials License was



Subdivisions				
Owner	Jurisdiction	Acres		Option
Rockwell	Rocketdyne - Area IV Rocketdyne Rockwell (Buffer)	289.9 784.8 1,142.6	→ 2,217.3	90.26
Government	NASA (former AFP 57) NASA (former AFP 64)	409.5 41.7	451.2	
Total Acres			2,668.5	

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Figure 2–1. Santa Susana Field Laboratory Site Arrangement

amended to permit only a minor amount of nuclear material for research purposes. Since then, the license has been further amended to permit only decommissioning operations.

The location of these sites in relation to nearby communities is shown in Figures 2-2 and 2-3. Undeveloped land surrounds most of the SSFL site. There is occasional cattle grazing on the southern portion and some avocado groves at the northeastern boundary. No significant agricultural land use exists within 30 km (19 miles) of the SSFL site. While the land immediately surrounding SSFL is undeveloped, at greater distances there are suburban residential areas. For example, 2.7 km (1.7 miles) toward the northwest from Area IV is the closest residential portion of Simi Valley. The community of Santa Susana Knolls lies 4.8 km (3.0 miles) to the northeast, and a small truck farm exists approximately 7 km (4.4 miles) to the northeast. The Bell Canyon area begins about 2.3 km (1.4 miles) to the southeast, and the Brandeis-Bardin Institute is 2.9 km (1.8 miles) to the north. A sand and gravel quarry was operated approximately 2.4 km (1.5 miles) to the west but is now deserted.

The Los Angeles basin is a semiarid region whose climate is controlled primarily by the semipermanent Pacific high-pressure cell that extends from Hawaii to the Southern California coast. The seasonal changes in the position of this cell greatly influence the weather conditions in this area. During the summer months, the high-pressure cell is displaced to the north. This results in mostly clear skies with little precipitation. During the winter, the cell moves sufficiently southward to allow some Pacific lows with their associated frontal systems to move into the area. This produces light to moderate precipitation with northerly and northwesterly winds.

The release of airborne material at De Soto during the summer would generally be under a shallow inversion layer. Contrary to the situation at De Soto, the base and top of this inversion layer usually lie below the elevation of the SSFL site. Thus, any atmospheric release from the SSFL site during the summer would likely result in considerable atmospheric dispersion above the inversion layer prior to any diffusion through the inversion layer into the Simi or San Fernando Valleys. In the winter season, surface airflow is dominated by frontal activity moving easterly through the area. Storms passing through the area during winter are generally accompanied by rainfall. Airborne mixing varies depending on the location of the weather front relative to the site. Generally, a light to moderate southwesterly wind precedes these storms, introducing a strong onshore flow of marine air and producing slightly unstable air. Wind speeds increase as the frontal systems approach, enhancing mixing and dispersion. Locally, average wind speeds range from 0 to about 4.4 m/s, mostly from the north and northwest.

Surrounding the De Soto complex is light manufacturing, other commercial establishments, apartment buildings, and single-family houses. With the exception of the Pacific Ocean about 20 km (12 miles) south, no recreational body of water of noteworthy size is located in the surrounding area. Four major reservoirs providing domestic water to the greater Los Angeles area are located within 50 km (30 miles) of SSFL. However, the closest reservoir to SSFL (Bard Reservoir) is more than 10 km (6 miles) from Area IV. The nearest groundwater well that is used for a municipal water supply is more than 16 km (10 miles) from Area IV, north of Moorpark.

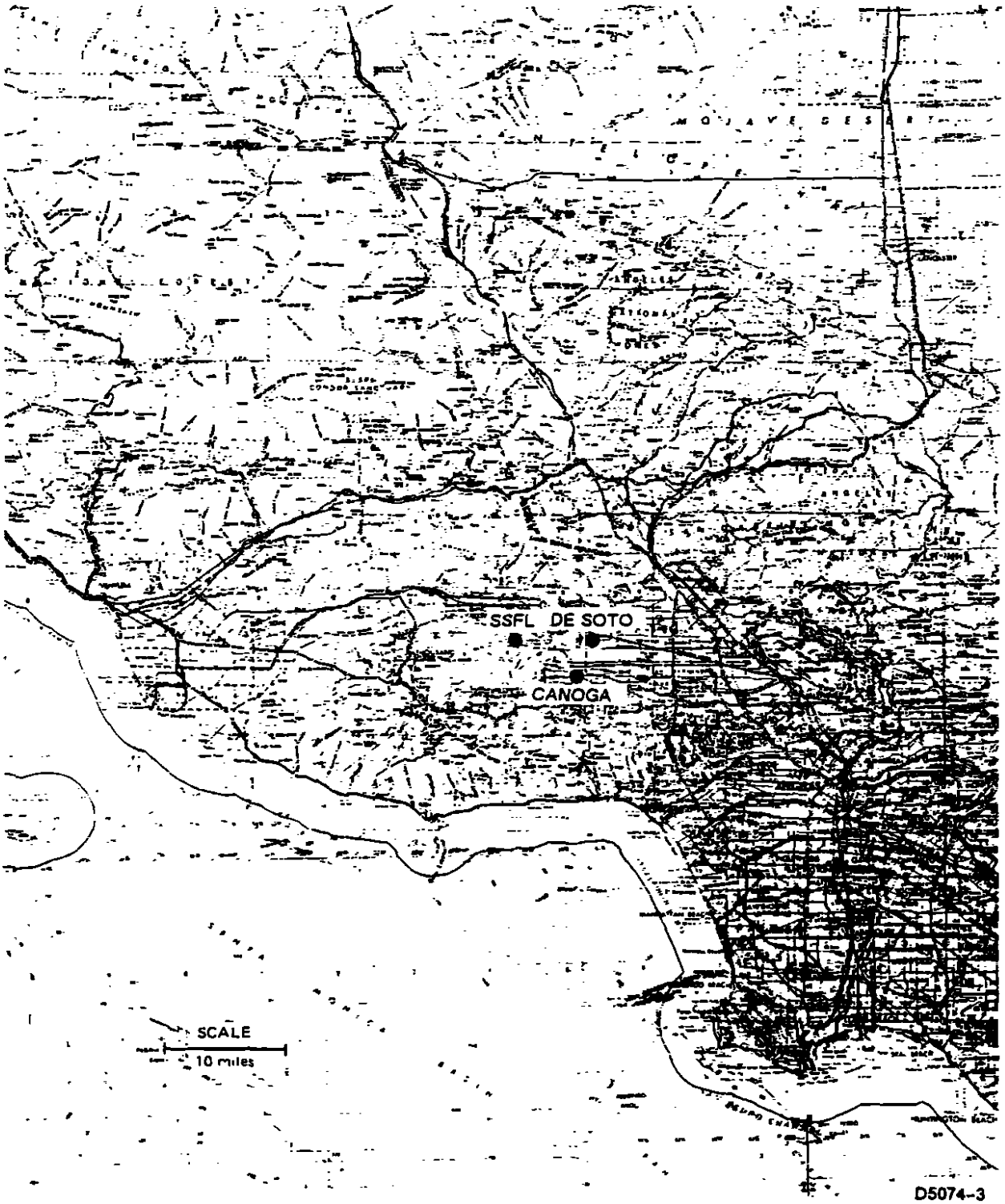

Figure 2–2. Map of General Los Angeles Area Showing Locations of Major Rocketdyne Facilities

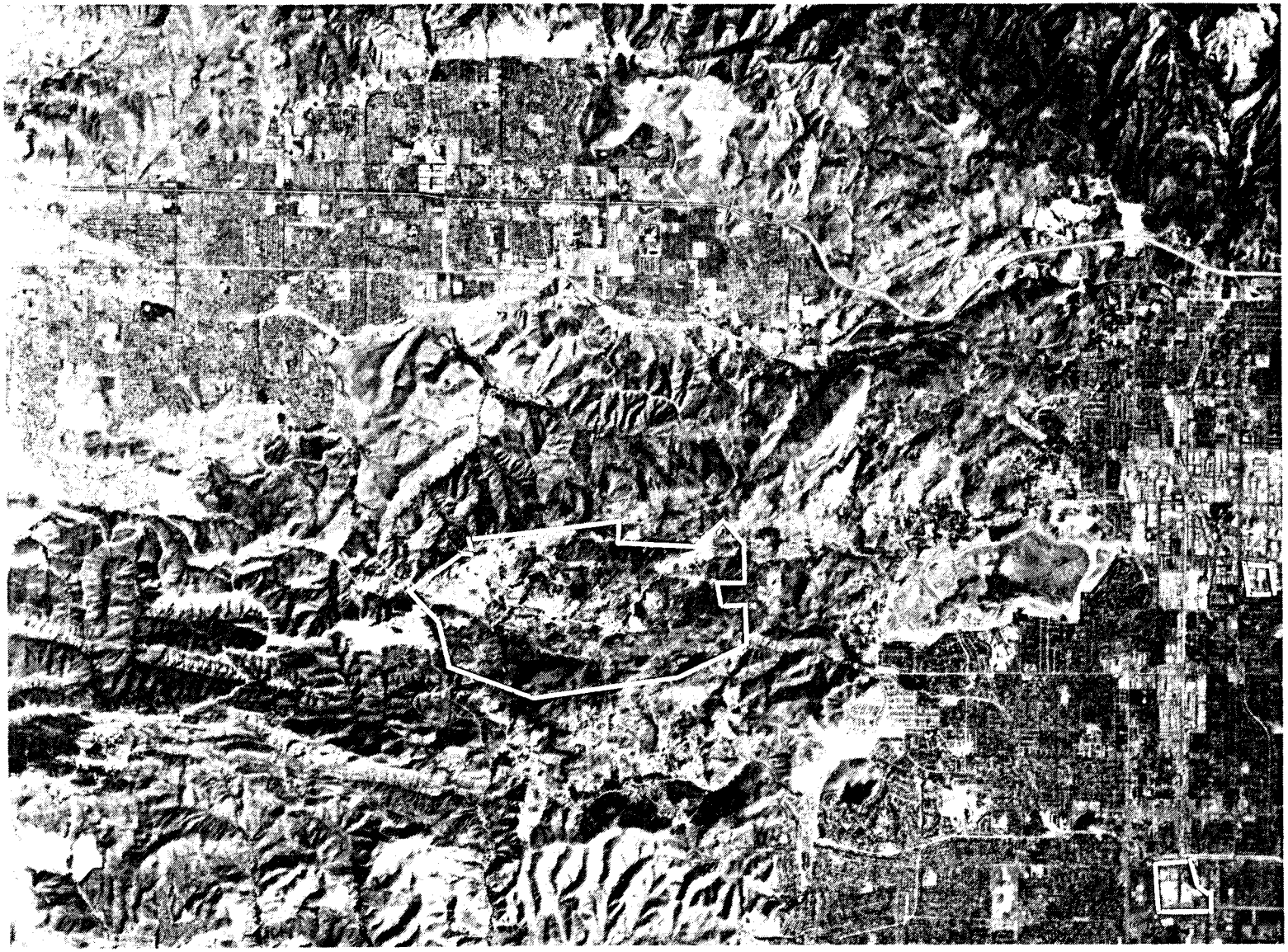

Figure 2–3. Area Surrounding SSFL (De Soto Site is Due East of SSFL, at Right Edge of Photo; Canoga Site, Lower Right Corner)

The SSFL site (Figure 2–4) occupies 2,668 acres located in the Simi Hills of Ventura County, approximately 48 km (30 miles) northwest of downtown Los Angeles. The SSFL site is situated on rugged terrain which typifies mountain areas of recent geological age. Elevations of the site vary from 500 to 700 m (1,650 to 2,250 ft) above sea level (ASL). Rockwell International– and DOE–owned facilities (Figure 2–5) share the Area IV portion of this site.

Within Area IV of the SSFL site is a 90–acre government–optioned area where DOE contract activities are conducted. Most of the work is performed by the Energy Technology Engineering Center (ETEC). The major operational nuclear installation within the DOE–optioned area is the Radioactive Materials Disposal Facility (RMDF). This facility has been used for storage of sealed irradiated fuel and for packaging radioactive wastes resulting from nuclear facility decommissioning operations. No nuclear fuel has been present at the RMDF since May of 1989 when the last packages of disassembled Fermi–reactor fuel were shipped to another DOE site. Radioactively contaminated water from the decontamination operations is evaporated and the sludge is dried and disposed as packaged dry waste together with other dry wastes at a DOE disposal site. Work proceeds on removal of the last significant amounts of radioactive material, in the form of activated steel and concrete, in the reactor test vault of Building T059.

Sealed radiation sources are used at several facilities for process monitoring. The SSFL site also contains facilities in which operations with nuclear materials licensed by the NRC and radioactive materials licensed by the State of California were conducted. The principal licensed facilities are the Rockwell International Hot Laboratory (RIHL) (Building 020) and the radiation instrument calibration laboratory.

Licensed programs conducted during 1992 were directed toward D&D of the RIHL, which was last used for nuclear reactor fuel disassembly in 1987.

Some research licensed by the State of California using radioactive materials is conducted at the De Soto site (Figure 2–6) in the Building 104 Applied Nuclear Technology laboratories and in the Gamma Irradiation Facility. The De Soto location is at an altitude of 267 m (875 ft) ASL.

2.1 FACILITY DESCRIPTIONS

2.1.1 Santa Susana Field Laboratory Site

2.1.1.1 RIHL—NRC and California State–Licensed Activities

Operations at Building 020 that may have generated radioactive effluents in the past consisted of hot cell examination and decladding of irradiated nuclear fuels and examination of reactor components. Only filtered atmospheric effluents are released from the building during D&D activities. Since Building 020 was shut down in 1989, only decontamination of the facility was performed in 1992. No radioactive liquids are released from the facility. Prior radioactive material handled in unencapsulated form in this facility included the following radionuclides that are present in minor

Figure 2-4. Rocketdyne Division – Santa Susana Field Laboratory Site, Area IV

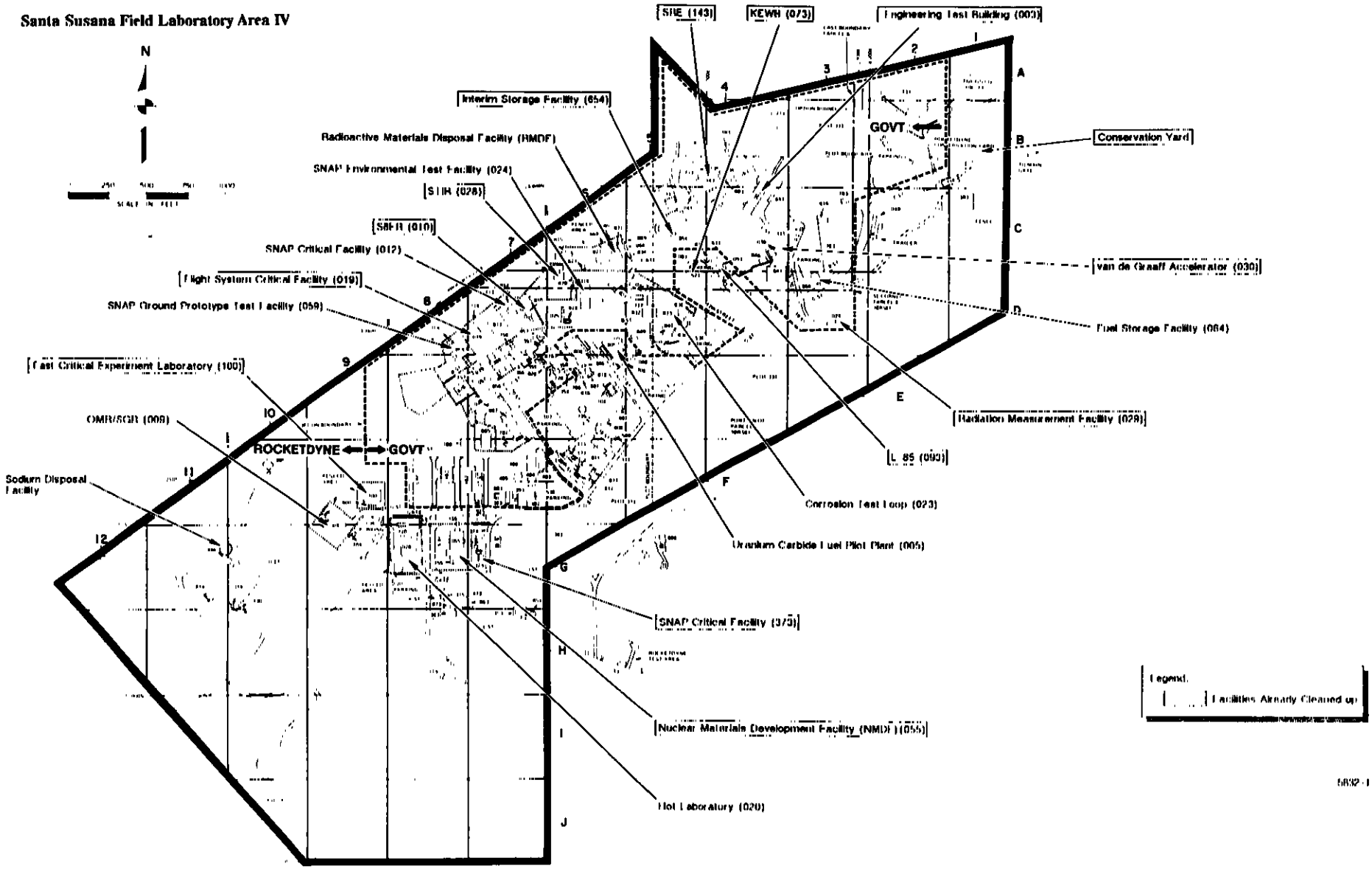

Figure 2–5. Map of Santa Susana Field Laboratory Area IV Facilities

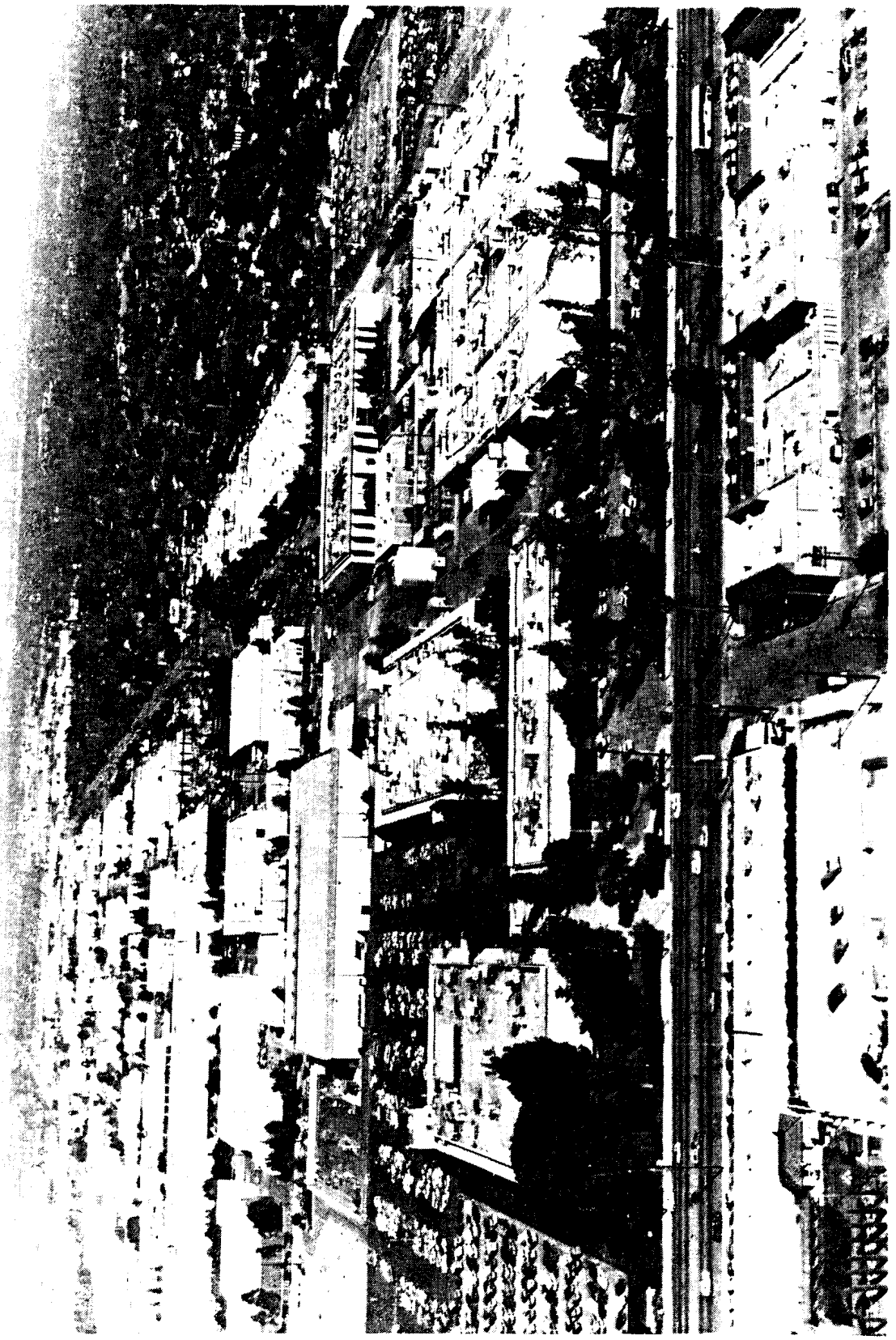

Figure 2-6. Rocketdyne Division – De Soto Site

amounts as facility contamination: U, Pu, as constituents in the various fuel materials; and Cs–137, Sr–90, and Pm–147 as mixed fission products.

2.1.1.2 RMDF—DOE Contract Activities

Operations at Buildings 021 and 022 that may generate radioactive effluents consist of the processing, packaging, and temporary storage of liquid and dry radioactive waste material for disposal. Only filtered atmospheric effluents are released from the building to uncontrolled areas. No radioactive liquids are released from the facility. Contamination from nuclear fuel and decontamination operations contains uranium and plutonium plus Cs–137, Sr–90, and Pm–147 as mixed fission products, and Co–60 and Eu–152 activation products.

2.1.1.3 Building T059—DOE Contract Activities

Operations at Building T059 that may generate radioactive effluents consist of removal of activated steel and concrete as part of the D&D of this former Systems for Nuclear Auxiliary Power (SNAP) reactor ground test facility. Only filtered atmospheric effluents are released from the building to uncontrolled areas. No radioactive liquid waste is released from the facility. Activation products consist primarily of Fe–55 and Co–60, some minor amounts of Eu–152, and minimal amounts of H–3.

2.1.2 De Soto Site

2.1.2.1 Building 104—California State–Licensed Activities

Operations at Building 104 that could have generated radioactive effluents consist of research studies in applied physics and physical chemistry. Only minimal quantities of filtered atmospheric effluents are released from the building to uncontrolled areas. No liquid effluents are released. Radionuclides present are limited to Co–60 in encapsulated form.

2.1.3 Canoga Site

Insufficient quantities of radioactive materials are used at the Canoga facility to warrant environmental monitoring.

3.0 COMPLIANCE SUMMARY

This section summarizes Rocketdyne's compliance with federal, state, and local environmental regulations. Two main categories are discussed; Section 3.1 discusses compliance status, and Section 3.2 discusses current issues and actions.

3.1 COMPLIANCE STATUS

3.1.1 Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) provides for the cleanup and emergency response for hazardous wastes released into the environment. The Superfund Amendments and Reauthorization Act (SARA) extended and revised CERCLA. SARA provides for emergency planning and preparedness, community right-to-know reporting, and toxic chemical release reporting. SARA requires a facility owner or operator to report hazardous substance releases to specific authorities, depending on the materials.

CERCLA was amended and strengthened by SARA in 1986. SARA adds provisions unrelated to preexisting CERCLA provisions. Title III of SARA created extensive hazardous material reporting, community right-to-know and emergency response planning provisions. ETEC fully complies with SARA Title III. The SSFL Hazardous Materials Release Response Business Plan and Inventory was issued to Ventura County Bureau of Fire Protection, addressing the following SARA Title III provisions:

1. Planning Emergency Response (Sections 301-303)
2. Reporting Leaks and Spills (Sections 304-305)
3. Reporting Chemical Inventories (Sections 311-312).

SARA Title III also addresses reporting released of toxic chemicals (Section 313). ETEC annually submits a Section 313 report to the EPA for toxic chemicals handled at ETEC facilities exceeding the reporting thresholds. The 1 July 1993 report covers the emissions for the year 1992. Two materials were reported for Area IV that exceeded the 10,000-lb use requirement, ammonia with emissions in compliance with the VCAQCB air permit and sulfuric acid which is completely used in the process with no emissions.

A Preliminary Assessment/Site Investigation (PA/SI) review of Area IV dated 11 August 1989 and transmitted to the ETEC on April 1990 was conducted by the EPA Site Evaluation Section. Prior to ranking the facilities. the EPA had requested additional air monitoring be provided for SSFL. Rocketdyne submitted the last quarterly status report in June 1992. The EPA has contracted an outside contractor, PRC Inc., to assist in the ranking of the facilities. ETEC will continue to periodically verify the status of the ranking.

3.1.2 Resource Conservation and Recovery Act

The RCRA gives the EPA broad authority to regulate the treatment, storage, and disposal of hazardous wastes. The Energy Technology Engineering Center (ETEC) Area IV has 14 underground storage tanks, 3 radioactive water and 11 sodium, that have been previously permitted by the Ventura County Environmental Health Division (VCEHD). In 1991, VCEHD removed these tanks from the permitting process. ETEC and VCEHD have been reviewing the tank histories and the permit requirements as they pertain to these tanks. The three radioactive water storage tanks will be exempt from permitting by the VCEHD per Article 2, Section 2621.a.11, Exemptions, California Underground Storage Tank Regulations, which states "Tanks containing radioactive material that are regulated by another Federal, State or Local Agency." The 11 sodium tanks are being reviewed by VCEHD for permitting in 1993.

There are two RCRA–permitted Treatment, Storage, and Disposal Facilities (TSDFs) owned by DOE and operated by Rocketdyne at SSFL. The Radioactive Materials Disposal Facility (RMDF) is an interim status facility. The Hazardous Waste Management Facility (HWMF), Buildings 133 and 029, is a fully permitted facility.

The Part B renewal was submitted for Buildings 133 and 029 to Cal–EPA Department of Toxic Substances Control (DTSC). A Notice of Deficiency (NOD) was issued to Rocketdyne (letter dated 27 June 1991) on the Part B permit application. Each of the items referenced in the NOD were addressed and the Part B NOD response was resubmitted 28 August 1991. On 18 September 1992 Cal–EPA DTSC transmitted a list of items for Rockwell to incorporate and/or modify and a checklist of requirements for the Facility Operating Plan. The Facility Operating Plan was modified and updated to include all items on the checklist. After approval by the DOE the new Facility Operating Plan was transmitted to DTSC on 28 January 1993. These facilities are permitted for reactive materials treatment and storage only. There is no on–site disposal of waste from these facilities.

Characterization of the groundwater at the site continues. In 1991, six monitoring wells were constructed less than 200 feet off–site and northwest of Area IV that indicate the presence of trichloroethylene (TCE) at concentrations exceeding the drinking water standard.

Rocketdyne submitted the Sampling and Analysis Plan (SAP) for the SSFL groundwater monitoring program to Cal–EPA DTSC on 1 March 1991. On 11 March 1991, Rocketdyne received two Reports of Violation (ROVs) concerning the groundwater monitoring program for Areas I and III (Rocketdyne–owned) and Area II (NASA–owned) from Cal–EPA DTSC. Rocketdyne was advised by DTSC that Area IV groundwater monitoring activities are subject to the same regulations.

In response to the ROVs, a Site Characterization Plan (SCP) was prepared and submitted to Cal–EPA DTSC on 6 June 1991. Cal–EPA approved the SCP on 6 August 1991. The SSFL groundwater Quality Assessment Plan (QUAP) was prepared and submitted to Cal–EPA in response to the ROVs on 30 October 1991.

The next phase of the groundwater site characterization program, "Proposed Interim Well Construction Plan," was prepared and submitted to DTSC in August 1992. DTSC approved the plan

in November 1992. This plan proposed the construction of 48 new wells, 8 of which are located in Area IV. Well RD-50, completed in May 1993, will assess hydrologic and water quality conditions along the Burro Flats Fault south of the Former Sodium Disposal Facility. The construction of the remaining seven wells is scheduled to begin later in 1993.

3.1.3 National Environmental Policy Act

The National Environmental Policy Act (NEPA) establishes a national policy to ensure that consideration is given to environmental values and factors in federal planning and decision-making. For those projects or actions that are expected to either affect the quality of the human environment or create controversy on environmental grounds, the DOE assures that appropriate NEPA milestones (Categorical Exclusion [CX], Environmental Assessment [EA], Finding of No Significant Impact [FONSI], or Notice of Intent [NOI], draft Environmental Impact Statement [EIS], final EIS, Record of Decision [ROD]) have been incorporated into project planning documents. The DOE has implemented the NEPA as defined in Federal Register Volume 57, Number 80, pages 15122 through 15199.

ETEC subjectively assesses the environmental impact of each project planned for implementation. Based on the assessments, DOE is requested to issue determinations of compliance to the NEPA. In Calendar Year 1992, ETEC submitted 24 requests for NEPA determinations, see Appendix D. Twenty-three were issued as "Categorical Exclusion" determinations and one was rejected for no action. ETEC has either requested NEPA determinations for projects planned for Calendar Year 1993 or is in the process of assessing the environmental affects of the projects in preparation for making a submittal.

3.1.4 Clean Air Act

The Clean Air Act (CAA) resulted in federal regulations that set air quality standards and require state implementation plans, National Emissions Standards for Hazardous Air Pollutants (NESHAPs), New Source Performance Standards (NSPS), and monitoring programs in an effort to achieve air quality levels which improve the public health and welfare. The SSFL is regulated by the Ventura County Air Pollution Control District (VCAPCD) and must comply with VCAPCD rules and regulations. VCAPCD rules and regulations incorporate, by reference, NESHAPs regulations as codified under the CAA.

3.1.4.1 Radiological

The results of radiological environmental monitoring indicate that there are no significant releases of man-made radiological material from Rocketdyne sites. Atmospheric discharge of radioactive materials and direct exposure are the only significant pathways to the general public from Rocketdyne's environmental remediation and waste management operations.

Small amounts of radioactive materials may be released in ventilation exhaust from facilities at SSFL and De Soto, along with naturally occurring airborne radioactivity. These releases are minimized by the use of high-efficiency particulate air (HEPA) filters, and are continuously monitored by

sampling the workplace air and the exhaust effluent. Radionuclide-specific analyses determine the radioactive composition of the effluents, and maximum off-site doses at the nearest residence are estimated by use of the EPA computer program CAP88-PC. The maximum individual annual exposure was estimated to be 1.6×10^{-6} mrem/yr for DOE operations at the SSFL. Operations at the Rockwell International Hot Laboratory (RIHL) and the De Soto site were estimated to have resulted in 3.3×10^{-7} mrem/yr and 2.6×10^{-6} mrem/yr, respectively. All effective dose equivalents for the maximally exposed individual are far below the EPA NESHAPs limit of 10 mrem/yr as specified in 40 CFR 61, Subpart H (DOE facilities) and Subpart I (licensed facilities).

Evaluation of potential point sources and distributed sources of airborne radioactivity were conducted to estimate likely and maximum potential public radiation doses due to these sources. Sampling and analysis methods and the sensitivity of the dose assessment program to meteorological and demographic data were also considered. These studies showed that predicted doses, with the assumption that filtration equipment is absent, were below 1% of the EPA NESHAPs standard. A review team from EPA Region IX and DOE-SF visited SSFL at the end of March 1992 to consider these matters relative to compliance with Subpart H of 40 CFR 61 (NESHAPs for radionuclides at DOE facilities). The team concluded that the studies and the results of the monitoring, analysis, and interpretation were adequate to demonstrate compliance.

3.1.4.2 Nonradiological

The Hazardous Waste Management Facility (HWMF), Kalina Plant, Sodium Pump Test Facility (SPTF), Molten Salt Test Facility (MSTF), Sodium Component Test Installation (SCTI), and wipe cleaning operations, as well as offsets for ETEC's Area I bowl area were combined into one permit. The new permit was issued 27 May 1992, valid 1 January 1992 to 31 December 1992.

VCAPCD Rule 74.15, as adopted in March 1989 and revised in December 1991, sets limits for oxides of nitrogen (NOX) and carbon monoxide (CO) emissions on boilers, steam generators, and process heaters. The SCTI finished installing the new low-NOX burners in 1991 as well as the carbon monoxide continuous emissions monitoring system. An extended variance to the rule was applied for and granted, running through 31 December 1992 to allow for source testing and adjusting of the H-1 and H-2 sodium heaters and the H-101 boiler to bring them into compliance. A further extension of the variance to 30 November 1993 was granted. The 0271 Permit renewal for 1993 was submitted on 26 March 1993. Since ETEC was operating under Variance 392-2, until the Rule 74.15 is modified or 30 November 1993 which ever comes first, VCAPCD may not issue the renewal permit until that time. VCAPCD has assured ETEC that ETEC is not in violation as long as VCAPCD is reviewing the permit renewal.

VCAPCD has inspected the facilities in Area IV four times during 1992 and the first four months of 1993. There were no Notices of Violation issued from these inspections. The inspections consisted of the 18 February 1992 annual permit inspection, the 26 March 1992 quarterly H-1 and H-2 heater data collection and verification inspection, the 29 February 1993 annual permit inspection, and the 7 April 1993 evaluation of SCTI inspection in preparation of modifying VCAPCD Rule 74.15.

Asbestos removal projects occurring during 1992 removed and disposed of a total of 750 ft^2 of floor tile and mastic and 245 ft^2 of insulation, transit, and wall board.

3.1.5 Clean Water Act

The Clean Water Act (CWA) is the primary authority for water pollution control programs, including the National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES program regulates point source discharges to navigable waters, the preparation of Spill Prevention Control and Countermeasure (SPCC) plans, and the discharge of stormwater runoff associated with industrial activity.

SSFL surface water discharges are regulated under the California Water Code (Division 7) as administered by the California Regional Water Quality Control Board (CRWQCB). The State Waste Discharge Requirement (WDR) program incorporates the regulations and guidelines of the CWA. Waste discharge requirements under the CRWQCB program serve as NPDES permits. The existing SSFL NPDES Permit (CA0001309), which was due to expire in 1988 but was extended, remained in force throughout 1992, and underwent significant modifications as a result of intensive negotiations surrounding the renewal process. Significant modifications to the permit and other current issues are discussed in Section 3.2.4.

During periods of rainfall, water grab samples are acquired during each rain event at the discharge points for the perimeter pond, pond R2A, and the five stormwater catch basins. When rainfall occurs more than once a week or continuously, samples are taken weekly. Otherwise, the perimeter pond and pond R2A are monitored per discharge during nonrainfall periods. When discharge occurs continuously in excess of one month, monthly sampling occurs.

Pursuant to the California Aboveground Petroleum Storage Act, ETEC submitted an aboveground petroleum storage statement to the State Water Resources Board along with a required biennial fee in February 1993.

3.1.5.1 Radiological

All liquid radioactive wastes are processed for subsequent disposal at DOE disposal sites. Liquid radioactive wastes are not released into the environment and do not constitute an exposure pathway. Groundwater and surface water are sampled and analyzed to assure detection of any man–made radioactivity.

At SSFL, a large number of groundwater monitoring wells are sampled and analyzed periodically and no indication of man–made radioactivity has been found, with the exception of low levels in a localized area (maximum of 7,069 pCi/L) of tritium, considerably below the Federal and State standard for drinking water supply limit of 20,000 pCi/L.

The french drain is sampled weekly at Building 059 as part of the groundwater management program. These samples are tested for any transfer of gamma–emitting activation products from the underground reactor test vault containment into the surrounding soil by gamma spectroscopy.

Activated materials include Co-60 and Eu-152, both of which are easily detected, and none has been found. Very low concentrations of tritium have been found (471 pCi/L), which also are well below Federal and State drinking water supply limits.

Surface water from two NPDES discharge points and five storm water runoff catch basins were also monitored for gross alpha, gross beta, gamma-emitting radionuclides, and tritium. No man-made radioactivity has been found.

Effective 7 December 1992, the Rocketdyne NPDES permit requires radiological measurements of gross alpha, gross beta, tritium, Strontium-90, Radium-226, and Radium-228.

3.1.5.2 Nonradiological

Throughout Calendar Year 1992, discharges associated with the SSFL NPDES permit were for the most part in consistent compliance with discharge standards. Incidents of noncompliance which did occur revolved around the operation of two on-site sewage treatment plants. The Area III sewage treatment plant, which receives waste from Area IV, experience relatively minor instances of noncompliance with average turbidity standards, and biological oxygen demand removal rates. These instances of noncompliance were attributed to severe rainfall affecting the plant operations and reducing treatment efficiency.

3.1.6 Miscellaneous

3.1.6.1 U.S. DOE Tiger Team Assessment

The U.S. DOE conducted a Tiger Team Assessment of ETEC from 18 March to 12 April 1991, using a team composed of DOE staff, contractors, and consultants. The April 1991 Tiger Team Assessment Report identified 39 environmental findings. Twenty-two findings were generally in compliance with Federal and State of California environmental regulations; however, noncompliance existed with regard to DOE's environmental order requirements. Seventeen findings represented conditions in which best management practices were not being employed. A Corrective Action Plan presenting the organizational structure, management systems, and specific responses, including milestone dates and funding requirements, was submitted 1 October 1991. ETEC has lead responsibility on 33 of the 39 action plans, 10 action plans have had all milestones completed and have been submitted to the DOE for validation. Letters of validation for closure of two action plans have been received from the DOE site office (reference DRF 2324, 9 October 1991, and DRF 0540, 27 March 1992). The DOE site office has lead responsibility for 6 of the 39 action plans, 3 action plans have all milestones completed.

3.1.6.2 Building 886 Former Sodium Disposal Facility Closure Order

The Building 886 Former Sodium Disposal Facility was used for removing solid sodium and sodium-potassium alloys from various metal components. The site consists of two earth-bermed impoundments, the Upper and Lower Ponds, and a concrete pad and pit area. The site is listed as a

Solid Waste Management Unit (SWMU) with Cal-EPA. This site was also considered a Toxic Pit under the Toxic Pits Cleanup Act (TPCA) by the CRWQCB. On 30 April 1991, CRWQCB issued Cleanup and Abatement Order 91-061 to Rockwell International Corporation and the DOE, for whom the site was operated. This order required the closure of the Lower Pond surface impoundment and the issuance of a plan for postclosure care and groundwater monitoring by 31 December 1992.

A closure plan, as required as part of the order, was prepared and submitted to both the Cal-EPA and the CRWQCB on 31 July 1991. An NOD was issued from both agencies on 1 November 1991 on the closure plan, and these comments were addressed and responded to in a letter from Rocketdyne on 3 January 1992. Both agencies sent final clarification letters and agreements on 11 February 1992 which would allow approval of the plan and permission to begin remedial activities at the site if concurred with by Rocketdyne. Letters of concurrence were sent to each agency from Rocketdyne on 20 February 1992. Cal-EPA also sent two further letters of clarification on 19 February and 10 March 1992. The contents of the Closure Plan and these letters constitute an approved plan for closure of the site. Following the removal of more than 7,000 yd^3 of soil from the Lower Pond, CRWQCB officially closed the Lower Pond pending postclosure sampling results under TPCA on 29 December 1992. Excavation of the upper pond and portions of the western area continues.

The DOE-imposed moratorium on the removal of hazardous material from Radioactive Materials Management Areas (RMMA) was lifted during the excavation of the Lower Pond.

3.1.6.3 Public Participation

Ongoing quarterly meetings of the EPA-organized SSFL Work Group, consisting of representatives of various regulatory agencies and several EPA-appointed local residences, were supported with information regarding environmental monitoring, both radiological and nonradiological, and remediation activities.

Two guided bus tours of SSFL were provided for the public during 1992. These tours were available to interested persons by reservation and covered the entire SSFL site. A total of 343 people from the Los Angeles area participated in these tours. Information on operations, environmental conditions, and decontamination projects, and opportunity for questions and discussions with appropriate staff members, were provided to the visitors.

3.1.6.4 Multi-Media Sampling

During 1992 the extensive Multi-Media Sampling program was conducted on properties to the north of the SSFL boundary. A final report of the results of this study was issued 10 March 1993. Appendix C summarizes the findings.

3.1.6.5 Site Boundary Exposures

The external radiation exposure estimates at the maximum exposed boundary location and at the nearest residence are based on results for site ambient radiation dosimeters and several facility workplace radiation dosimeters. The external exposure from direct radiation at the maximum exposed boundary location for the SSFL was estimated to correspond to an average annual dose of about 15 mrem above natural background. A similarly calculated value of 0.0001 mrem/yr was found for the nearest residence. These values are considerably below the DOE long-term limit of 100 mrem/yr. The external radiation exposure estimates for the De Soto facility are 0.32 mrem/yr and 0.21 mrem/yr for the site boundary and the nearest residence, respectively. These values are far below the State of California limit of 500 mrem/yr.

3.2 CURRENT ISSUES AND ACTIONS

3.2.1 Environmental Monitoring Plan

The DOE-SF self-assessment, the ETEC self-assessment, and the Tiger Team assessment acknowledged the requirement for Rocketdyne to prepare an environmental monitoring plan (for both radiological and nonradiological monitoring) and for DOE-SF to provide funds for the preparation and implementation of such a plan to meet the requirements of DOE Orders 5400.1, 5400.5, draft 10 CFR 834, and DOE/EH-0173T. Preparation of a comprehensive plan was completed and submitted to DOE 30 September 1992. Comments from DOE were received and incorporated into a revision that was submitted 3 May 1993. ETEC also prepared a comprehensive Site Characterization Plan (SCP) and submitted it to DOE 31 March 1993. The impending closure of ETEC due to termination of funding from DOE Nuclear Energy should not have a significant effect on the environmental monitoring program. Remediation of buildings and land will continue under funding from DOE Environmental Management, as will implementation of the new environmental monitoring program.

3.2.2 Epidemiological Study

As a result of attention associated with DOE activities, the State of California legislators called for an epidemiological study of workers and local communities. The California Public Health Foundation has been awarded DOE grant funds and in February 1993 an advisory panel selected the University of California at Los Angeles to perform the study. The 18-month study will cover radiological and nonradiological health effects on workers.

3.2.3 Resource Conservation and Recovery Act

Pursuant to Health and Safety Code, Section 25187, Cal-EPA, Region 3, DTSC has issued a Stipulated Enforcement Order (the Order) to Rockwell International Corporation regarding SSFL.

Under the Hazardous and Solid Waste Amendments of 1984 (HSWA), RCRA facilities are generally brought into the corrective action process when an agency is considering a permit application for the facility or when a release justifying action under Section 3008(h) is identified. The SSFL was initially subject to the corrective action process in 1989 when EPA, Region IX, and the former

DHS were reviewing a Part B permit application for the SSFL. EPA partially completed the agency-conducted RCRA Facility Assessment (RFA) and has issued an interim final on the RFA (10 July 1991). The EPA has performed the Preliminary Assessment Report (i.e., record search) and the Visual Site Inspection portions of the RFA process. However, the sampling visit step of the RFA process was not conducted by the EPA to confirm or disprove suspected releases.

The State of California has since obtained final RCRA authorization and has become the lead agency in implementing the corrective action process for the SSFL. Rockwell will perform soil sampling at various SWMUs and Areas of Concern (AOC) that were identified in the RFA report. This activity will be equivalent of the sampling visit. This will enable Rockwell to determine if further action and/or interim measures will be necessary for SWMUs to be incorporated into the RCRA Facility Investigation (RFI). A schedule for the RFI will be developed after completion of the Rockwell sampling.

There are 11 SWMUs and 3 AOCs in Area IV. RFA sampling activities have been conducted at Building 005 Coal Gasification and the RIHL (Building 020).

3.2.4 Clean Water Act

The revised NPDES permit was adopted by the CRWQCB on 7 December 1992, and became effective on 17 December 1992. There were many significant modifications to the permit with the potential to effect compliance, including the addition of five Area IV runoff points as permitted stormwater discharge outfalls, and the establishment of inland surface water quality objectives as effluent standards for off-site discharge of storm and industrial wastewater via the SSFL reclamation system. The revised permit also contains significant modifications to the constituents and frequencies included in the required monitoring and reporting program, and a requirement to develop and implement a Stormwater Pollution Prevention Plan. This plan is currently under development and includes by reference many existing pollution prevention plans, policies, and procedures.

As a result of the formerly unpermitted Area IV stormwater runoff locations becoming permitted outfalls, a formal monitoring and reporting program for these outfalls was established, in addition to the adoption of effluent standards for conventional pollutants and radionuclides. Initial monitoring conducted during 1993 indicates consistent compliance is being achieved for stormwater runoff at the five Area IV outfalls. However, due to the heavy rains received, the Area III sewage treatment plant has again experienced noncompliance with average turbidity treatment standards. A project to replace a damaged sewer line (thought to be the main source of infiltration) has completed the design stage and is scheduled for construction in 1993.

3.2.5 Building 886 Former Sodium Disposal Facility

Rocketdyne is now in the process of removing soils suspected of being contaminated from the Building 886 Upper Pond and western areas. Cal-EPA now has jurisdiction for the closure of the Building 886 facility as an SWMU. Completion of the remaining excavation activities is expected in December 1993.

3.2.6 Permits and Licenses (Area IV)*

Air (VPAPCD)

Permit	Facility	Valid
0271	New combined permit	1/1/92 - 12/31/92 VPAPCD reviewing 1993 submittal

Treatment Storage (EPA)

CAD000629972	Hazardous Waste Management Facility (B/133 and B/029)	Part B renewal submitted 12/92
CA3890090001	Radioactive Materials Disposal Facility (RMDF)	Part A interim status updated 4/93

NPDES (CRWOCB)

CA0001309	Santa Susana Field Laboratory	12/7/92 - 11/10/97
ORDER 59-68	Subsurface Disposal SSFL (septic tanks, leach fields, and spray fields)	1959 ongoing

Extremely Hazardous Waste

3-920624-02	Hazardous Waste Management Facility (B/133 and B/029)	6/24/92 - 6/24/93
3-920624-06	Radioactive Materials Disposal Facility (RMDF)	6/24/92 - 6/24/93

Nuclear Regulatory Agency

SNM-21	Rockwell International Hot Laboratory (B/020)	Amendment 7 issued 11/7/90 ongoing

State of California

Radioactive Materials License (0015-70)	All Rocketdyne facilities	Original issue 8/29/86 Amendment 86 2/11/92 - 9/11/93

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*Extremely hazardous waste permits are requested and granted on an as needed basis in the state of California. The extremely hazardous waste permits are issued for a one-time use or for a one-year duration, at which time the permit expires and a new permit must be applied for when needed. Permit 3-10320 was an extremely hazardous waste permit issued to SSFL in 1988. The two permits 3-920624-02 and 3-920424-06 are the only active hazardous waste permits for Area IV.

There were no underground storage tanks permitted in Area IV during 1992.

The waste discharge requirements for the sewage treatment plant in Area II which receives the Area IV sewage are included in the NPDES permit.

4.0 ENVIRONMENTAL PROGRAM INFORMATION

The purpose of the environmental program is to detect and measure releases of hazardous materials and identify other undesirable impacts on the environment. It includes remediation efforts to correct or improve impacted conditions at the site and prevent off-site effects. For this purpose, the environment is sampled and monitored, effluents are analyzed, and the condition and uses of the surrounding environment are reviewed. A direct goal of this program is to demonstrate compliance with applicable regulations.

The basic policy for the control of radiological and chemical hazards requires that adequate containment of such materials be provided through engineering controls and that facility effluent releases and external radiation levels be reduced to a minimum through rigid operational controls. The environmental monitoring program provides a measure of the effectiveness of safety procedures and of the engineering safeguards incorporated into facility designs. Gross alpha and beta radiation analyses are performed for screening purposes, and radionuclide-specific radiochemistry analyses are performed on representative environmental samples. Facility atmospheric effluent sample filters for 1992 were composited for radiochemistry analysis by IT Analytical Services.

The radiological environmental monitoring program was initiated in 1952 for nuclear operations by North American Aviation, a predecessor to the current Rockwell International organization. At that time, a program of soil and vegetation sample collection and analysis was begun to study environmental effects from nuclear research and development (R&D). This program was designed with the primary purpose of adequately surveying environmental radioactivity to ensure that operations would not contribute significantly to local radioactivity. Evolving program changes have reflected that primary objective. Environmental sampling was subsequently extended to the then proposed Sodium Reactor Experiment (SRE) site in the Simi Hills in May 1954. Sampling was also begun in the Burro Flats area, southwest of SRE. Other changes were made to the program as new facilities came into operation and as older facilities were closed. After review of the needs and results of the environmental monitoring program in 1986, sampling of vegetation for radioactivity analysis was terminated and soil sampling frequency was reduced to quarterly. This was based on reviews of the sampling program and the continuing reductions in the nuclear operations being conducted at the site. At that time, all nuclear reactors and the plutonium laboratory had been decommissioned. The reduced nuclear operations and the historical data led to the conclusion that quarterly sampling was adequate to confirm any releases of radioactivity that might occur and that would be identified by other monitoring methods. Although the reduction in the number of on-site soil samples taken annually was significant, the number of off-site soil samples was not reduced at that time. After further review of on-site and off-site soil radioactivity data, the elimination of routine off-site soil sampling as a formal part of the environmental monitoring program was done. In view of the extreme reduction in radioactivity and lack of any indication of radioactive contamination spread by routine and special surveys and inspections, routine soil sampling was terminated at the end of 1989. Annual soil testing is planned following implementation of the Environmental Monitoring Plan now in review.

Occasional gamma-spectrometry analyses of bulk samples such as soil, water, and ambient air sample filters confirm that the major radionuclides present are normally those of the naturally occurring thorium and uranium decay chains, plus other natural radionuclides such as the primordial K-40, and Be-7 produced by cosmic ray interactions in the atmosphere.

In addition to environmental monitoring, workplace air and atmospheric effluents are continuously monitored or sampled, as appropriate. This directly measures the effectiveness of engineering controls and allows remedial action to be taken before a significant release of radioactivity could occur.

In 1992, in addition to on-site monitoring, a significant one-time off-site multi-media sampling program was performed. The program results are summarized in Appendix C and addressed in detail in the McLaren/Hart report, "Multi-media Sampling Report for the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy."

5.0 ENVIRONMENTAL RADIOLOGICAL PROGRAM INFORMATION

The selection of monitoring locations was based on several site-specific parameters such as topography, meteorology, hydrology, and the location of nuclear facilities. The prevailing wind direction for the SSFL site is generally from the north and northwest, with some seasonal diurnal shifting to the southeast quadrant. Most rainfall runoff at the SSFL site flows through several natural watercourses and drainage channels and is collected in two large-capacity retention ponds. This water may be discharged off-site into Bell Canyon to the south or it may be reused for industrial purposes.

Gross alpha and beta measurements are used for screening purposes and to permit a long-term historical record of radioactivity in the environment. For water, these measurements also permit direct comparison with the screening limits established by EPA for suppliers of drinking water. Ventilation exhaust and ambient air samples are counted for gross alpha and beta radioactivity and are also analyzed for specific radionuclides. Detailed analyses of these samples permit more accurate estimates of dose for the air pathway. The following discussion presents a brief summary of pathway dose analysis results for SSFL and De Soto for 1992.

DOE Facilities at SSFL (Area IV) - RMDF and Building 059

Airborne releases from the RMDF and Building 059 are detailed in Table 5-1, sheets 1 and 3, and are shown to be below the derived concentration guides (DCGs) of DOE Order 5400.5. Airborne and direct radiation doses from RMDF and Building 059 are detailed in Table 5-14 and are shown to be below the dose limits of DOE Order 5400.5 and EPA NESHAPs limits of 40 CFR 61, Subpart H. Key results are discussed below.

At the site boundary line location nearest to the RMDF, the external annual exposure from direct radiation is estimated to correspond to an average annual dose of about 15 mrem, above natural background, at the nearest boundary-line location and a calculated annual dose less than 0.0001 mrem for the nearest residence. These values are below the DOE long-term limit of 100 mrem/yr as specified in DOE Order 5400.5 "Radiation Protection of the Public and the Environment" (2/8/90). The boundary-line exposure is a conservative estimate of potential dose, in that the rugged terrain at the site boundary nearest the RMDF precludes anything more than the possible rare and temporary presence of any person at that location. These values were determined by calculating the exposure expected at the boundary and nearest residence on the basis of the highest annual result for area dosimeters in place around the facility. For the nearest residence, radiation attenuation by the air reduces direct radiation to levels indistinguishable from normal background. In addition, intervening irregular rock formations and hills completely shield off-site locations from the radiation sources. Essentially only natural background radiation inherent to the residence location would be present.

Airborne effluent from the RMDF and Building 059 is a factor of 10^3 to 10^6 lower than the DOE isotopic DCGs. Nearest receptor doses from airborne effluent are 7.9×10^{-7} mrem/yr for releases from RMDF, 3.5×10^{-8} mrem/yr for releases from Building 059, and 6.9×10^{-7} mrem/yr from

Building 023. The DOE site limit is 10 mrem/yr, as specified in 40 CFR 61, Subpart H. Potential releases from these facilities are so low that, even assuming absence of HEPA filters, estimated doses would be below the level requiring continuous monitoring. However, continuous monitoring is still being performed as a best management practice.

NRC Licensed Facility at SSFL (Area IV)—RIHL

Airborne releases from the Rockwell International Hot Laboratory (RIHL) are detailed in Table 5–1, sheet 2, and are shown to be below the maximum permissible concentrations (MPCs) of 10 CFR 20.106 and State of California, CCR Title 17, Section 30269. Airborne and direct radiation doses at the site boundary are detailed in Table 5–15 and are shown to be less than the dose limits of 10 CFR 20.105 and State of California, CCR Title 17, Section 30269.

Direct radiation dose at the nearest site boundary is 0.07 mrem/yr and less than 6×10^{-6} mrem/yr at the nearest residence, compared to annual NRC and State of California limits of 500 mrem/yr. Airborne effluent is a factor of 10^4 to 10^6 less than the isotopic MPCs of the NRC and State of California. Nearest receptor dose from airborne effluent from RIHL is 3.3×10^{-7} mrem/yr, and, though not applicable to NRC licensed facilities, this compares well with the EPA NESHAPs limit of 10 mrem/yr from 40 CFR 61, Subpart H. Even in the absence of HEPA filters the dose from RIHL would still be below the level requiring continuous monitoring; however, continuous monitoring is still being performed as a best management practice.

State of California Licensed Facility at De Soto—Building 104

Airborne releases from Building 104 at the De Soto facility are detailed in Table 5–1, sheet 4, and are shown to be below the MPCs of State of California, CCR Title 17, Section 30269. Airborne and direct radiation doses at the site boundary are detailed in Table 5–16 and are shown to be less than the dose limits of State of California, CCR Title 17, Section 30268.

Direct radiation dose from Building 104 at the site boundary is 0.32 mrem/yr above background compared to the state's dose limit of 500 mrem/yr. Direct radiation dose at the nearest residence is 0.21 mrem/yr. These estimates are based on the difference between the Building 104 dosimeter measurement and the average of all offsite dosimeter measurements. Airborne effluent from Building 104 ranges from a factor of 10^4 to 10^5 less than the isotopic MPCs for the State of California. Nearest receptor dose from airborne effluent is 2.5×10^{-6} mrem/yr, which is less than the EPA NESHAPs limit of 10 mrem/yr from 40 CFR 61, Subpart H.

In the tables that follow, the data are generally presented in an uncensored manner. That is, analytical results that were less than the procedure background value are shown as negative values and results that did not indicate the presence of a radionuclide that could have been detected by the analytical method are shown as "not detected." In showing comparative data, the negative values are included to permit a complete and balanced view of the results. Omission of the negative values would significantly bias the presentation. Censoring of the results by substituting zero for negative values would produce a misleading impression of environmental conditions, and an incorrect estimate of the average values.

5.1 EFFLUENT MONITORING

Workplace ventilation is provided in all areas where unencapsulated or unpackaged radioactive material is handled, such as in the RIHL decontamination project (in the hot cells) and in the decontamination and packaging rooms at RMDF (where equipment is decontaminated and radioactive waste is repackaged). This assures protection of the workers from inhalation of airborne radioactive material and prevents the spread of radioactive contamination into the adjacent clean areas. The ventilation exhaust is passed through high-efficiency particulate air (HEPA) filters before being discharged to the atmosphere, to prevent the release of airborne radioactivity. The filtered air generally contains less long-lived radioactivity than does ambient air, caused by the naturally occurring radionuclides in the atmosphere. Essentially all short-lived radioactivity in the air is caused by the naturally present radon daughters, which dominate the airborne activity.

The ventilation exhaust is sampled at several facilities to measure the effluent radioactivity. Data from this sampling is used to demonstrate compliance with NRC, State RHB, DOE, and EPA standards. The U.S. EPA regulates airborne releases of radioactivity from DOE facilities under 40 CFR 61, Subpart H (NESHAPs).

Effluents that may contain radioactive material are released at the Rocketdyne Division facilities as the result of operations performed under contract to DOE, under NRC Special Nuclear Materials License SNM-21, and under the State of California Radioactive Material License 0015-70. The specific facilities are identified as RMDF, Building 059, Building 023, and RIHL at SSFL, and Building 104 at the De Soto complex.

The only potential release of radioactivity to uncontrolled areas is by way of filtered discharge from the RMDF, the RIHL, Building 059, and Building 104, and the unfiltered exhaust from the small samples analyzed in the Inductively Coupled Plasma (ICP) unit in Building 023 to the atmosphere. No contaminated liquids are discharged to uncontrolled areas.

Due to the short period of operation of the ICP, the effluent from Building 023 was monitored by sample inventory and not by continuous exhaust sampling as performed for the RMDF, the RIHL, and Buildings 059 and 104. The ICP analytical unit was used for elemental content analysis of molten salt oxidation unit test solutions of radioactively contaminated oils. Process air from the ICP was exhausted without filtration. Only very low levels of radioactivity are permitted in Building 023. A radiological evaluation (CAP88-PC) prior to operation of the ICP indicated an equivalent expected maximum off-site dose of less than 4.5E-06 mrem/yr without exhaust filtration. This is below the threshold of 1% of the standard requiring the monitoring prescribed in 40 CFR 61.93(b). The dose calculated from actual operation in 1992 using CAP88-PC was an equivalent maximum off-site dose of 6.9E-07 mrem/yr.

The level of radioactivity contained in all atmospheric effluents is reduced to the lowest practical value by passing the effluents through certified HEPA filters. The effluents are sampled for particulate radioactive materials by means of continuously operating stack exhaust samplers at the point

of release. In addition, stack monitors installed at the RIHL and the RMDF provide automatic alarm capability in the event of the release of particulate activity from the RIHL and the RMDF. The HEPA filters used for filtering atmospheric effluents are at least 99.97% efficient for particles 0.3 mm in diameter.

The average concentration and total radioactivity in atmospheric effluents to uncontrolled areas from the RMDF, the RIHL, Building 059, and De Soto 104 are shown in Table 5–1. Since Building 023 exhaust was not continuously sampled, it is not included in Table5–1. The total shows that no significant quantities of radioactivity were released in 1992.

The isotopic composition of the radioactivity deposited on the nuclear facility exhaust air sampling filters, composited for the year, is also presented in Table 5–1. Gamma–emitting radionuclides were measured by using a high–resolution gamma spectrometer. All others were measured by using specific chemical separations followed by alpha or beta counting. Radionuclides that were reported as less than the method detection level are shown as "not detected" (ND). The Po–210 that is collected on the RIHL filter due to the use of unfiltered bypass (ambient) air taken into the main exhaust system from the outside is a result of naturally occurring elements in the U–238 decay chain in the environment. The K–40 is due to the presence of this radionuclide in the airborne dust in the ambient air. Materials used in operations conducted at the SSFL site are responsible for the fission/activation product radioactivity. For each radionuclide detected, the laboratory calculates a lower limit of detection (LLD). This is the lowest activity that would be identified as "radioactive" with 95% confidence. "Radioactive" is specified as above 95% of the distribution of background results. This LLD refers to the specific sample form analyzed, in this case a composite of filters. For the purpose of comparing effluent releases, the laboratory LLD for the composited filters was converted to an equivalent annual release and is shown in the table as the release LLD. These results are also shown in Table 5–2, for comparison with ambient air. (For convenience in presenting and viewing this data, the results are presented in units of femtocuries per cubic meter [fCi/m^3], which is 10^{-15} μCi/mL.) The effectiveness of the air cleaning systems is evident from the fact that the atmospheric effluents are less radioactive than is the ambient air with respect to the ambient air radionuclides Be–7, K–40, and Po–210.

Exhaust samples are counted for gross alpha and beta activity after allowing decay of the short–lived airborne radioactivity, on a weekly basis. Composited samples are analyzed in detail at the end of the year to determine the individual radionuclide concentrations. The results of these analyses for the RMDF, the RIHL, Building 059, and De Soto are also shown in Table 5–2. Since Building 023 exhaust was not continuously sampled, it is not included in Table 5–2.

The effluent at the exhaust stack for each facility is compared with an appropriate limit for exposure of the public. The isotopic limits for DOE facilities are Derived Concentration Guides (DCG) for exposure of the public for the most restrictive form of the radionuclide as specified in DOE Order 5400.5. Isotopic effluent limits for facilities with State of California– and NRC–licensed activities are Maximum Permissible Concentrations (MPC) for release to an unrestricted area for the

Table 5-1. Atmospheric Effluents to Uncontrolled Areas
(Sheet 1 of 4)

SSFL/RMDF - 1992	
Effluent volume (m^3)	194,581,611
Lower limit of detection, LLD	
Gross alpha (μCi/mL)	3×10^{-16}
Gross beta (μCi/mL)	1×10^{-15}
Air volume sampled (m^3)	28,562
Annual average concentration in effluent	
Gross alpha (μCi/mL)	1.88×10^{-16}
Gross beta (μCi/mL)	6.59×10^{-15}
Maximum observed concentration	
Gross alpha (μCi/mL)	8.67×10^{-16}
Gross beta (μCi/mL)	5.91×10^{-14}
Activity released (μCi)	
Gross alpha	0.04
Gross beta	1.25

Radionuclide-Specific Data

Radionuclide	Half-Life (yr)	Activity Detected (pCi)	Annual Release (μCi)	Analysis LLD (pCi)	Release LLD (μCi)	Average Exhaust Concentration (μCi/mL)	DCG (μCi/mL)
Be-7	0.146	ND	0	76	0.52	0	Natural
K-40	1,260,000,000	ND	0	150	1.02	0	Natural
Co-60	5.26	46.0	0.313	11	0.08	1.61×10^{-15}	8×10^{-11}
Sr-90	27.7	6.70	0.046	6	0.04	2.35×10^{-16}	9×10^{-12}
Cs-137	30	63.0	0.429	10	0.07	2.21×10^{-15}	4×10^{-10}
Po-210	0.38	1.70	0.012	0.2	1.36×10^{-3}	5.95×10^{-17}	Natural
Th-228	1.9131	ND	0	0.1	6.81×10^{-4}	0	4×10^{-14}
Th-230	80,000	ND	0	0.1	6.81×10^{-4}	0	4×10^{-14}
Th-232	14,100,000,000	ND	0	0.1	6.81×10^{-4}	0	7×10^{-15}
U-234	247,000	ND	0	0.1	6.81×10^{-4}	0	9×10^{-14}
U-235	710,000,000	ND	0	0.1	6.81×10^{-4}	0	1×10^{-13}
U-238	4,510,000,000	ND	0	0.1	6.81×10^{-4}	0	1×10^{-13}
Pu-238	86.4	ND	0	0.2	1.36×10^{-3}	0	3×10^{-14}
Pu-239/240	24,390/6,580	0.294	0.002	0.2	1.36×10^{-3}	1.03×10^{-17}	2×10^{-14}
Am-241	458	ND	0	0.1	6.81×10^{-4}	0	2×10^{-14}

Naturally occurring radionuclides are included for information. These activities have not been used in dose estimates.

Derived concentration guides (DCG) for exposure of the public, for most restrictive form of radionuclide as specified in DOE Order 5400.5 (2/8/90).

ND = Not detected

Table 5-1. Atmospheric Effluents to Uncontrolled Areas
(Sheet 2 of 4)

SSFL/RIHL - 1992	
Effluent volume (m^3)	457,849,095
Lower limit of detection, LLD	
Gross alpha (μCi/mL)	3×10^{-16}
Gross beta (μCi/mL)	1×10^{-15}
Air volume sampled (m^3)	32,494
Annual average concentration in effluent	
Gross alpha (μCi/mL)	1.09×10^{-15}
Gross beta (μCi/mL)	7.75×10^{-15}
Maximum observed concentration	
Gross alpha (μCi/mL)	3.24×10^{-15}
Gross beta (μCi/mL)	1.92×10^{-14}
Activity released (μCi)	
Gross alpha	0.49
Gross beta	3.52

Radionuclide-Specific Data

Radionuclide	Half-Life (yr)	Activity Detected (pCi)	Annual Release (μCi)	Analysis LLD (pCi)	Release LLD (μCi)	Average Exhaust Concentration (μCi/mL)	MPC (μCi/mL)
Be-7	0.146	172	2.424	76	1.07	5.29×10^{-15}	Natural
K-40	1,260,000,000	ND	0	150	2.11	0	Natural
Co-60	5.26	ND	0	11	0.155	0	3×10^{-10}
Sr-90	27.7	7.40	0.104	6	0.085	2.28×10^{-16}	3×10^{-11}
Cs-137	30	25.80	0.364	10	0.141	7.94×10^{-16}	5×10^{-10}
Po-210	0.38	112.8	1.59	0.2	0.003	3.47×10^{-15}	Natural
Th-228	1.9131	ND	0	0.1	0.001	0	2×10^{-13}
Th-230	80,000	ND	0	0.1	0.001	0	8×10^{-14}
Th-232	14,100,000,000	ND	0	0.1	0.001	0	1×10^{-12}
U-234	247,000	ND	0	0.1	0.001	0	4×10^{-12}
U-235	710,000,000	ND	0	0.1	0.001	0	4×10^{-12}
U-238	4,510,000,000	ND	0	0.1	0.001	0	3×10^{-12}
Pu-238	86.4	ND	0	0.2	0.003	0	7×10^{-14}
Pu-239/240	24,390/6,580	0.08	0.001	0.2	0.003	2.31×10^{-18}	6×10^{-14}
Am-241	458	ND	0	0.1	0.001	0	2×10^{-13}

Naturally occurring radionuclides are included for information. These activities have not been used in dose estimates.

Maximum permissible concentrations (MPC) for release to unrestricted area, for most restrictive form of radionuclide as specified in 10 CFR 20, Appendix B and CCR 17, Appendix A.

ND = Not detected

Table 5–1. Atmospheric Effluents to Uncontrolled Areas
(Sheet 3 of 4)

SSFL/059 – 1992	
Effluent volume (m^3)	30,098,645
Lower limit of detection, LLD	
Gross alpha (μCi/mL)	3×10^{-16}
Gross beta (μCi/mL)	1×10^{-15}
Air volume sampled (m^3)	20,966
Annual average concentration in effluent	
Gross alpha (μCi/mL)	2.90×10^{-16}
Gross beta (μCi/mL)	1.58×10^{-15}
Maximum observed concentration	
Gross alpha (μCi/mL)	1.14×10^{-15}
Gross beta (μCi/mL)	4.67×10^{-15}
Activity released (μCi)	
Gross alpha	0.01
Gross beta	0.04

Radionuclide-Specific Data

Radionuclide	Half-Life (yr)	Activity Detected (pCi)	Annual Release (μCi)	Analysis LLD (pCi)	Release LLD (μCi)	Average Exhaust Concentration (μCi/mL)	DCG (μCi/mL)
Be-7	0.146	ND	0	76	0.109	0	Natural
K-40	1,260,000,000	ND	0	150	0.215	0	Natural
Co-60	5.26	ND	0	11	0.016	0	8×10^{-11}
Sr-90	27.7	ND	0	6	0.009	0	9×10^{-12}
Cs-137	30	6.50	0.009	10	0.014	3.10×10^{-16}	4×10^{-10}
Po-210	0.38	11.7	0.017	0.2	2.87×10^{-4}	5.58×10^{-16}	Natural
Th-228	1.9131	ND	0	0.1	1.44×10^{-4}	0	4×10^{-14}
Th-230	80,000	ND	0	0.1	1.44×10^{-4}	0	4×10^{-14}
Th-232	14,100,000,000	ND	0	0.1	1.44×10^{-4}	0	7×10^{-15}
U-234	247,000	ND	0	0.1	1.44×10^{-4}	0	9×10^{-14}
U-235	710,000,000	ND	0	0.1	1.44×10^{-4}	0	1×10^{-13}
U-238	4,510,000,000	ND	0	0.1	1.44×10^{-4}	0	1×10^{-13}
Pu-238	86.4	ND	0	0.2	2.87×10^{-4}	0	3×10^{-14}
Pu-239/240	24,390/6,580	ND	0	0.2	2.87×10^{-4}	0	2×10^{-14}
Am-241	458	ND	0	0.1	1.44×10^{-4}	0	2×10^{-14}

Naturally occurring radionuclides are included for information. These activities have not been used in dose estimates.

Derived concentration guides (DCG) for exposure of the public, for most restrictive form of radionuclide as specified in DOE Order 5400.5 (2/8/90).

ND = Not detected

Table 5–1. Atmospheric Effluents to Uncontrolled Areas (Sheet 4 of 4)

De Soto 104 – 1992	
Effluent volume (m^3)	39,481,205
Lower limit of detection, LLD	
Gross alpha (μCi/mL)	3×10^{-16}
Gross beta (μCi/mL)	1×10^{-15}
Air volume sampled (m^3)	23,587
Annual average concentration in effluent	
Gross alpha (μCi/mL)	4.56×10^{-16}
Gross beta (μCi/mL)	2.11×10^{-15}
Maximum observed concentration	
Gross alpha (μCi/mL)	6.23×10^{-15}
Gross beta (μCi/mL)	2.11×10^{-14}
Activity released (μCi)	
Gross alpha	0.02
Gross beta	0.08

Radionuclide-Specific Data

Radionuclide	Half-Life (yr)	Activity Detected (pCi)	Annual Release (μCi)	Analysis LLD (pCi)	Release LLD (μCi)	Average Exhaust Concentration (μCi/mL)	MPC (μCi/mL)
Be-7	0.146	ND	0	76	0.127	0	Natural
K-40	1,260,000,000	ND	0	150	0.251	0	Natural
Co-60	5.26	ND	0	11	0.018	0	3×10^{-10}
Sr-90	27.7	ND	0	6	0.010	0	3×10^{-11}
Cs-137	30	ND	0	10	0.017	0	5×10^{-10}
Po-210	0.38	13.8	0.023	0.2	3.35×10^{-4}	5.85×10^{-16}	Natural
Th-228	1.9131	ND	0	0.1	1.67×10^{-4}	0	2×10^{-13}
Th-230	80,000	ND	0	0.1	1.67×10^{-4}	0	8×10^{-14}
Th-232	14,100,000,000	ND	0	0.1	1.67×10^{-4}	0	1×10^{-12}
U-234	247,000	8.75	0.015	0.1	1.67×10^{-4}	3.71×10^{-16}	4×10^{-12}
U-235	710,000,000	0.33	5.59×10^{-4}	0.1	1.67×10^{-4}	1.42×10^{-17}	4×10^{-12}
U-238	4,510,000,000	ND	0	0.1	1.67×10^{-4}	0	3×10^{-12}
Pu-238	86.4	ND	0	0.2	3.35×10^{-4}	0	7×10^{-14}
Pu-239/240	24,390/6,580	ND	0	0.2	3.35×10^{-4}	0	6×10^{-14}
Am-241	458	ND	0	0.1	1.67×10^{-4}	0	2×10^{-13}

Naturally occurring radionuclides are included for information. These activities have not been used in dose estimates.

Maximum permissible concentrations (MPC) for release to uncontrolled area, for most restrictive form of radionuclide as specified in 10 CFR 20, Appendix B and CCR 17, Appendix A.

ND = Not detected

Table 5–2. Filtered Exhaust and Ambient Air Radioactivity Concentrations

	Activity Concentration (femtocuries per cubic meter)															
	Be-7	K-40	Co-60	Sr-90	Cs-137	Po-210	Th-228	Th-230	Th-232	U-234	U-235	U-238	Pu-238	Pu-239/ 240	Am-241	Gross Alpha	Gross Beta
Maximum Permissible Concentration	40,000,000	-	300,000	30,000	500,000	7,000	200	80	1,000	4,000	4,000	3,000	70	60	200	20	100,000
Exhaust																	
RMDF	ND	ND	1.61	0.235	2.21	0.060	ND	ND	ND	ND	ND	ND	ND	0.010	ND	0.2	6.6
RIHL	5.29	ND	ND	0.228	0.794	3.47	ND	ND	ND	ND	ND	ND	ND	0.002	ND	1.1	7.8
DS 104	ND	ND	ND	ND	ND	0.585	ND	ND	ND	0.371	0.014	ND	ND	ND	ND	0.5	2.1
T059	ND	ND	ND	ND	0.310	0.558	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.3	1.6
Ambient																	
RMDF	69.5	55.2	ND	ND	ND	10.6	ND	0.016	ND	ND	ND	ND	ND	ND	ND	1.4	34.3
RMDF Pond	60.3	29.6	ND	ND	ND	10.1	ND	ND	0.017	ND	ND	ND	ND	ND	ND	1.2	30.0
RIHL	83.4	75.1	ND	0.143	ND	10.4	ND	0.018	0.014	ND	ND	ND	ND	ND	ND	1.6	32.5
T100 (7 day)	24.7	ND	ND	0.518	ND	9.63	0.022	0.013	0.010	ND	ND	ND	ND	ND	ND	1.4	31.2
T886	41.8	28.7	ND	ND	ND	9.43	0.054	0.023	0.036	ND	ND	ND	ND	ND	ND	1.5	28.6
DS 104	61.6	73.0	ND	ND	ND	10.1	0.017	0.029	0.014	ND	ND	ND	ND	ND	ND	1.1	30.1
Exhaust Average	5.29	0	1.61	0.230	1.18	2.27	0	0	0	0.371	0.014	0	0	0.006	0	0.5	4.5
Ambient Average	56.8	52.3	0	0.331	0	10.0	0.031	0.020	0.018	0	0	0	0	0	0	1.4	31.1

ND = Not detected

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most restrictive form of the radionuclide as specified in 10 CFR 20, Appendix B, and CCR 17, Appendix A.

The most restrictive MPC or DCG for each radionuclide (from CCR 17) is shown at the head of each column of data. (The natural radionuclide K–40 is so uniformly present, and so rarely present in an enriched form, that no MPC or DCG has been developed for it.) These values refer to the permissible concentrations allowed by the State of California (and the NRC) and the DOE for continuous exposure of the public. Note that, in all cases, for the exhaust air, the observed concentrations are far below the MPC and DCG. Many of the results are so low (close to zero) that the measurements are dominated by analytical and background variations, with the result that negative and inconsistent values are frequently produced. Furthermore, dilution and dispersion would occur before the material reaches an unrestricted area.

The downwind concentration of radioactive material emissions to the atmosphere during 1992 from each of the four Rocketdyne exhaust stacks has been calculated with the CAP88–PC computer code using representative input data including wind speed, directional frequency, and stability (using meteorological data developed for the SSFL site by the NRC and Argonne National Laboratory [ANL]) plus facility–specific data such as stack heights and exhaust air velocity.

The radioactivity concentrations at the site boundary location nearest to each release point and at the nearest residence for each nuclear facility are shown in Table 5–3. Table 5–3 shows the non–natural radioactivity concentrations at the nearest boundary and residence locations for effluents from the four facilities. These concentrations were estimated by use of CAP88–PC and specific radionuclide releases for each facility.

Table 5–3. Annual Average Radioactivity Concentrations of Atmospheric Effluents—1992

Facility	Annual Release (μCi)	Distance (m) to		Downwind Concentration (10^{-18} μCi/mL)	
		Boundary	Residence	Boundary	Residence
DS 104	0.016	187 E	315 S	0.003	0.002
RIHL	0.469	302 NW	1,900 SE	0.14	0.009
RMDF	0.790	118 NW	2,300 SE	0.004	0.006
059	0.009	80 NW	1,997 SSE	0.052	0.0005
023	0.177	250 NW	3,000 NW	0.49	0.01

5.2 ENVIRONMENTAL SAMPLING

5.2.1 Air

Ambient air sampling is performed continuously at De Soto and SSFL with air samplers operating on 24–hour sampling cycles. Monitoring locations currently in use are shown in Figures 5–1 and 5–2 and listed in Table 5–4. Airborne particulate radioactivity is collected on glass fiber (Type A/E) filters which are automatically changed daily at the end of each sampling period (midnight). The samples are counted for gross alpha and beta radiation following a minimum 120–hour decay period. The volume of a typical daily ambient air sample is about 25 m^3.

Daily ambient air samples are counted for gross alpha and beta radiation with a low–background thin–window gas–flow proportional–counting system. The system is capable of simultaneously counting both alpha and beta radiation. The sample–detector configuration provides a nearly hemispherical (2p) geometry. The thin–window detector is continually purged with argon/methane counting gas. A preset time mode of operation is used for counting all samples.

Counting system efficiencies are determined routinely with Tc–99 and Th–230 standard sources. The activities of the standard sources are traceable to the National Institute of Standards and Technology (NIST).

Filter media for each sampling location are composited annually and analyzed for isotopic–specific activity. The results of the sample analyses are shown in Table 5–2 with the effluent results for comparison. As the case with effluent air samples, the observed ambient air radionuclide concentrations were far below the MPC. The measurements were dominated by analytical and background variations, with the result that negative and inconsistent values were produced.

It should be emphasized that these measurements determine only the long–lived particulate radioactivity in the air and therefore do not show radon (Rn–222) and most of its daughter radionuclides. Polonium–210 is a long–lived daughter and is detected by these analyses. It is assumed to be in equilibrium with its parent, Pb–210, whose relatively long half–life (22.3 years) provides an essentially constant level of Po–210 in the samples. Because of these effects, the ambient air, the air that is being breathed, is actually about four times as radioactive as implied in this table. Since most of the short–lived particulate radioactivity is removed from the exhaust air by the HEPA filters, these effects are not significant in the filtered effluent.

The ambient air is sampled at six locations (five at SSFL, one at De Soto). Air is drawn through glass fiber (Type A/E) filter discs for 24–hour periods (one sampler operates on a 7–day cycle) for each calendar day. The collected radioactivity is measured for gross alpha and beta radiation, after a delay of at least 120 hours to allow complete decay of the short–lived radioactivity, with a thin–window gas–flow proportional counter, to determine gross alpha and gross beta activity, as an early measure of the discharged radioactivity and environmental radioactivity.

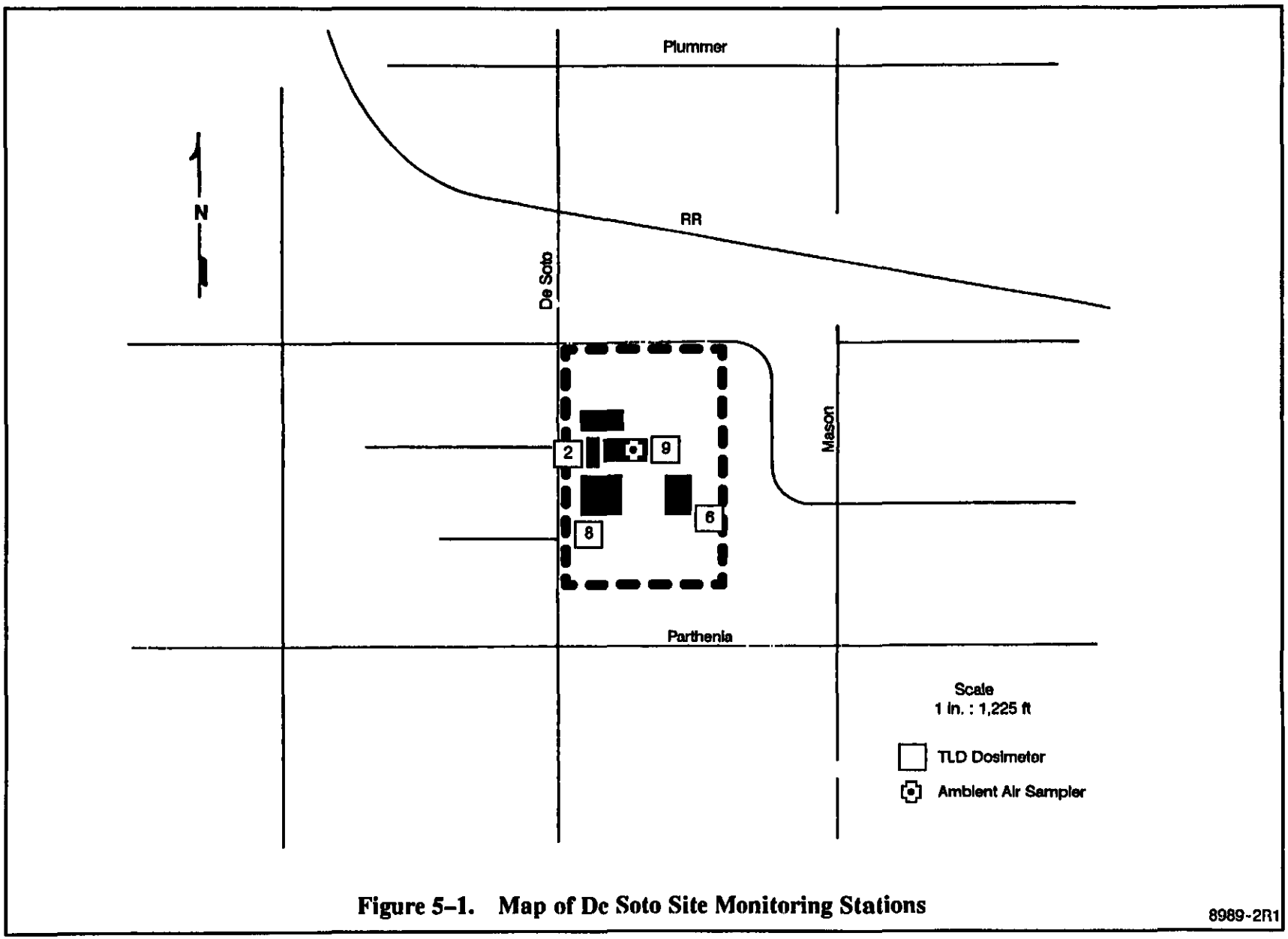

Figure 5–1. Map of De Soto Site Monitoring Stations

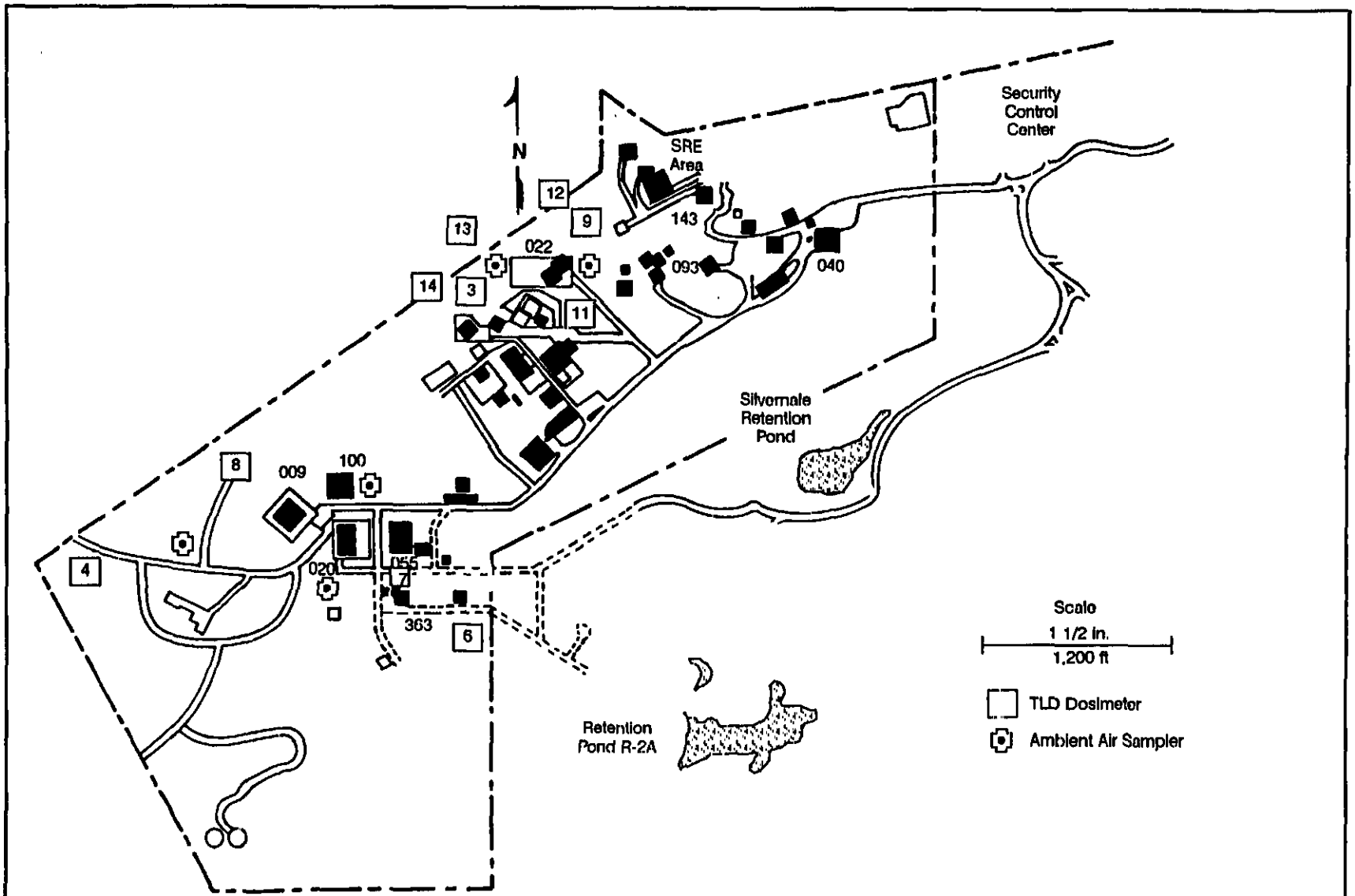

Figure 5-2. Map of Santa Susana Field Laboratory Site Sampling Stations

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Table 5–4. Sampling Location Description
(Sheet 1 of 2)

Station	Location	Frequency of Sampling
Ambient Air Sampler Locations		
A–1	De Soto Site, Building 104 roof	(D)
A–2	SSFL Site, Building 020, southwest side	(D)
A–3	SSFL Site, Building 034, at main gate	(D)
A–4	SSFL Site, Building 886, former Sodium Disposal Facility	(D)
A–5	SSFL Site, RMDF Pond, north side	(D)
A–6	SSFL Site, Building 100, east side – 7–day sampler	(W)
On–Site—De Soto – Ambient Radiation Dosimeter Locations		
DS–2	De Soto Site, northwest corner of Building 101 (State of California TLD Location Number 2)	(Q)
DS–6	De Soto Site, east boundary, southeast corner of Building 105 (State of California TLD Location Number 1)	(Q)
DS–8	De Soto Site Guard Post 4, southwest corner of Building 101 (State of California TLD Location Number 7)	(Q)
DS–9	De Soto Site, southeast of Building 104	(Q)
On–Site—SSFL – Ambient Radiation Dosimeter Locations		
SS–3	SSFL Site, Electric Substation 719 on boundary fence (State of California TLD Location Number 3)	(Q)
SS–4	SSFL Site, west boundary on H Street	(Q)

Table 5–4. Sampling Location Description
(Sheet 2 of 2)

Station	Location	Frequency of Sampling
SS–6	SSFL Site, northeast corner of Building 353 (State of California TLD Location Number 4)	(Q)
SS–7	SSFL Site, Building 363, north side (State of California TLD Location Number 8)	(Q)
SS–8	SSFL Site, former Sodium Disposal Facility north boundary	(Q)
SS–9	SSFL Site, Radioactive Materials Disposal Facility, northeast boundary at Building 133	(Q)
SS–11	SSFL Site, Building 036, east side	(Q)
SS–12	SSFL Site, RMDF northwest property line boundary (State of California TLD Location Number 10)	(Q)
SS–13	SSFL Site, RMDF northwest property line boundary	(Q)
SS–14	SSFL Site, RMDF northwest property line boundary	(Q)
Off–Site Ambient Radiation Dosimeter Locations		
OS–1	Off–site, Chatsworth (State of California TLD Location Number 5)	(Q)
OS–5	Off–site, Simi Valley (State of California TLD Location Number 6)	(Q)

Code:		Location:	
A	Air Sampler Station	DS	De Soto
TLD	Thermoluminescent Dosimeter Location	SS	SSFL
D	Daily Sample	OS	Off–Site
W	Weekly Sample		
Q	Quarterly Sample		

Since the alpha and beta activity is counted relatively soon after collection, most of the natural Be–7 is detected, elevating the beta activity. The naturally occurring radionuclides, Po–210 and Ra–226 and –228, also contribute to the activity detected on the stack exhaust filter samples, particularly at the RIHL, where some unfiltered outside air is brought into the exhaust system after the HEPA filters.

A more complete list of the results from the gross alpha and gross beta counting of the ambient air samples is shown in Table 5–5.

The appropriate guide value of 6×10^{-14} µCi/mL (Pu–239) for SSFL site ambient air alpha activity is due to contamination remaining from work with unencapsulated plutonium (the DOE value is 2×10^{-14} µCi/mL). The appropriate value of 3×10^{-11} µCi/mL (Sr–90) for beta activity is due to the presence of Sr–90 in fission product contamination from previous work with irradiated nuclear fuel at the SSFL site (the DOE value is 9×10^{-12} µCi/mL). The appropriate guide value of 3×10^{-12} µCi/mL (U–238) for De Soto ambient air alpha activity is due to prior (licensed) work with unencapsulated depleted uranium. The appropriate guide value of 3×10^{-10} µCi/mL (Co–60) for beta activity is for Co–60, since it is the most restrictive limit for any beta–emitting radionuclide currently in use at De Soto.

Figure 5–3 is a graph of the weekly averaged long–lived alpha and beta ambient air radioactivity concentrations for De Soto and SSFL during 1992 as indicated by the gross alpha and gross beta counting. (Gaps in the record shown in this figure are due to negative results from samples showing

Table 5–5. Ambient Air Radioactivity Data – 1992

Area	Activity	Number of Samples	Gross Radioactivity Concentrations (µCi/mL)		
			Annual Average Value and Dispersion	Maximum Value* and Date Observed	Average Percent of Guide**
De Soto Building 104	Alpha Beta	362	(1.1 ± 2.6)E-15 (30.1 ± 17.8)E-15	9.4E-15 (05/20) 91.9E-15 (11/17)	0.04 0.01
SSFL Area IV RIHL	Alpha Beta	362	(1.6 ± 2.8)E-15 (32.5 ± 20.1)E-15	13.6E-15 (09/21) 144.6E-15 (01/05)	2.7 0.11
SSFL Area IV RMDF	Alpha Beta	352	(1.4 ± 2.7)E-15 (34.3 ± 20.8)E-15	10.8E-15 (11/09) 125.8E-15 (11/23)	7.0 0.38
SSFL Area IV Building T886	Alpha Beta	332	(1.5 ± 3.0)E-15 (28.6 ± 19.2)E-15	15.2E-15 (10/26) 103.2E-15 (01/01)	2.5 0.10
SSFL Area IV RMDF pond	Alpha Beta	325	(1.2 ± 2.8)E-15 (30.0 ± 20.7)E-15	9.3E-15 (01/01) 105.9E-15 (01/01)	2.0 0.10

*Maximum value observed for single sample.

**Guide De Soto Site: 3E–12 µCi/mL alpha, 3E–10 µCi/mL beta; 10 CFR 20 Appendix B, CCR 17. SSFL site: 6E–14 µCi/mL alpha, 3E–11 µCi/mL beta; 10 CFR 20 Appendix B, CCR 17, and 2E–14 µCi/mL alpha, 9E–12 µCi/mL beta, DOE Order 5400.5 (02/08/90).

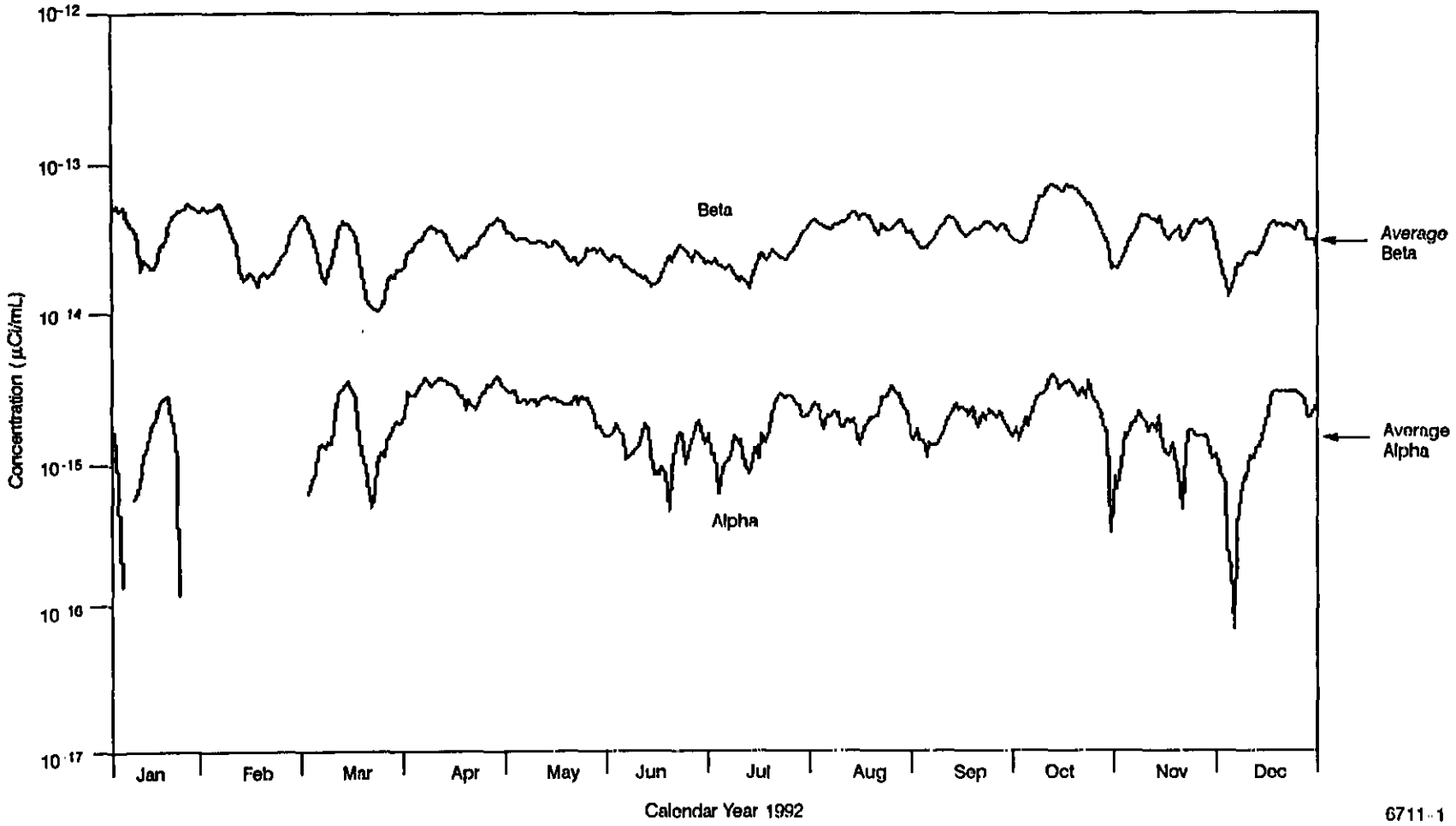

Figure 5-3. Seven-day Smoothed and Annual Average Airborne Radioactivity at the De Soto and Santa Susana Field Laboratory Sites – 1992

less activity than instrument background.) Generally, the ambient airborne radioactivity was relatively constant during 1992, and showed no significant disturbances.

The daily data were mathematically smoothed in a moving weekly average of daily data for the year. The activity detected in ambient air is attributed to naturally occurring radioactive materials and possibly to aged fission products from past atmospheric tests of nuclear devices or other events such as the Chernobyl accident. Radionuclides detected by gross alpha and beta analysis of air samples collected during 1992 include K–40 plus several naturally occurring radionuclides from the uranium and thorium series.

A further comparison of ambient air and facility exhaust radioactivity is presented in Figure 5–4. The gross alpha and the gross beta concentrations for the ambient weekly samples are compared with the stack sample results for the RIHL, the RMDF, Building 059, and Building DS104, which are also on a weekly cycle. For both alpha and beta activity, the concentration in the RIHL exhaust is close to that in ambient air, largely due to the use of unfiltered outside air to bypass the HEPA filter system to control suction pressure in the ventilation system. At the RMDF and Buildings 059 and DS104, all the discharged air is filtered, and so the gross alpha and beta activities are generally lower than in ambient air. Gaps in the plots are due to negative values resulting from air samples showing less activity than instrument background.

5.2.2 Water

Groundwater is sampled from a large number of alluvial and Chatsworth Formation wells and analyzed for radioactivity. The locations of these wells are shown in Figure 6–2. Detailed results of the analysis of groundwater samples are reported quarterly and annually. The summary results for 1992 are shown in Table 5–6. While it may be noted that in some cases the gross alpha activity has exceeded the drinking water supply limits, this activity is due predominantly to naturally occurring uranium. No man–made fission products have been detected in the groundwater.

With the exception of two wells, tritium results from all wells were less than the detection level of 500 pCi/L. Two wells indicated elevated tritium. Well RD–28 had readings of 420 pCi/L to 1025 pCi/L, and well RD–34A had readings of 1800 pCi/L to 7069 pCi/L. Both wells indicated downward trends in concentrations. All results were less than the EPA drinking water supplier limit of 20,000 pCi/L. The source of the tritium has been investigated and has been determined to be neutron–activated lithium in shielding concrete from Building 059 (for RD–28) and Building 010 (for RD–34A). Building 010 has long since been decommissioned and excavated, while Building 059 is nearing the end of decommissioning. Further soil sampling in the vicinity of the NW boundary of Area IV planned for early 1994 will further characterize the tritium contamination.

Surface waters discharged from SSFL facilities and the sewage plant outfall drain southward into Rocketdyne retention pond R–2A. When the pond is full, the water may be discharged into Bell Creek, a tributary of the Los Angeles River in the San Fernando Valley, Los Angeles County.

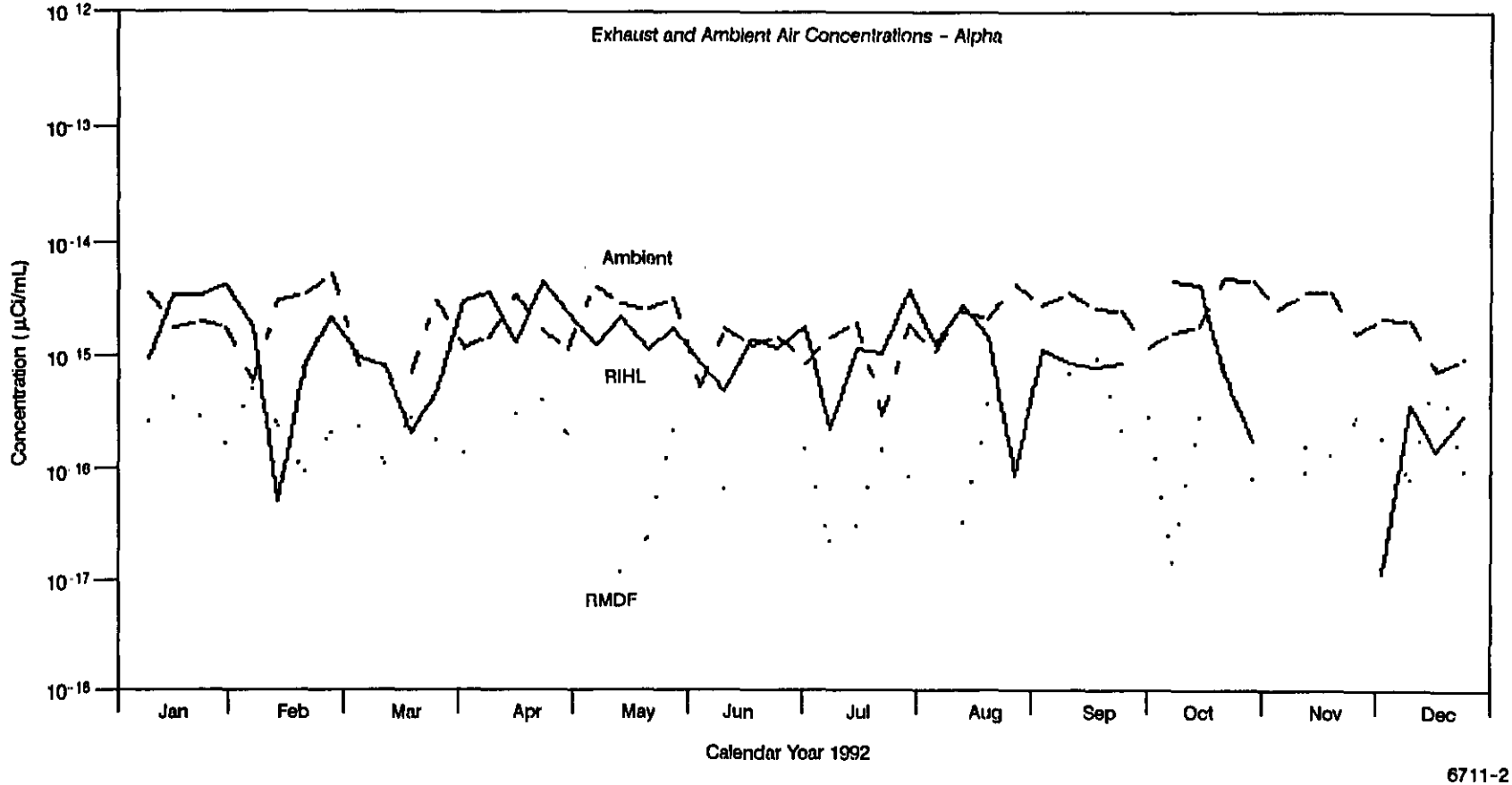

Figure 5–4. Filtered Exhaust and Ambient Air Radioactivity Concentrations (Sheet 1 of 4)

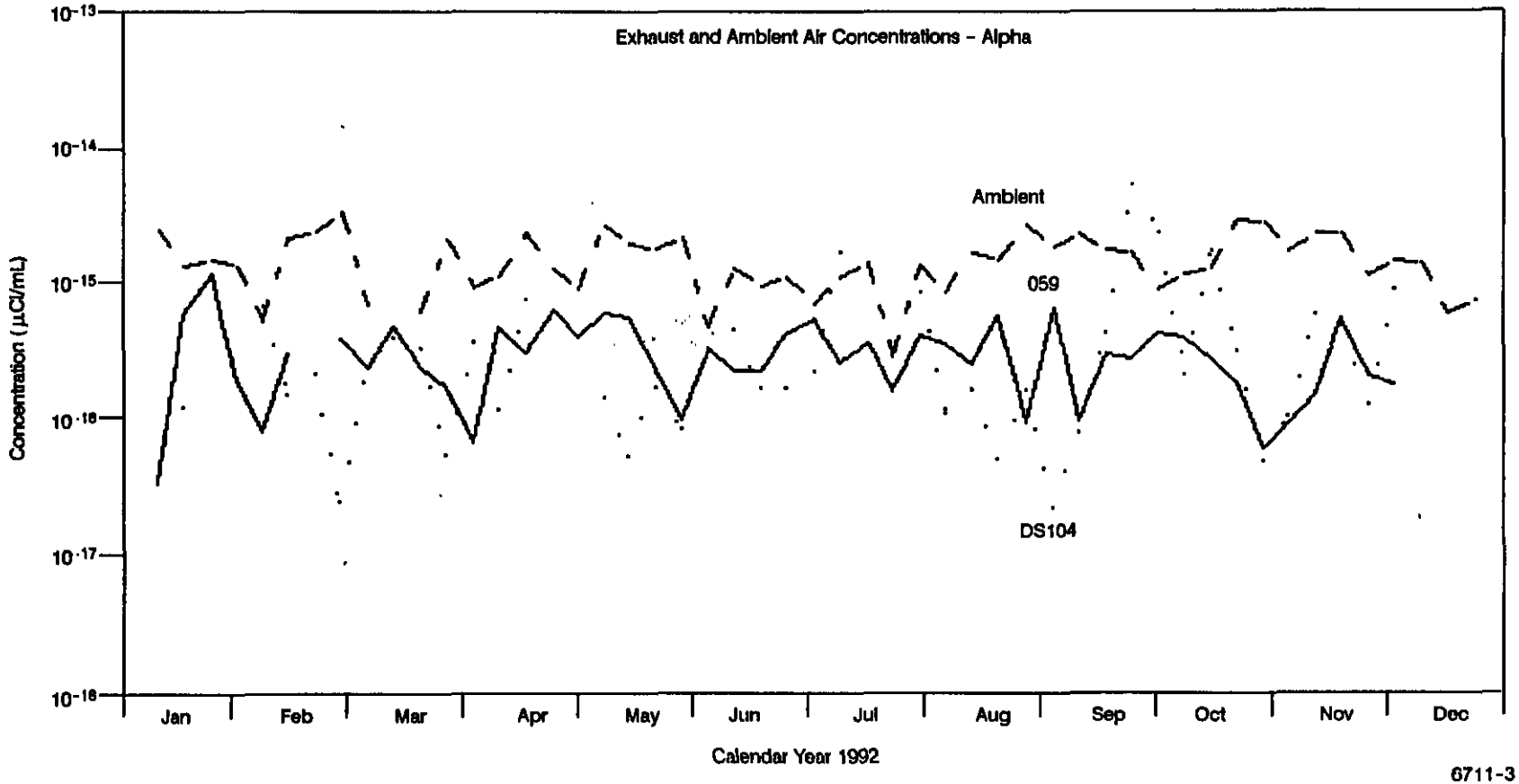

Figure 5–4. Filtered Exhaust and Ambient Air Radioactivity Concentrations (Sheet 2 of 4)

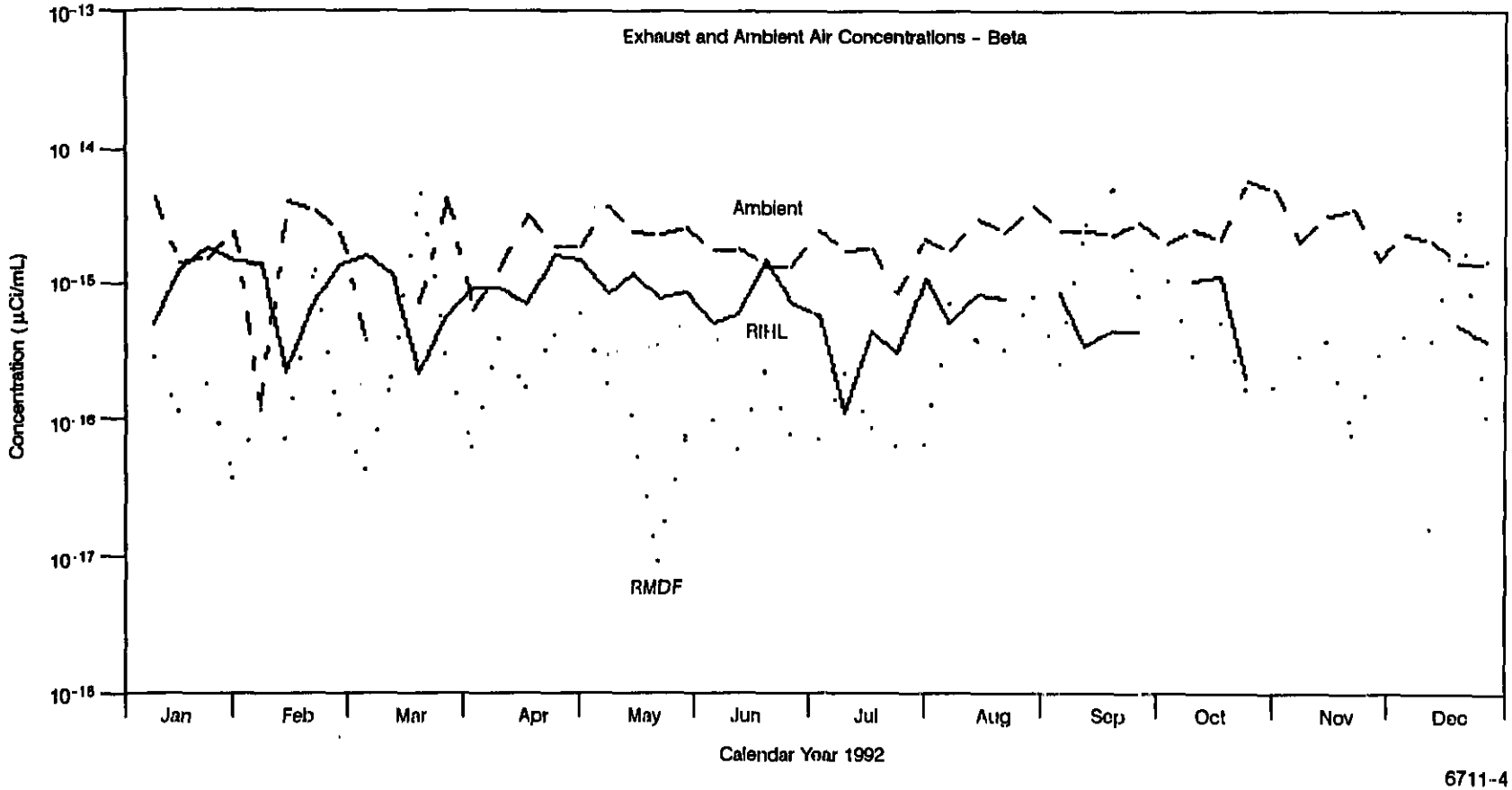

Figure 5–4. Filtered Exhaust and Ambient Air Radioactivity Concentrations (Sheet 3 of 4)

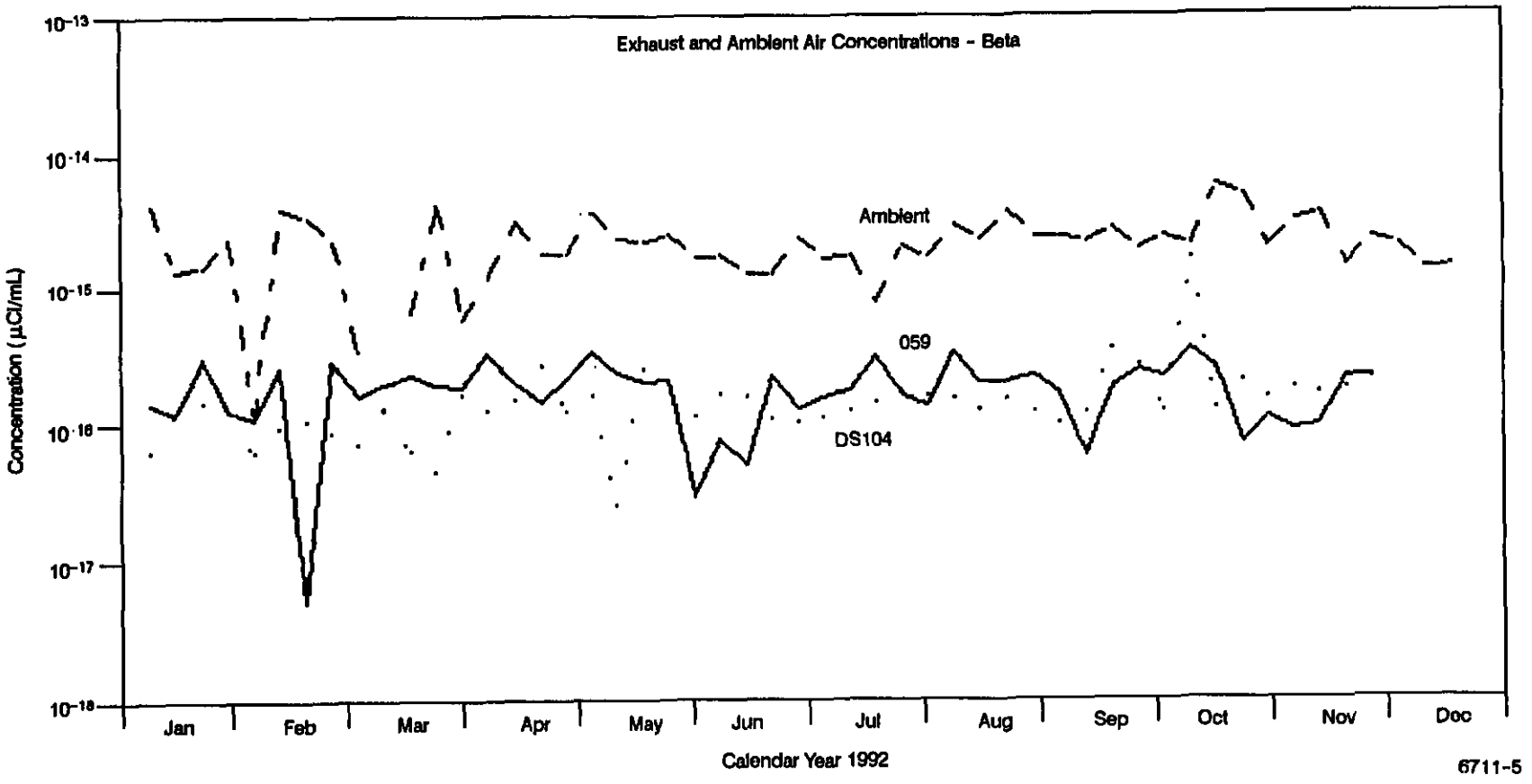

Figure 5–4. Filtered Exhaust and Ambient Air Radioactivity Concentrations (Sheet 4 of 4)

Table 5–6. Radioactivity in Groundwater at SSFL—1992

	Activity (pCi/L)											
	H–3	Cs–137	Ra–226	Ra–228	Ac–228	Th–228	Th–230	Th–232	U–234	U–235	U–238	Gross Alpha	Gross Beta
Maximum Permissible Concentration	20,000*	20,000	Combined 5*		90,000	7,000	2,000	2,000	30,000	30,000	40,000	15*	50*
Maximum	7,069		33.0						36.6	1.80	41.9	78.0	50.0
Mean	668	ND	12.7	ND	ND	ND	ND	ND	10.4	0.135	12.2	7.97	8.51
Minimum	ND		ND						1.22	ND	1.42	ND	ND
Number of analyses**	57(29)	(88)	3(9)	(2)	(10)	(2)	(2)	(2)	6	2(14)	6	75(28)	80(22)

*EPA Limits for drinking water suppliers
**Numbers in parentheses represent the number of analyses reported as less than the detectable limit (< DL). The mean has been calculated from reported values only.
ND = not detected

Average radioactivity concentrations in two retention ponds and upper Bell Creek samples are presented in Table 5–7.

Comparison of the radioactivity concentrations in water from the ponds with that of the supply water (see Table 5–8) shows no significant differences in either alpha or beta activity.

Radioactivity concentration guide values used for comparisons for licensed operations are those concentration limits adopted by the NRC and the State of California as MPC values for uncontrolled areas. These values are established in 10 CFR 20 and California Code of Regulations Title 17. For comparisons related to the DOE operations, the DCG for ingested water presented in

Table 5–7. SSFL Surface Water Radioactivity Data—1992

	Activity (pCi/L)			
	H–3	Cs–137	Gross Alpha	Gross Beta
Drinking Water Standards/MPC	20,000	20,000*	15	50
Maximum	2,573	-	3.3	8.0
Mean	2,340	ND	3.2	5.8
Minimum	2,107	-	3.0	4.0
Number of analyses**	2(1)	(11)	2(8)	6(4)

*MPC for release to unrestricted area.
**Numbers in parentheses represent the number of analyses reported as less than the detectable limit (< DL). The mean has been calculated from reported values only.
ND = not detected

Table 5–8. Domestic Water Supplies (1989–1992) Radioactivity

	Activity (pCi/L)							
	H-3	Sr-90	Rn-222	Ra-226	Ra-228	Uranium	Gross Alpha	Gross Beta
State Maximum Contamination Level	20,000	8	–	5 combined		20	15	50
Maximum	48	–	–	–	–	7.00	11.0	24.0
Mean	-5	< 2	ND	< 1	< 1	2.50	1.9	6.0
Minimum	-150	–	–	–	–	0.00	-5.5	0.9
Number of sources	7	13	–	12	10	11	15	13

ND = not detected

DOE Order 5400.5 are used. Where noted, limits for drinking water suppliers are also used (tritium, gross alpha, gross beta).

Most of Area IV slopes toward the southeast and rainfall runoff is collected by a series of drainage channels and accumulates in pond R–2A. This water is then used for cooling the rocket engine test stand flame buckets or, if in excess, is released to Bell Creek under the NPDES permit. Most of this water is runoff because the rain falls on building roofs and roadways. Some of Area IV slopes to the northwest and a small amount of rainfall drains toward the northwest ravines, which lead into Meier Canyon. To permit sampling this runoff, five catch basins were installed near the site boundary to accumulate runoff. The results of analyses for radioactivity in this water are shown in Table 5–9.

In addition to the rainfall runoff samples taken in the five catch basins, samples were taken of the rainfall runoff in the RMDF pond. The results of the analyses for radioactivity in the water are shown in Table 5–10. The sources of this water are RMDF buildings and the asphalt pad inside the RMDF complex.

Domestic water in this area is supplied by a variety of municipal and regional organizations, including the Los Angeles Department of Water and Power, the Metropolitan Water District of Southern California, several Ventura County Waterworks Districts, and the Oxnard Public Works Department. Most of the water is imported from distant sources, such as Owens Valley, the Feather River, and the Colorado River; some water, for Oxnard and Moorpark, comes from local groundwater wells. The local water is blended with imported water and treated to assure purity and safety. Water is transported in open aqueducts and enclosed pipelines and is stored in open reservoirs and underground settling basins. The State of California requires that these suppliers routinely monitor their water for many potentially hazardous materials (and less significant quality factors, as well) and report the results of this monitoring to their customers on an annual basis. Tests for radioactivity are relatively limited, and are performed over an extended period of time, so not all parameters are reported in any one year. The results reported by several of the local water suppliers during 1989–92 are shown in Table 5–8. (Tritium values include results from a series of high-sensitivity tests obtained by Rocketdyne.)

Table 5-9. SSFL Rainfall Runoff Radioactivity Data—1992
(Five Locations, Sampled After Rainfall)

	Activity (pCi/L)								
	H-3	Co-60	Sr-90	Cs-137	Ra-226	Ra-228	U-235	Gross Alpha	Gross Beta
Drinking Water Standards /MPC	20,000	30,000*	8	20,000*	5 Combined		30,000*	15	50
Maximum	2,239	3,136†	3.2			17.0		8.0	28.0
Mean**	678	3,136	2.8	ND	ND	11.7	ND	4.5	9.0
Minimum	-156	ND	ND			3.0		3.0	4.0
Number of Analyses***	10(26)	1(37)	2(3)	(38)	(8)	3(2)	(3)	11(26)	28(9)

*MPC for release to unrestricted area.
**Average of values greater than detection limit.
***Numbers in parentheses represent the number of analyses reported as less than the detectable limit (< DL). The mean has been calculated from reported values only.
†Subsequent resampling did not detect Co-60.
ND = Not detected

Table 5-10. RMDF Pond Rainfall Runoff Radioactivity Data—1992

	Activity (pCi/L)					
	Co-60	Cs-137	Ra-226	U-235	Gross Alpha	Gross Beta
Drinking Water Standards /MPC	30,000*	20,000*	5	30,000*	15	50
Maximum		44.0	117.3	22.5	5.0	11.0
Mean**	ND	44.0	117.3	20.1	5.0	11.0
Minimum		ND	ND	ND	< 2	< 3
Number of Analyses***	(8)	1(7)	1(7)	5(3)	1(1)	1(1)

*MPC for release to unrestricted area.
**Average of values greater than detection limit.
***Numbers in parentheses represent the number of analyses reported as less than the detectable limit (< DL). The mean has been calculated from reported values only.
ND = Not detected

5.2.3 Rock and Soil

While not considered by any regulations, the radioactivity in environmental rock and soil can serve as an indicator of any spread of contamination outside the operating facilities and other known areas of radioactive contamination. The results for occasional samples, in conjunction with routine

sampling, special studies, and the decontamination of the Sodium Disposal Facility are shown in Tables 5–11 and 5–12. Sampling locations are shown in Figure 5–5.

Soil samples were taken before and during the excavation of the Sodium Disposal Facility, see Figure 5–5 and Table 5–11. Eighty–two analyses were performed of the soil samples taken from the vicinity of the Lower Burn Pit. Forty–five analyses showed Cs–137 in concentrations below 1.0 pCi/g and 21 had concentration levels between 1.0 and 10.0 pCi/g. Two analyses showed concentration levels between 150 and 1,000 pCi/g. A single analysis resulted in 1,647 pCi/g and another 31,108 pCi/g.

With the exception of samples taken from known contaminated areas (e.g., RMDF north slope), the detected gross radioactivity in soil at locations other than the Sodium Disposal Facility (Table 5–12) is due to various naturally occurring radionuclides present in the environment and to radioactive fallout of dispersed nuclear weapons materials. Naturally occurring radionuclides include K–40 and the uranium and thorium series (including radon and daughters). The radionuclide composition of local area surface soil has been determined to be predominantly K–40, natural thorium, and natural uranium, both in secular equilibrium with daughter nuclides. Radioactivity in nuclear weapons test fallout consists primarily of the fission–produced Sr–90, Cs–137, and Pm–147, as well as U–234 and Pu–239.

The natural origin of possibly nonnatural radioactive materials such as thorium and uranium has been confirmed by comparison of their activities in uncontaminated soils and the ratios of their activities to each other and to their daughter radionuclides. These analytical results indicated that the thorium and uranium are natural occurrences.

5.2.4 Vegetation

No sampling and analysis of native vegetation was performed.

5.2.5 Wildlife

Since no hunting is permitted at SSFL, wildlife is abundant. Occasional samples are collected as the result of road–kills and analyzed for radioactivity. The most commonly found radionuclide is the natural activity, K–40. These analyses showed no indication of radioactive contamination.

5.2.6 Ambient Radiation

Standard commercial thermoluminescent dosimeters (TLDs) using lithium fluoride (LiF) are placed, in pairs, at locations near the site boundaries at SSFL and De Soto, and at two off–site locations. These are processed on a quarterly basis by a contractor laboratory and the paired results are averaged for each location. These results are shown in Table 5–13, and include the contributions due to natural background radiation (about 62.5 mrem/yr for 1992, as measured by these TLDs). These results show compliance with the annual limits of NRC and the Radiologic Health Branch (RHB) of

Table 5–11. Sodium Disposal Facility Rock and Soil Radioactivity Data – 1992

	Activity (pCi/g)																			
	Be-7	K-40	Co-60	Sr-90	Cs-137	Eu-152	Eu-154	Tl-208	Pb-212	Bi-212	Ra-226	Ac-228	Th-228	Th-230	Th-232	U-234	U-235	U-238	Pu-238	Pu-239/240	Am-241
Maximum	0.12	23.7	0.06	44.5	31,108	0.40	0.12	8.27	27.0	15.6	10.6	25.7	0.74	0.86	3.62	57.9	13.2	6.16	0.51	1.57	
Mean	0.09	17.6	0.06	10.5	588	0.13	0.04	0.58	1.87	1.08	1.88	1.83	0.24	0.24	0.50	4.64	0.62	0.83	0.51	0.85	ND
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.14	ND	ND	ND	ND	
Number of analyses*	3(63)	61(5)	1(65)	13(3)	59(42)	16(50)	13(53)	57(9)	59(7)	58(8)	54(12)	59(7)	13(1)	12(4)	14(2)	16	48(34)	15(1)	1(13)	2(12)	(64)

*Numbers in parentheses represent the number of analyses reported as less than the detectable limit (< DL). The mean has been calculated from reported values only.
ND = Not detected

Table 5–12. SSFL Rock and Soil Radioactivity Data – 1992

	Activity (pCi/g)												
	Be-7	K-40	Co-60	Cs-137	Eu-152	Eu-154	Tl-208	Pb-212	Bi-212	Ra-226	Ac-228	U-235	Am-241
Maximum	0.390	24.4	2.91	126.3	0.12		0.48	1.7	0.86	5.4	1.3	0.27	
Mean	0.267	18.9	1.37	14.9	0.10	ND	0.34	1.2	0.64	1.6	1.0	0.09	ND
Minimum	ND	5.37	ND	0.02	ND		0.20	ND	ND	0.2	ND	ND	
Number of analyses*	3(13)	16	3(13)	16	3(13)	(16)	16	14(2)	14(2)	16	15(1)	13(3)	(14)

*Numbers in parentheses represent the number of analyses reported as less than the detectable limit (< DL). The mean has been calculated from reported values only.
ND = Not detected

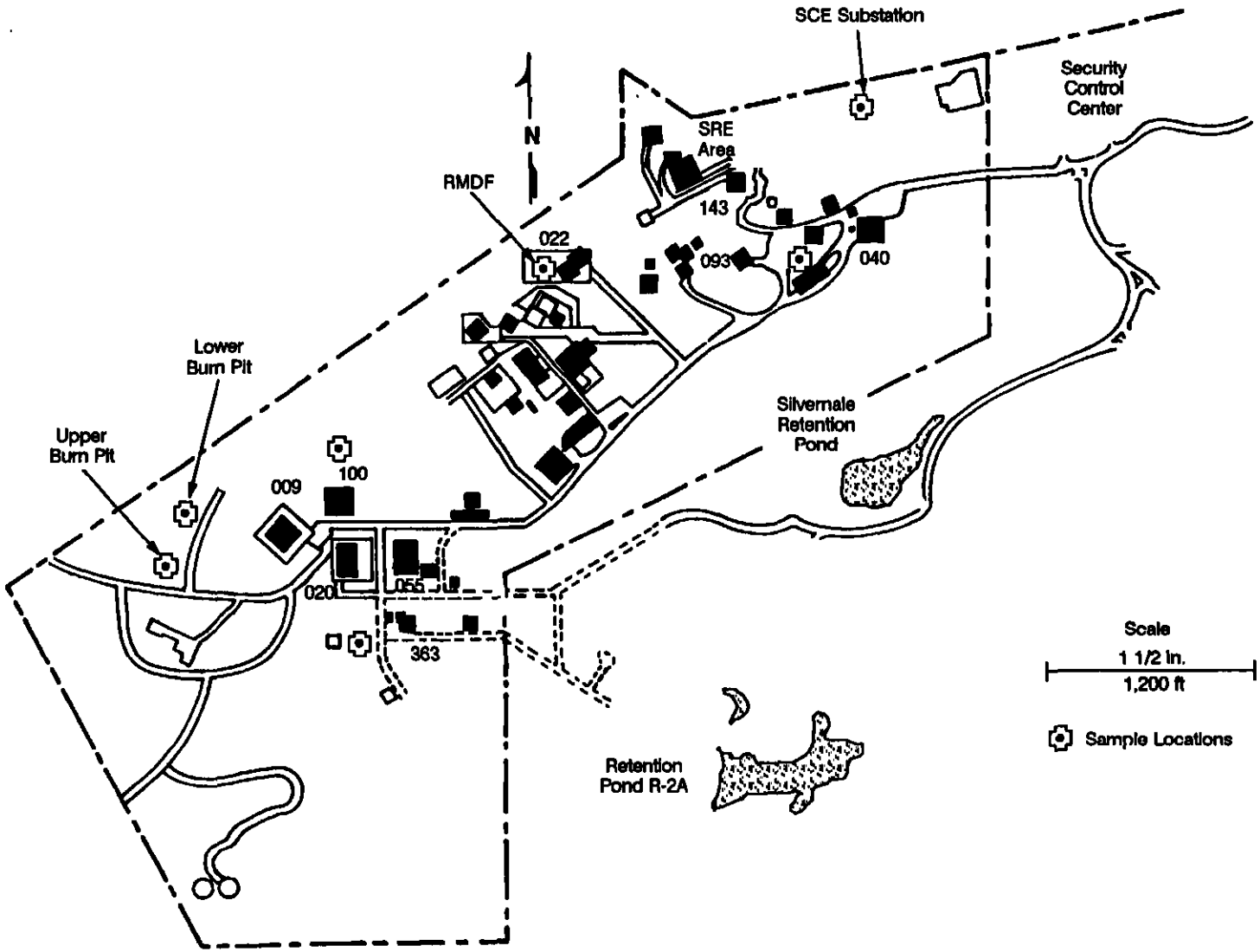

Figure 5-5. Map of Santa Susana Field Laboratory Site Soil Sampling, Area IV

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Table 5–13. De Soto and SSFL—Ambient Radiation Dosimetry Data—1992*

TLD Location		Quarterly Exposure (mrem)				Annual Exposure (mrem)	Annual Average Exposure Rate (μR/h)	
		Q–1	Q–2	Q–3	Q–4		Rocketdyne	State DHS
De Soto	DS–2	10.0	10.0	10.0	10.0	40.0	4.6	9.3
	DS–6	10.0	10.0	10.0	10.0	40.0	4.6	9.7
	DS–8	10.0	10.0	10.0	10.0	40.0	4.6	9.5
	DS–9	20.0	20.0	10.0	20.0	70.0	8.0	
Mean value		12.5	12.5	10.0	12.5	47.5	5.4	9.5
SSFL	SS–3	10.0	15.0	30.0	10.0	65.0	7.4	10.8
	SS–4	10.0	10.0	30.0	10.0	60.0	6.8	
	SS–6	10.0	15.0	30.0	10.0	65.0	7.4	11.9
	SS–7	10.0	10.0	30.0	10.0	60.0	6.8	11.0
	SS–8	10.0	20.0	30.0	10.0	70.0	8.0	
	SS–9	15.0	20.0	30.0	20.0	85.0	9.7	
	SS–11	10.0	20.0	30.0	10.0	70.0	8.0	
	SS–12	20.0	30.0	20.0	20.0	90.0	10.3	16.8
	SS–13	10.0	30.0	20.0	20.0	80.0	9.1	
	SS–14	10.0	20.0	10.0	10.0	50.0	5.7	
Mean value		11.5	19.0	26.0	13.0	69.5	7.9	12.6
Off-site	OS–1	10.0	15.0	30.0	10.0	65.0	7.4	10.5
	OS–5	10.0	10.0	30.0	10.0	60.0	6.8	9.8
Mean value		10.0	12.5	30.0	10.0	62.5	7.1	10.1

*Includes natural background radiation of approximately 62.5 mrem per year.

the State of California Department of Health Services (DHS) (500 mrem/yr) and the DOE (100 mrem/yr for extended exposure), above natural background.

The State RHB provides packages containing calcium sulfate ($CaSO_4$) dosimeters for independent monitoring of radiation levels at SSFL and in the surrounding area. These dosimeters are placed with the Rocketdyne TLDs. The State dosimeters are returned to the RHB for evaluation by their vendor laboratory. Data for these TLDs, placed at nine Rocketdyne dosimeter locations, both on–site and off–site, are also shown in Table 5–13. The differences between exposure rates determined by Rocketdyne and the State may be due to differences in the precision with which the results are reported, and differences in gamma–radiation energy response for the two different dosimeter materials. The Rocketdyne vendor reports these results to the nearest 10 mrem, while the State vendor reports results to the 0.1 mrem.

Table 5–13 shows that radiation exposures and equivalent annual exposure rates monitored on–site are nearly identical to levels monitored at the two off–site locations. These data reflect natural background radiation from cosmic radiation, radionuclides in the soil, radon and thoron in the

atmosphere, and local radioactive fallout. Locally, the natural background radiation level as measured by these dosimeters is about 62.5 mrem/yr. The small variability observed in the data is attributed to differences in elevation and geologic conditions at the various dosimeter locations. The altitude range for the dosimeter locations is from about 260 m (850 ft) ASL (above sea level) at the Canoga facility to a maximum of about 580 m (1,900 ft) ASL at SSFL.

5.3 ESTIMATION OF PUBLIC RADIATION DOSE

Because so little radioactive material is released from the Rocketdyne facilities, and the radiation exposure is so small, it is not possible to directly measure radiation dose to the public. Hypothetical doses are estimated based on measurements at the facilities, and extrapolated to occupied areas off-site by well-established mathematical procedures.

The external dose calculations assume that differences in TLD readings represent true differences in local exposure. These differences are extrapolated to the boundary and nearest residence using an inverse square distance relation from an assumed source of radiation and accounting for air attenuation of the radiation. The estimated doses are far below the applicable limits of DOE, NRC, and the State of California.

The external exposures, above background, are based on the averaged off-site exposure measurements. The mean value for two off-site dosimeters was 62.5 mrem with a maximum annually observed value for a single location of 65 mrem. Boundary dose estimates assume 100% occupancy, whereas the actual presence of persons at the boundary is rare or nonexistent.

Except for the nearest boundary line exposure for the Radioactive Materials Disposal Facility (RMDF), the estimated off-site doses are extremely low compared to the maximum permissible exposures recommended for the general population in the vicinity of DOE facilities. The effective dose equivalent for any member of the public, for all pathways (combining internal and external dose), shall not exceed 100 mrem/yr for DOE facilities or 500 mrem/yr for NRC and State of California licensed facilities. The RMDF boundary to the north of the facility received an estimated average "property line" exposure of about 15 mrem above background for the year. However, this does not constitute a dose to the general public since it lies within an isolated area without direct public access.

Estimates of the internal dose assume a constant unsheltered exposure, adjusted for wind direction frequency, throughout the year and therefore considerably overestimate the actual annual averaged doses near the site. Estimated internal radiation doses due to atmospheric emission of radioactive materials from De Soto and the SSFL nuclear facilities are several orders of magnitude below the radiation standards and are far below doses from internal exposure resulting from natural radioactivity in air. For the air pathway only, for DOE operations, the standard is 10 mrem/yr for committed effective dose equivalent, as established by EPA.

Public exposure to radiation and radioactivity is shown in Tables 5-14 through 5-16. These tables present the estimated exposures in comparison to the regulatory standards and that received due to natural radioactivity in the environment.

Table 5–14. Public Exposure to Radiation and Radioactivity from DOE Operations at SSFL – 1992

Radioactive Materials Disposal Facility (RMDF), Building 059, and Building 023 Department of Energy (DOE, Exempt from Licensing)

1. All pathways	
a. Maximum estimated external dose to an individual	1×10^{-4} mrem/yr
b. Maximum estimated internal dose to an individual*	6.6×10^{-7} mrem/yr
Total	1×10^{-4} mrem/yr
Limit ("Radiation Protection of the Public and the Environment" DOE Order 5400.5, 2/8/90)	100 mrem/yr
2. Air pathway (reported in NESHAPs report)	1.6×10^{-6} mrem/yr
Limit (40 CFR 61, Subpart H)	10 mrem/yr
Natural Exposure to Average Member of U.S. Public	
1. All pathways ("Health Effects of Exposure to Low Levels of Ionizing Radiation – BEIR V," National Academy Press, Washington DC, 1990)	300 mrem/yr
2. Air pathway ("Health Effects of Exposure to Low Levels of Ionizing Radiation – BEIR V," National Academy Press, Washington DC, 1990)	200 mrem/yr

*Inhalation and ingestion exposure from CAP88–PC calculation of air pathway; NESHAPs report contains only total air pathway exposure.

Table 5–15. Public Exposure to Radiation and Radioactivity from Rocketdyne Operations at SSFL – 1992

Rockwell International Hot Laboratory (RIHL)
U.S. Nuclear Regulatory Commission
Special Nuclear Material License No. SNM–21
State of California
Radioactive Material License No. 0015–70

1. Direct radiation at boundary		4.0×10^{-2} mrem/yr
Limits (10 CFR 20.105, CCR 17 Section 30268)	Annual	500 mrem in 1 yr
	Weekly	100 mrem in 7 days
	Hourly	2 mrem in 1 h
2. Airborne (nonnatural radioactivity) effluent at boundary		1.4×10^{-19} μCi/mL
Limits (10 CFR 20.106, CCR 17 Section 30269)		2×10^{-14} μCi/mL
Natural Exposure to Average Member of U.S. Public		
1. Direct radiation ("Health Effects of Exposure to Low Levels of Ionizing Radiation – BEIR V," National Academy Press, Washington DC, 1990)		100 mrem/yr
2. Airborne (natural) radioactivity (Estimated by De Soto site measurements of gross alpha and beta radioactivity concentrations in ambient air.)		3.1×10^{-14} μCi/mL

Table 5–16. Public Exposure to Radiation and Radioactivity from Rocketdyne Operations at De Soto—1992

Applied Nuclear Technology Laboratory (DS104)
State of California
Radioactive Materials License No. 0015–70

1. Direct radiation at boundary		3.2×10^{-1} mrem/yr
Limits (CCR 17 Section 30268)	Annual	500 mrem in 1 yr
	Weekly	100 mrem in 7 days
	Hourly	2 mrem in 1 h
2. Airborne (nonnatural radioactivity) effluent at boundary		3×10^{-21} μCi/mL
Limit (CCR 17 Section 30269)		2×10^{-14} μCi/mL
Natural Exposure to Average Member of U.S. Public		
1. Direct radiation ("Health Effects of Exposure to Low Levels of Ionizing Radiation – BEIR V," National Academy Press, Washington DC, 1990)		100 mrem/yr
2. Airborne (natural) radioactivity (Estimated by De Soto site measurements of gross alpha and beta radioactivity concentrations in ambient air.)		3.1×10^{-14} μCi/mL

Figure 5–6 shows the arrangement of the census tract boundaries from the 1990 census. Figures 5–7 through 5–9 show local population distribution estimates that were determined from the 1990 Federal census by Urban Decision Systems, Inc., and modified by direct observation of nearby residential areas around the SSFL site.

The general population (person–rem) dose estimates were calculated using CAP88–PC. This code uses release rate, wind speed, wind direction and frequency stability fractions, and stack height parameters as input data. Population dose estimates are 2.7×10^{-4} person–rem for the SSFL site and 9.0×10^{-5} person–rem for the De Soto site. Inhalation is the only potential exposure pathway likely to exist. The doses reported for SSFL site emissions are summed for all release points and nuclides.

In spite of the large number of people in the surrounding population, the population dose estimated for Rocketdyne operations is extremely small. For comparison, the dose received by the same population from naturally occurring radiation is approximately 2 million person–rem, approximately 5 billion times greater than that estimated for SSFL operations.

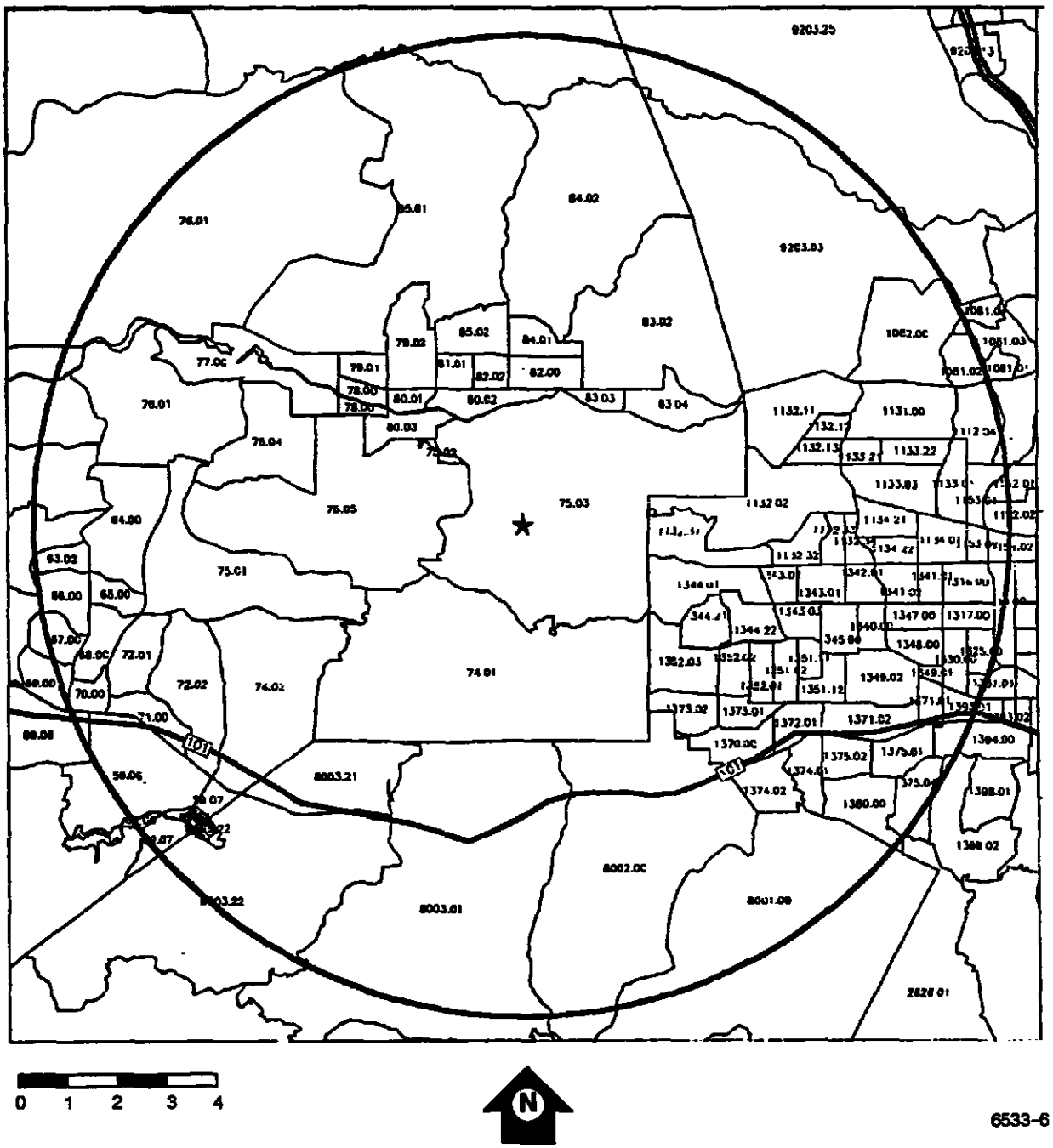

Figure 5–6. Census Tract Boundaries (1990) within 10 miles of SSFL (Individual tracts are identified by number)

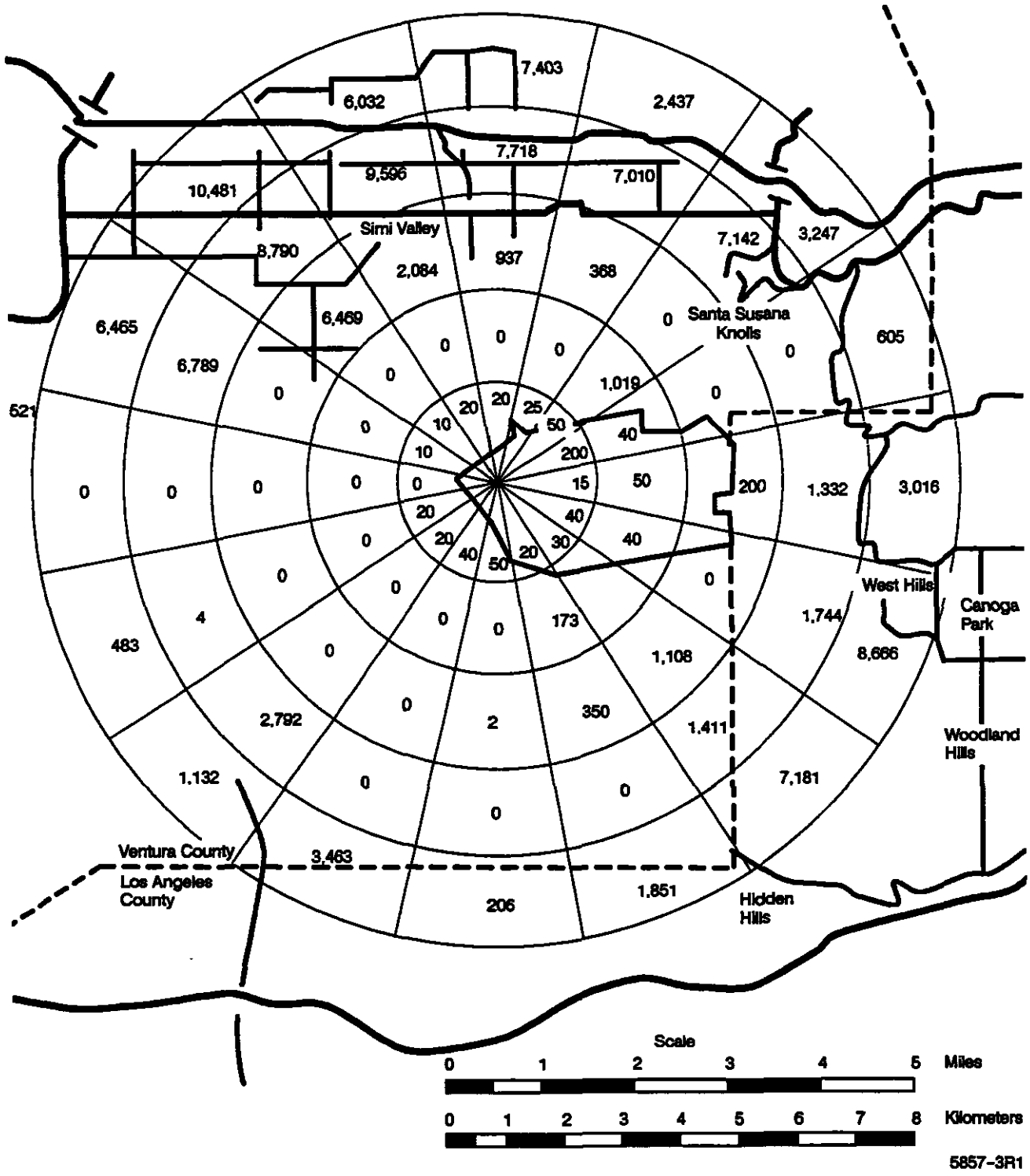

Figure 5–7. SSFL Site-Centered Demography to 8 km, Showing Number of Persons Living in Each Grid Area (Daytime Employment for SSFL)

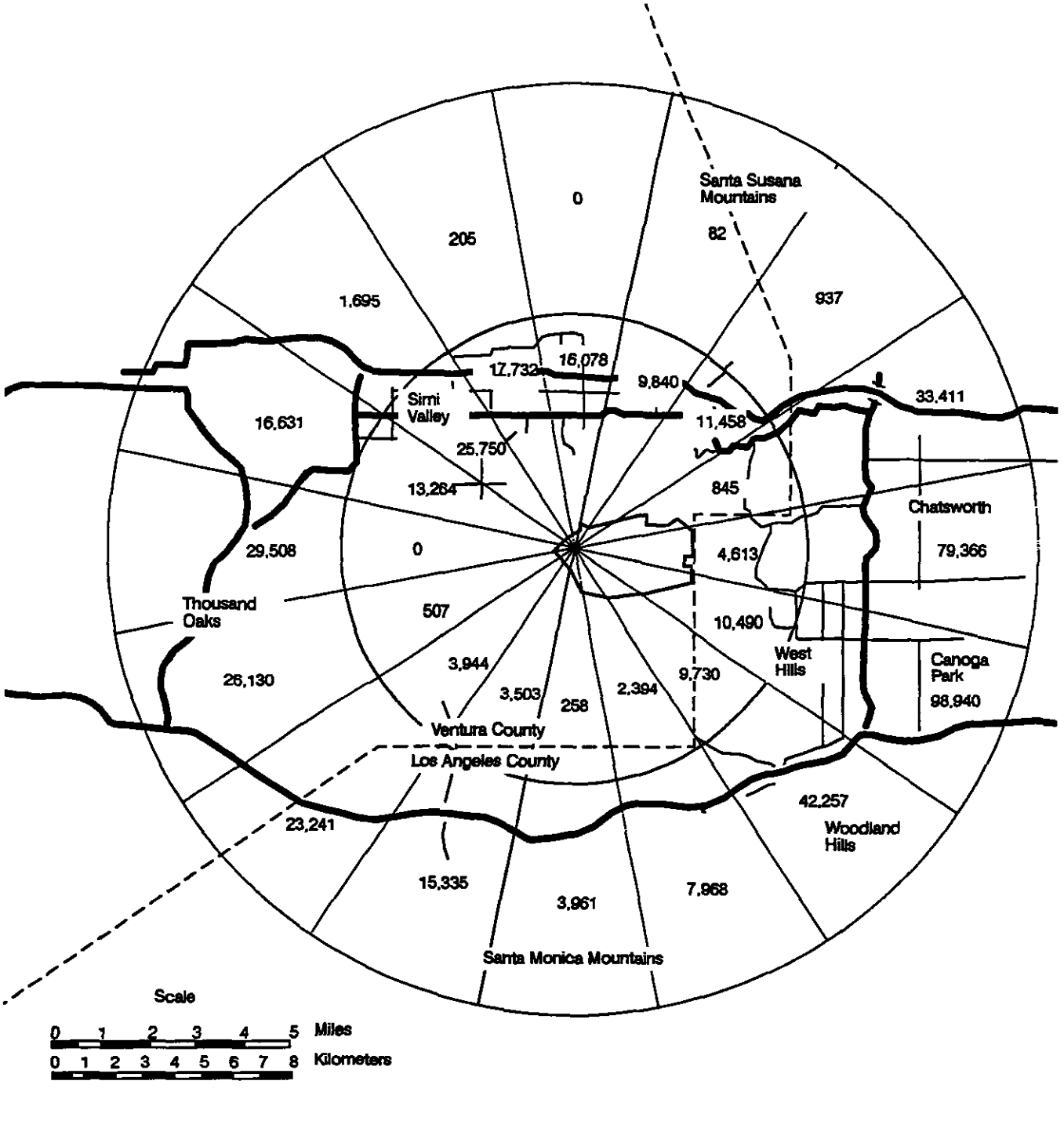

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Figure 5–8. SSFL Site–Centered Demography to 16 km, Showing Number of Persons Living in Each Grid Area

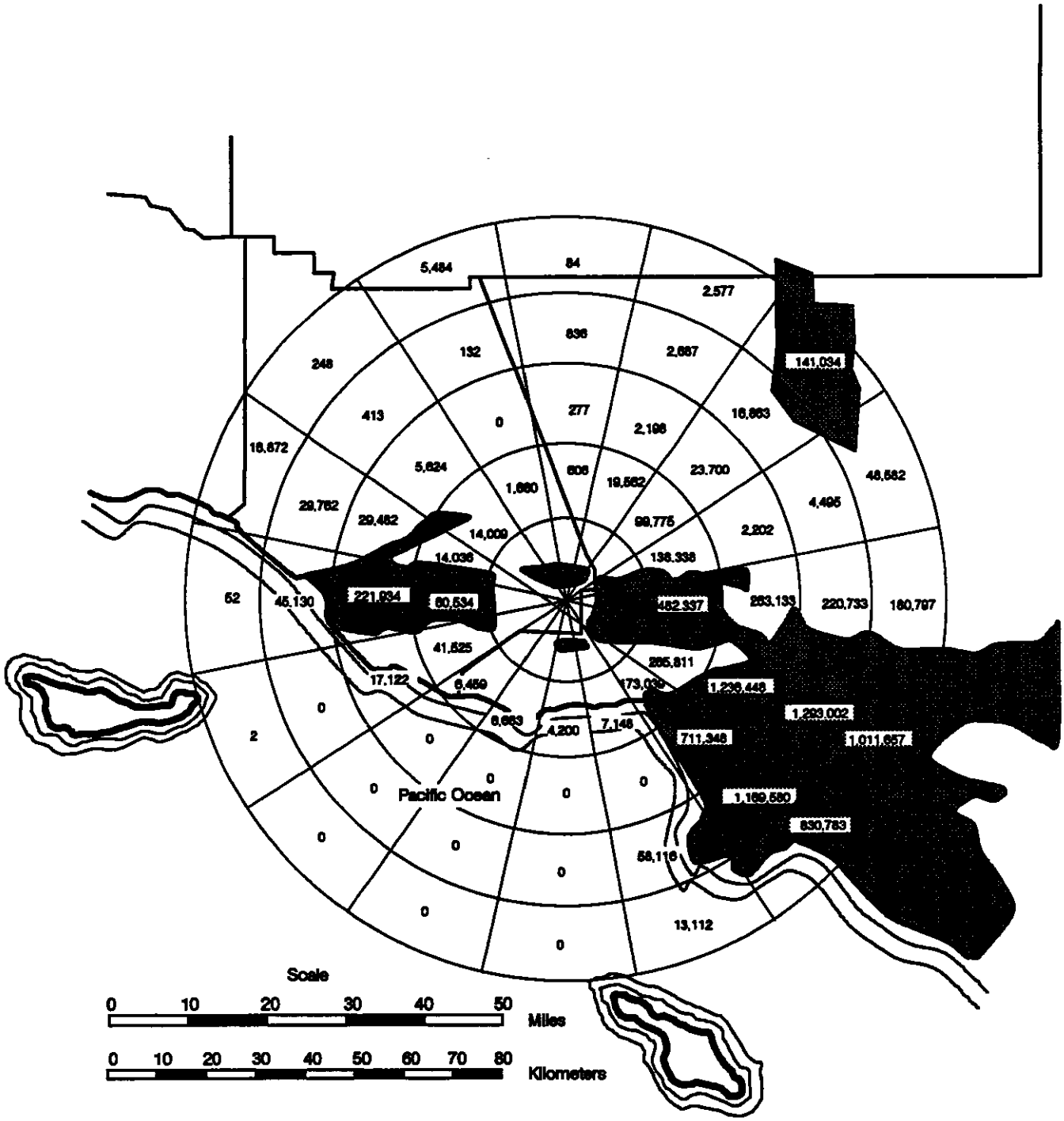

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Figure 5–9. SSFL Site–Centered Demography to 80 km, Showing Number of Persons Living in Each Grid Area (heavily populated areas are shown by shading)

6.0 ENVIRONMENTAL NONRADIOLOGICAL PROGRAM INFORMATION

Rocketdyne maintains a comprehensive environmental program to ensure compliance with all applicable regulations, to prevent adverse environmental impact, and to restore the quality of the environment from past operations. As a part of this program, Rocketdyne is currently involved in an extensive groundwater remediation program and has the capacity for removing solvent contamination from approximately one million gallons of groundwater per day at SSFL. All former surface impoundments have been closed and are in the closure approval process with the Cal–EPA Department of Toxic Substance Control (DTSC). Contamination resulting from underground storage tanks (USTs) has been remediated, and the majority of the storage tanks have been removed. The few remaining USTs are equipped with automatic leak detection systems in compliance with Ventura County UST ordinances. The environmental restoration activities at SSFL include an extensive review of past programs and historical practices to identify, characterize, and correct all areas of potential concern.

Extensive monitoring programs for both radiological and chemical contaminants in air, soil, surface water, and groundwater are in effect to assure that the existing environmental conditions do not pose a threat to the public welfare or environment.

The discharge of surface water at SSFL is usually rain induced or due to the nonutilization of treated groundwater and is regulated by the California Regional Water Quality Control Board through an NPDES permit. The majority of surface water runoff drains to the south and is collected in the water reclamation/pond system. Discharges from this system are subject to effluent limitations and monitoring requirements as specified in the existing NPDES permit. A small portion of the site near Area IV generates rainfall runoff to five northwest boundary runoff channels where monitoring locations (see Figure 6–1) have been established and sampling is conducted in accordance with the northwest slope monitoring program. All discharges are periodically monitored for volatile organics, heavy metals, and applicable radionuclides, in addition to other parameters necessary to assess water quality.

All sources of air emissions at SSFL are subject to the provisions of the Clean Air Act (CAA) as administered through the California Air Resources Board and the Ventura County Air Pollution Control District (VCAPCD). The VCAPCD regulates sources of air emissions and issues permits that contain limits on pollutant levels and conditions of operation.

Soil analyses have been and are site specific according to the activities generating the analyses and potential disposition of the soil. A wide variety of analyses are conducted to determine the extent of any potential chemical contamination. All analyses conducted in Area IV at the present time are conducted per RCRA regulations.

The 1992 SARA Title III Form R (Toxic Release Inventory) submission was sent to both the state and federal agencies by the 1 July deadline. The information for the SSFL facility was a composite report using information for Rocketdyne, DOE, and NASA. The forms include questions regarding off-site waste shipments and air emission calculations. Only two chemicals met the threshold

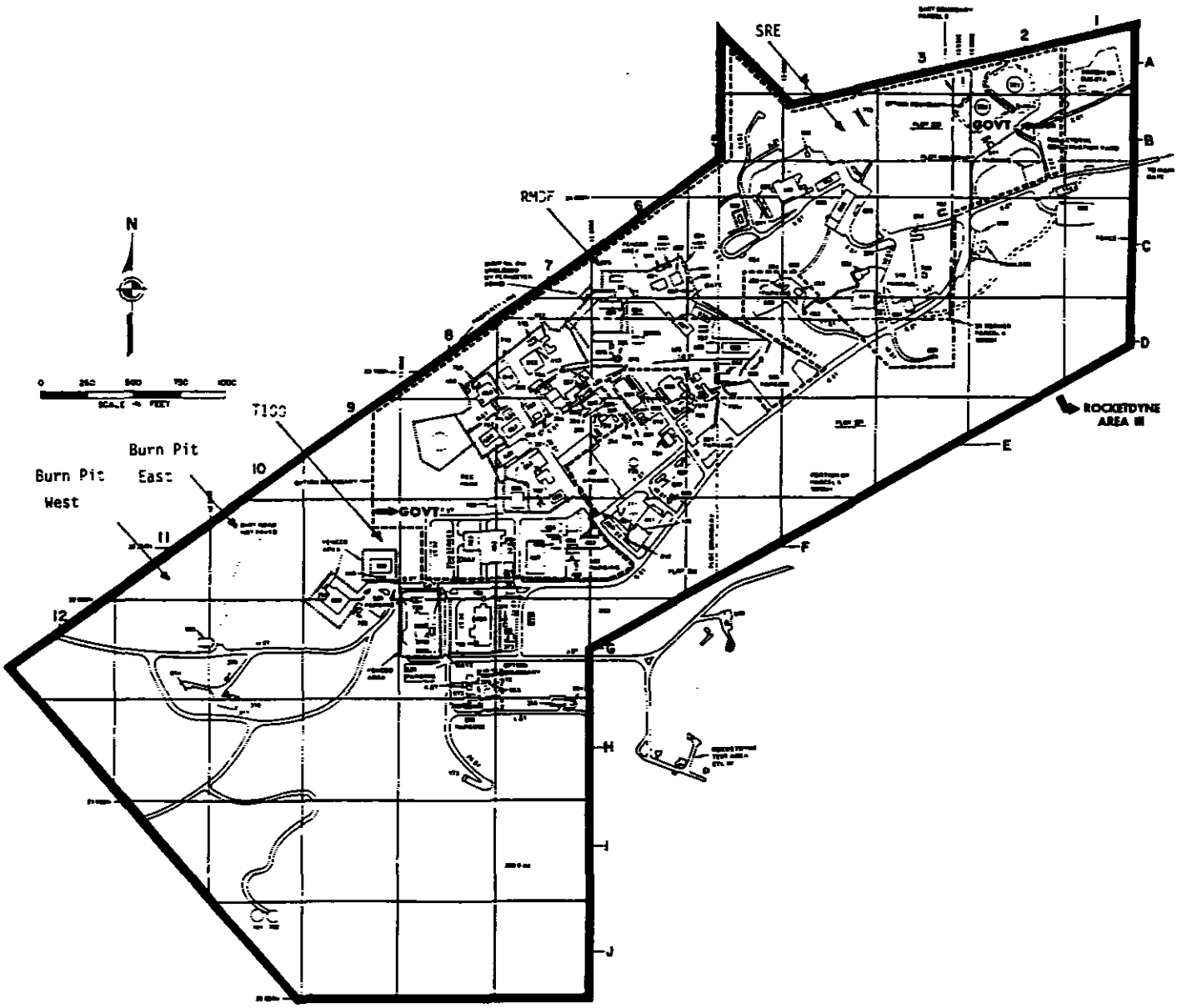

Figure 6–1. Locations of Rainfall Runoff Collectors Along Northwest Boundary of SSFL, Area IV

requirements this year: 1,1,1–Trichloroethane (CAS No.:71–55–6) and Trichloroethylene (CAS No.:79–01–6).

The overall annual groundwater monitoring program at SSFL addresses collection and analysis of groundwater samples and measurement of the water levels for the 154 on–site and 22 off–site wells. The locations of these wells within and around Area IV are shown on the map of SSFL in Figure 6–2. Groundwater quality parameters and sampling frequency have been determined based on historical water quality data, location of known or potential sources of groundwater contamination, operational requirements of groundwater extraction and treatment systems and regulatory direction. The groundwater monitoring program includes the following parameters, all analyzed using the appropriate EPA methods: volatile organic constituents, base/neutral and acid extractable organic compounds, petroleum hydrocarbons, and trace metals and common ion constituents.

Hydrogeologic studies at SSFL describe two groundwater systems at the site: a shallow, unconfined system in the alluvium (surface mantle soils) of the Burro Flats area and along the major drainage channels, and a deeper fracture controlled groundwater system in the Chatsworth Formation sandstone (bedrock). Alluvium along the major surface drainage systems may store and transmit groundwater to the underlying Chatsworth Formation through fractures. Water levels in the alluvium respond to recharge resulting from surface flows and may vary considerably between wet and dry periods. The alluvium is composed of a heterogeneous mixture of gravel, sand, silt, and clay, which are known to have hydraulic conductivities ranging from 0.1 to 100 gal/day/ft^2.

The Chatsworth Formation is composed of well–consolidated, massively bedded sandstones with interbedded layers of siltstone and claystone. The formation may be as thick as 6,000 ft at the SSFL site. The direction of groundwater flow in the formation is probably radially off–site toward the surrounding lowlands.

The hydrogeologic environment at the SSFL site is a dynamic system. Groundwater is recharged at the site, moves through the aquifers, and discharges to the surface or to other aquifers down–gradient of the site. The groundwater system is recharged by precipitation and by unlined ponds and drainage channels. Because of the meager rainfall in the area and the relatively large variability in annual precipitation, groundwater recharge is low and may vary greatly from year to year. Specific pathways of possible contaminant transport along fracture zones are difficult to predict on the basis of on–site well data. Fracture zones vary widely in frequency and geometry from one location to the other as well as from one specific depth to another. Recharge over the area may also vary over both space and time.

In addition to this environmental monitoring and restoration program, current operational procedures reflect Rocketdyne's commitment to a clean and safe environment. For example, solvents and oil are collected and recycled to the maximum extent possible. A comprehensive training and employee awareness program is in place. All employees working with hazardous materials are required to attend a course on hazardous materials waste management. Environmental bulletins are circulated in the Rocketdyne newspaper to promote environmental awareness among all employees.

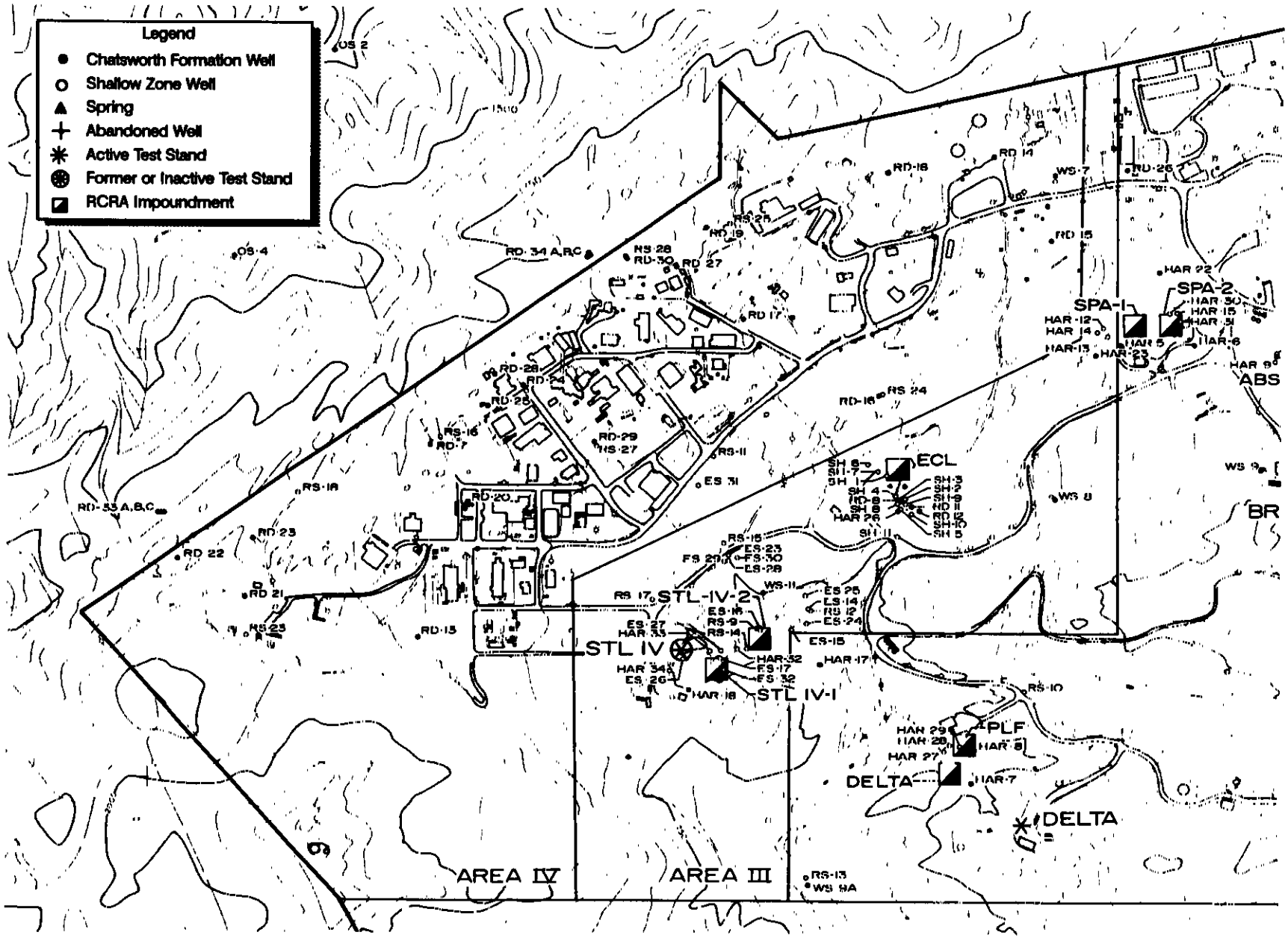

Figure 6–2. Locations of Wells Used in Groundwater Management Program

A revised Spill Prevention Control and Countermeasure (SPCC) plan was submitted as a part of the revised Spill Prevention and Response Plan to the local Administering Agency on 26 March 1992. The U.S. EPA requires the preparation of an SPCC plan by those facilities which, because of their location, could reasonably be expected to discharge oil in harmful quantities into or upon navigable waters. Additionally, an updated hazardous materials inventory was submitted as an update of the business plan on 1 February 1992.

Asbestos control at Rocketdyne is conducted under the requirements of Titles 29, 40, and 49 of the Code of Federal Regulations (CFR), in addition to any state or local regulations that apply to any asbestos abatement program. Several steps in managing an asbestos program have been incorporated into facility renovation and demolition. These generally include assessment or identification of asbestos-containing materials (ACMs), abatement activities such as worker protection and surveillance, and clearance requirements such as cleanup and disposal. With Area IV, approximately 100% of the buildings have been surveyed, and materials in question have been analyzed for asbestos. Where required, asbestos abatement will occur when renovation or demolition projects are identified.

In summary, Rocketdyne is committed to sound environmental management of all programs at our facilities and to correcting existing environmental problems before they pose a threat to our employees or the public. We have a longstanding record of our commitment to protecting the environment and will continue to strengthen that commitment in the future.

6.1 SURFACE WATER

Rocketdyne has filed a Report of Waste Discharge with the California Regional Water Quality Control Board (RWQCB) and has been granted a discharge permit pursuant to the National Pollutant Discharge Elimination System (NPDES) and Section 402 of the federal Water Pollution Control Act. The permit to discharge, NPDES No. CA0001309, initially became effective 27 September 1976. The permit was renewed with minor changes effective 17 September 1984 and has since undergone significant modifications subsequent to reissuance on 7 December 1992. This permit allows the discharge of reclaimed wastewater and storm water runoff from water retention ponds into Bell Creek, a tributary to the Los Angeles River in addition to the discharge of storm water runoff from the northwest slope (Area IV) locations. Discharge generally occurs only during and after periods of heavy rainfall which cause the retention ponds to overflow. Periodically, dry weather discharges are necessary due to nonutilization of treated groundwater for engine testing purposes.

There is no sanitary sewer discharge from SSFL. Domestic sewage is treated, disinfected, and discharged to the retention ponds. Permit conditions are placed on the operation of the two treatment plants. Area IV sewage is discharged directly to the Area III Sewage Treatment Plant (SPT III).

Of the two retention ponds at SSFL which discharge via the NPDES permit, only one receives influent from Area IV, and is referred to as Pond R-2A. The remaining pond is identified as Perimeter Pond. Analytical results from 1992 surface water discharge events are shown in Table 6-1.

Table 6–1. 1992 Analytical Results for Surface Water Releases

Constituent	Limit	Pond R-2A Number of Samples	Minimum	Mean	Maximum	Perimeter Pond Number of Samples	Minimum	Mean	Maximum
BOD	30	13	1.5	3.7	7.0	5	0.2	1.7	4.0
Boron	1	13	0.2	0.27	0.5	5	0.2	0.14	0.3
Chloride	150	13	8.8	45	85.1	5	7.2	30.7	39.4
Fluoride	1	13	0.2	0.34	0.5	5	0.2	0.26	0.3
Grease and Oil	15	13	0.6	1.4	2.5	5	0.7	1.1	1.4
Arsenic	0.05	13	0.001	0.0018	0.004	5	0.002	0.003	0.004
pH	6 to 9	13	7.5	8.1	8.9	5	7.4	7.7	8.8
Residual chlorine	0.1	13	<0.04	<0.04	<0.04	5	<0.04	<0.04	<0.04
Settleable solids	0.3	13	ND	0.15	0.4	5	ND	0.1	0.2
Sulfate	300	13	24	111	172	5	17	62.2	123
Suspended solids	150	13	3	35.3	158	5	4	20.4	23
Surfactants	0.05	13	ND	0.029	0.1	5	ND	0.018	0.09
Temperature (°C)	37.8	13	12	17	23	4	12	13.5	14
Total dissolved solids	950	13	118	410	675	5	134	286.8	463
Toxicity	70%	13	80%	98%	100%	5	100%	100%	100%
Turbidity	***	13	5	28	120	5	17	24.4	34

Influent to the ponds includes tertiary treated domestic sewage, cooling water from various testing operations, and storm water runoff. During periods of discharge from the ponds, grab–type samples are collected for analysis by a California State certified Testing Lab. Analytes include nonradioactive chemical constituents such as heavy metals, volatile organics, base/neutral acid extractables, and general chemistry in addition to specified radionuclides. Toxicity testing is also conducted in the form of fish bioassays. The NPDES permit, shown as Appendix A, lists the specific constituents which are analyzed, as well as their respective effluent limits.

In November 1989, a storm water runoff program was developed and implemented in Area IV for runoff from the northwest portion of the site. Five monitoring locations were selected which include: the former Sodium Disposal facility (SBP1 and SBP2), behind T100, along the north side of RMDF, and the SRE watershed. This monitoring program has now been implemented as permit requirements and remains in effect. The results of runoff monitoring for 1992 rain events are shown in Table 6–2.

Table 6–2. 1992 Analytical Results for Northwest Rainfall Runoffs (Sheet 1 of 2)

Analyses in (mg/L)								
Constituent	SBP1 Number of Samples	Minimum	Mean	Maximum	SBP2 Number of Samples	Minimum	Mean	Maximum
Arsenic	12	0.001	0.0011	0.004	12	ND	0.0004	0.004
Boron	13	ND	0.04	0.3	13	ND	0.0033	0.2
Chloride	13	2.5	9.14	19.5	13	2.2	6.5	16.2
Dissolved beryllium	12	ND	0.00044	0.004	12	0.0003	0.0072	0.003
Dissolved cadmium	12	ND	ND	ND	12	ND	ND	ND
Dissolved chromium	12	ND	ND	ND	12	ND	0.002	0.013
Dissolved copper	12	ND	0.0012	0.008	12	ND	0.0006	0.007
Dissolved lead	12	0.002	0.0026	0.014	12	ND	0.0006	0.004
Dissolved mercury	13	0.0002	0.0087	0.003	12	ND	0.0002	0.0023
Dissolved nickel	12	ND	ND	ND	12	ND	ND	ND
Dissolved zinc	12	ND	0.0358	0.09	12	ND	0.022	0.087
Fluoride	13	0.1	0.25	0.7	13	0.1	0.14	0.2
Oil & Grease	13	1.9	1.1	0.4	13	0.4	0.86	1.3
pH	13	7.0	8.0	9.0	13	6.7	7.6	10.8
Residual chlorine	13	ND	ND	ND	13	ND	ND	ND
Sulfate	13	3	20.8	104	13	ND	10.4	31
Surfactants	12	ND	ND	ND	12	ND	0.02	0.087
Volatile Organics (Total)	12	ND	0.76	6.3	12	ND	ND	ND
BNAs (total)	12	ND	13.8	152.2	12	ND	11.02	121.3
Toxicity	13	100%	100%	100%	12	95%	99.5%	100%

Constituent	B/100 Number of Samples	Minimum	Mean	Maximum	RMDF Number of Samples	Minimum	Mean	Maximum
Arsenic	12	ND	0.00018	0.001	11	ND	0.00036	0.002
Boron	13	ND	0.016	0.2	12	ND	0.042	0.3
Chloride	13	0.6	3.7	17.2	12	1.3	7.7	23.5
Dissolved beryllium	12	ND	0.0008	0.005	11	ND	0.0006	0.005
Dissolved cadmium	12	ND	0.0008	0.009	11	ND	ND	ND
Dissolved chromium	12	ND	ND	ND	11	ND	ND	ND
Dissolved copper	12	ND	ND	ND	11	ND	0.0005	0.006
Dissolved lead	12	ND	0.0004	0.004	11	ND	0.00018	0.002
Dissolved mercury	13	ND	0.00018	0.002	12	ND	0.000025	0.0003
Dissolved nickel	12	ND	ND	ND	11	ND	ND	ND
Dissolved zinc	12	ND	0.0088	0.056	11	ND	0.022	0.053
Fluoride	13	0.1	0.125	0.2	12	0.1	0.116	0.2
Oil & Grease	13	0.3	0.96	1.6	12	0.6	1.37	3.2
pH	13	6.9	7.7	9.0	12	7.0	7.4	9.5
Residual chlorine	13	ND	ND	ND	12	ND	ND	ND
Sulfate	13	ND	8.4	16.0	12	6.0	23.6	78.0
Surfactants	12	ND	0.018	0.058	11	ND	0.014	0.072
Volatile Organics (Total)	12	ND	ND	ND	11	ND	ND	ND
BNAs (total)	12	ND	8.29	99.5	11	ND	11.36	125.0
Toxicity	13	95%	99.6%	100%	12	85%	88.7%	100%

ND = not detected

Table 6–2. 1992 Analytical Results for Northwest Rainfall Runoffs (Sheet 2 of 2)

Analyses in (mg/l)				
Constituent	SRE Number of Samples	Minimum	Mean	Maximum
Arsenic	12	ND	0.0005	0.002
Boron	13	ND	ND	ND
Chloride	13	1.3	11.7	66.5
Dissolved beryllium	12	ND	0.0006	0.005
Dissolved cadmium	12	ND	0.0005	0.006
Dissolved chromium	12	ND	ND	ND
Dissolved copper	12	ND	ND	ND
Dissolved lead	12	ND	0.0007	0.004
Dissolved mercury	13	ND	0.00002	0.0003
Dissolved nickel	12	ND	ND	ND
Dissolved zinc	12	ND	0.019	0.085
Fluoride	13	0.1	0.13	0.2
Oil & Grease	13	0.4	1.13	2.2
pH	13	6.8	7.4	8.0
Residual chlorine	13	ND	ND	ND
Sulfate	13	ND	56.4	280.0
Surfactants	12	ND	0.011	0.068
Volatile Organics (Total)	12	ND	ND	ND
BNAs (total)	12	ND	2.75	33
Toxicity	13	90%	98.6%	100%

ND = not detected

6.2 AIR

In addition to the wastewater discharge limitations, atmospheric pollutant discharge limitations are imposed by VCAPCD Permit 0271 on natural gas personnel comfort space heaters, and boilers in various buildings in Area IV and several natural gas/oil-fired sodium heaters operated by ETEC for component testing.

In September 1991, Rocketdyne petitioned for and received a VCAPCD variance No. 392 from rule 74.15.H.1 pertaining to boilers and steam generators. This variance was required to allow ETEC to operate during start-up and checkout of the newly installed low NOX burners in H-1, H-2, and H-101 boilers and heaters. Problems encountered during checkouts of the system necessitated the request on 15 January 1992 for an extension of the variance which was granted (No. 392-1) until 31 December 1992. The H-1, H-2, and H-101 heaters and boilers are in full compliance at the load levels 25%, 50%, 75%, and 100% as of the H-1 source test in June 1992. However, at load levels lower than 25% and at start-up and shutdown the heaters and boilers have been out of compliance. An extended variance (No. 392-2) was issued by the VCAPCD on 18 November 1992 to cover these noncompliant operations. Variance No. 392-2 is valid until 30 November 1993 or until a modification/revision to rule 74.15 is completed (addressing the noncompliant operations), whichever comes first.

VCAPCD held a routine inspection on 18 February 1992, no violations were cited related to DOE operations. On 27 May 1992 the VCAPCD issued consolidated permit to operate No. 0271 for the permit period from 1 January 1992 through 31 December 1992. The new consolidated permit No. 0271 covers the Sodium Component Test Installation (SCTI), Hazardous Waste Management Facility (HWMF), Sodium Pump Test Facility (SPTF), Molten Salt Test Facility (MSTF), Kalina Plant, and wipe cleaning. The new permit emissions are listed at 9.63 tons/yr for reactive organic compounds, 138.44 tons/yr for oxides of nitrogen, 5.68 tons/yr for particulates, 3.89 tons/yr for oxides of sulfur, 33.58 tons/yr for carbon monoxide, and 9.30 tons/yr for ammonia.

6.3 GROUNDWATER

A groundwater monitoring program has been in place at the SSFL site since 1984. This has been accomplished largely under the direction and guidance of the regulatory agency responsible during the period 1984 through July 1989, the Los Angeles office of the California RWQCB. (The EPA appointed the Cal-EPA DTSC [Region 3/Burbank] as lead agency in July 1989.) During the past five years, a network that now consists of 154 on-site wells and six off-site wells near the northwest boundary has been completed. Ninety-one of these are in the Shallow Zone, and 69 have been drilled into the Chatsworth Formation, the indurated sandstone that represents the uppermost aquifer underlying the facility. In 1987, as part of the statewide requirements under the Toxic Pits Cleanup Act, Rocketdyne submitted the Hydrogeological Assessment Report (HAR) for the entire facility while addressing the 10 RCRA-permitted surface impoundment closures. (There are no RCRA surface impoundments in Area IV.) Subsurface soil sampling at over 150 locations has been accomplished. Routine quarterly chemical and radiological monitoring of the wells scheduled for annual review is conducted according to the monitoring plan submitted to the lead agency for the groundwater program.

At the facility, Rocketdyne has seven permitted remedial water treatment systems operating in Areas I, II, and III with one additional treatment system in the permitting process. The combined treatment capacity of these systems is nearly 1,000,000 gal of solvent-contaminated water per day. Two of the systems are ultraviolet light/hydrogen peroxide treatment units (UV/H_2O_2). The six air stripping tower systems include those at the Area I Road, Alfa, Bravo, Canyon, STL-IV (now in the permitting process), and Delta sites. The combined pumping total of these remediation units has resulted in treatment of 690 million gal of solvent-contaminated water since 1987. The summaries of the water quality results for the treatment systems are included in the quarterly groundwater program reports submitted to the regulatory agencies. Although seasonal variations exist, examination of the results has revealed that there has been substantial progress in groundwater remediation via the treatment technologies utilized by Rocketdyne.

Plans are in progress to batch the solvent-contaminated waters of two new extraction wells (to be constructed in the summer of 1993) and transport them to the STL-IV Stripping Towers Treatment System. One well will be located northwest of the RMDF. The second well will be near Building T886, the former Sodium Disposal Facility. Additional treatment options for Area IV are being considered, pending DOE funding. These include an air stripping tower unit or a UV H_2O_2 unit on-site in Area IV or newer technologies (using solar radiation).

The bulk of the Area IV shallow groundwater is seasonal and dependent upon rain/natural drainage patterns. The surface water sampling occurs rarely because it is rain-prompted. Documentation of these rainfall events since November 1989 has been submitted to the California RWQCB (Los Angeles area).

The solvents found in the groundwater include trichloroethylene and its family of decomposition products. The results of the analyses of the Area IV wells have been documented in the "Area IV (Phase III) Groundwater Investigation Report" prepared for Rocketdyne by Groundwater Resources Consultants, Inc., in December 1992, as well as in the 1992 Annual Report.

Three existing TCE occurrences in the northwest part of Area IV were monitored in 1992. No new data changing the shape and size of these occurrences and the potential for their off-site extensions were obtained. The northwestern boundaries of these occurrences have not been defined (see Figure 6-3).

Two wells within the occurrence (No. 1, Figure 6-3) northwest of RMDF, recorded a decrease in the range of TCE concentration during 1992. The shallow zone well RS-28, one of the two on-site wells within the occurrence, recorded 46 to 60 µg/L TCE in 1992 compared to 57 to 77 µg/L TCE in 1991 (see Table 6-3). The other well, a Chatsworth Formation well (RD-30) showed 20 to 38 µg/L TCE in 1992. In 1991, RD-30 recorded 28 to 42 µg/L TCE. Both wells were installed in 1989. RS-28 decreased from the 1990 peak of 85 µg/L TCE to the 1991-1992 level, but RD-30 did not record any significant change in the trend during the same period. RD-34A, an off-site Chatsworth Formation well (shallowest well of a three-well cluster constructed in 1991), within the same occurrence recorded an increase in the range of the TCE concentration above MCL. It showed 27 to 61 µg/L TCE in 1992, compared to 28 to 42 µg/L in 1991.

The Chatsworth Formation well (RD-7), the only well within the occurrence (No. 2, Figure 6-3) southwest of Building 059, also recorded a drop in TCE concentration from 18 to 35 µg/L in 1991 to 12 to 29 µg/L in 1992. Since its construction in 1986, RD-7 generally maintained the TCE concentration in 16 to 35 µg/L range with three peaks of 120 to 130 µg/L.

Two wells, a Chatsworth Formation well (RD-21) and a shallow zone well (RS-18) of the occurrence (No. 3, Figure 6-3) near Building 886, recorded a significant increasing trend in TCE concentration during 1991 to 1992. TCE in RD-21 increased from a 1991 low of 520 µg/L to the 1992 peak of 2,900 µg/L. RD-21 was constructed in 1989. From 1989 to 1990, TCE concentration in the well ranged from 450 to 1,900 µg/L. RS-18, mostly dry since its construction in 1985 to 1991, recorded an increase in TCE from 36 to 2,000 µg/L in 1992. RD-23, the third well within the occurrence, recorded 52 to 78 µg/L TCE in 1992 and 42 to 92 µg/L TCE in 1991. From 1989 (the year of construction) to 1990, RD-23 showed 38 to 200 µg/L TCE. RD-33A, an off-site Chatsworth Formation well (shallowest well of a three-well cluster constructed in 1991) of the occurrence, showed 4 to 6 µg/L TCE, compared to 6 to 8 µg/L TCE in 1991.

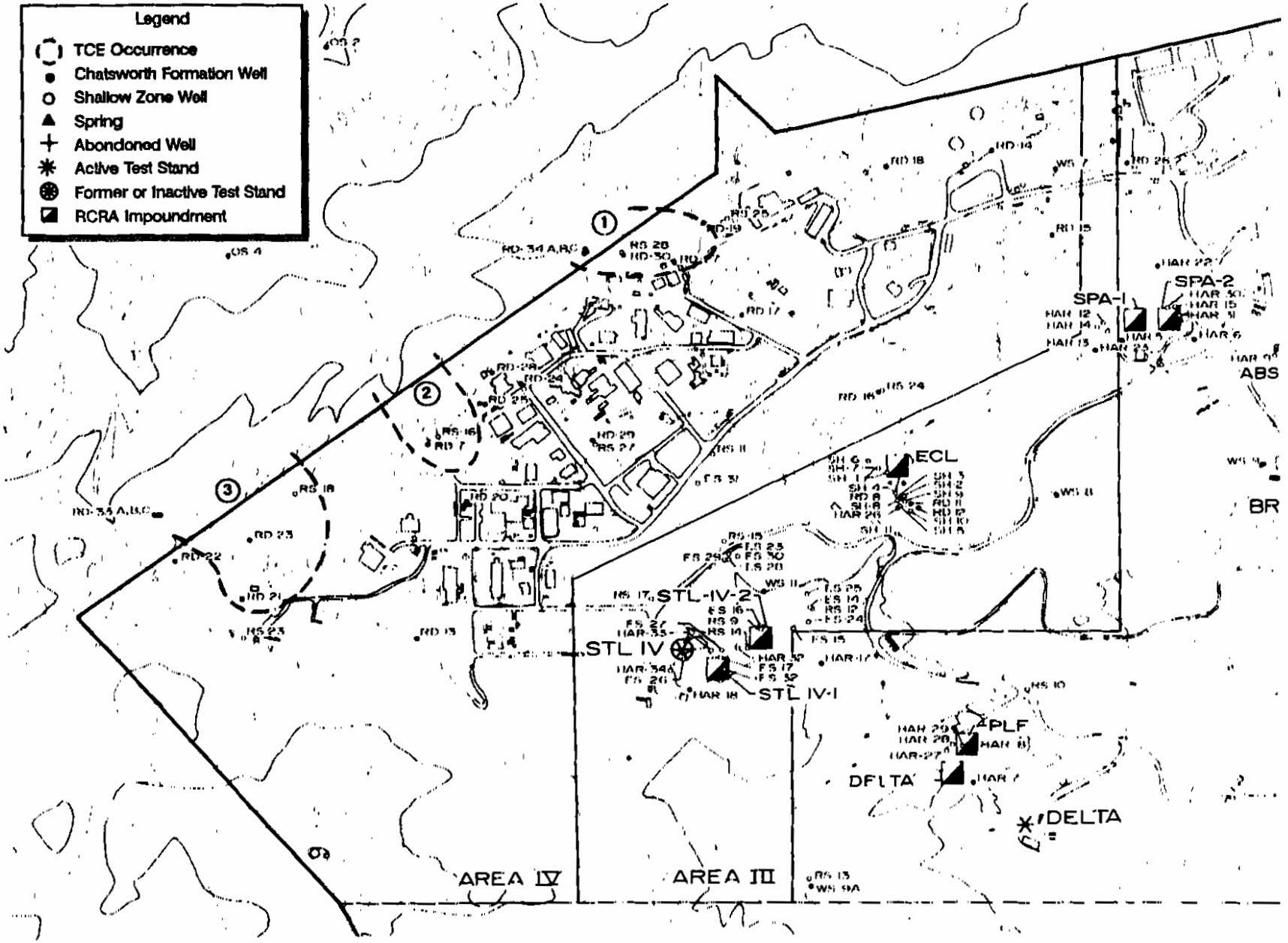

Figure 6–3. TCE Occurrences in Groundwater of Area IV

Table 6-3. 1992 and 1991 Analytical Results* of Wells in TCE and PCE Contaminated Occurrences

Well Number	TCE µg/L 1992	TCE µg/L 1991	cis-1,2-DCE µg/L 1992	cis-1,2-DCE µg/L 1991	PCE µg/L 1992	PCE µg/L 1991
RD-30	20 - 38	28 - 42	5.7 - 10	12 - 14		
RS-28	46 - 60	57 - 77	9.5 - 18	6.8 - 18		
RD-34A	27 - 61 <1 in 9/92	19 - 31	7 - 17 <1 in 9/92	5 - 9		
RD-7	12 - 29	18 - 35				
RS-18	36 - 2,000	19 - 26				
RD-21	1,500 - 2,900	520 - 1,900				
RD-23	52 - 78	42 - 92	4.1 - 6.8	2 - 8		
RD-33A	4 - 6	6 - 8				
RD-25					9.7 - 14	7.6 - 11

*Results below MCLs or detection limits are not shown.

RD-25, located southwest of Building 059, continued to record perchloroethene (PCE). In 1992, the well recorded 9.7 to 14 µg/L PCE, compared to 7.6 to 11 µg/L PCE in 1991. From 1989 to 1990, the well showed less than 1 to 7.6 µg/L PCE.

In 1992, an Interim Well Construction Plan for the next phase of monitor well drilling and testing at SSFL was submitted to Cal-EPA DTSC. The plan was approved in November 1992. According to the plan, eight new Chatsworth Formation wells are to be constructed in Area IV with DOE funding. Six of these wells are planned to be drilled as two well clusters, each with three wells. One of these two clusters will be drilled in the Building 886 area as required by the Building 886 closure. The other cluster will be located off-site, down gradient and northwest of the RMDF area. An off-site well will also be drilled down gradient of Building 886. The eighth well will be drilled south of Building 886 near the Burro Flats Fault.

The new wells are designed to characterize the hydrogeology and water quality of known groundwater contamination, horizontally and vertically and in relation to the potential source areas. The drilling of new wells started in January 1992 in Areas I, II, and III of SSFL. Wells in Area IV and off-site of Area IV will be drilled when the contract with DOE and GWRC and an access agreement with the off-site property owner are signed (expected in summer 1993).

A proposed plan for constructing and testing of two pilot groundwater extraction systems in Area IV was submitted to DTSC. In addition to the initial request for approval of the pilot groundwater extraction plan, a response to DTSC's questions and a formal work plan have been submitted.

The plan calls for the construction of one extraction well downgradient northwest side of the Former Sodium Disposal Facility B/886 site and one extraction well downgradient west of the RMDF leach field. Each of these wells will be constructed on–site within the Area IV boundary. The two systems would be installed and then tested for a period of up to 90 days. The goal of this project is to develop data required to design a long–term, full–scale groundwater extraction system necessary to contain and withdraw degraded groundwater from beneath the boundary of Area IV.

Each pilot system will consist of one extraction well and one temporary above–ground 5,000 gallon dual–wall tank for short–term storage of degraded groundwater. Once the stored water is found to be free of elevated radionuclide concentrations, it will be hauled to an on–site permitted airstripper treatment system for removal of volatile organic constituents and discharge.

There were no draft or final environmental impact statements or reports, site assessments, or remedial action reports produced during 1992. Additionally, there were no actions taken by local authorities relative to CERCLA/SARA activities or Notices of Violation for the DOE Area.

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7.0 ENVIRONMENTAL MONITORING PROGRAM QUALITY CONTROL

This section describes the quality assurance (QA) elements that are incorporated into the Rocketdyne radiological analysis program to ensure that data produced are as meaningful as possible.

The following elements of quality control are used for the Rocketdyne program:

1. Reagent Quality – Reagent–grade chemicals and certified grade counting gas used.
2. Laboratory Ventilation – Room air supply is controlled to minimize temperature variance and dust incursion.
3. Laboratory Contamination – Periodic laboratory contamination surveys for fixed and removable surface contamination are performed. Areas are cleaned routinely and decontaminated when necessary.
4. Control Charts – Background and reference source control charts for counting equipment are maintained to evaluate stability and response characteristics.
5. Laboratory Intercomparisons – Rocketdyne participates in the DOE EML–QAP.
6. Calibration Standards – Counting standard radioactivity values are traceable to the NIST primary standards.

7.1 PROCEDURES

Procedures followed include sample selection; sample collection; packaging, shipping, and handling of samples for off–site analysis; sample preparation and analysis; the use of radioactive reference standards; calibration methods and instrument QA; and data evaluation and reporting.

7.2 RECORDS

Records generally cover the following processes: field sample collection and laboratory identification coding; sample preparation method; radioactivity measurements (counting) of samples, instrument backgrounds, and analytical blanks; and data reduction and verification.

Quality control records for laboratory counting systems include the results of measurements of radioactive check sources, calibration sources, backgrounds, and blanks, as well as a complete record of all maintenance and service.

Records relating to overall laboratory performance include the results of analysis of interlaboratory cross–check samples and other quality control analyses; use of standard (radioactive) reference sources; and calibration of analytical balances.

7.3 QUALITY ASSURANCE

Rocketdyne participates in the DOE Quality Assessment Program (QAP) operated by the Environmental Measurements Laboratory (EML) in New York for radiological analyses. During 1992, two sets of samples were distributed: QAP XXXVI and QAP XXXVII. A summary of results is shown in Table 7-1. While these comparisons involve sample types, geometries, and analyses that are not part of the routine procedures at the Rocketdyne laboratory, review of these results and those of the other laboratories shows a similar quality in most cases. In this summary, the values shown are the average ratios of the analytical result determined by each laboratory relating to the reference result (EML). Ideally, these should equal that of the reference laboratory, 1.00.

Table 7–1. Summary of QAP–XXXVI and –XXXVII Results (Sheet 1 of 2)

Laboratory Identifier	Number of Results	Result Compared to Reference		
		Unweighted		
		Minimum	Average	Maximum
YP	8	0.17	0.71	1.77
PI	13	0.39	0.85	1.12
WI	29	0.38	0.87	1.95
SC	51	0.05	0.90	1.91
LB	22	0.26	0.92	3.86
TN	41	0.44	0.93	1.73
PA	26	0.62	0.94	1.22
SR	61	0.05	0.94	1.56
EC	27	0.31	0.95	2.32
BN	41	0.71	0.96	1.90
RA	54	0.47	0.96	1.36
TM	79	0.47	0.97	2.05
AL	35	0.59	0.97	1.23
CL	39	0.03	0.98	2.97
LA	63	0.08	0.99	4.60
ML	57	0.59	0.99	2.29
AN	76	0.44	0.99	1.90
BL	35	0.50	0.99	1.66
BE	38	0.47	0.99	1.28
PC	18	0.79	0.99	1.22
RF	3	0.86	0.99	1.16
EML (reference)	92	1.00	1.00	1.00
AP	32	0.27	1.00	2.23
RG	5	0.93	1.01	1.13
EP	24	0.82	1.01	1.26
FL	42	0.73	1.01	1.55
BP	49	0.46	1.01	1.57
AR	72	0.56	1.01	1.66
WA	75	0.18	1.01	2.00
IT	83	0.21	1.01	2.56
SK	34	0.79	1.02	1.19
GA	41	0.78	1.02	1.19
WP	39	0.66	1.02	1.48
TI	35	0.21	1.02	2.60
OR	72	0.22	1.03	3.72
AG	18	0.80	1.04	1.29
RE	59	0.13	1.04	1.60
BX	40	0.52	1.04	2.06
WN	34	0.41	1.04	3.02
OL	16	0.92	1.05	1.14
AW	15	0.88	1.06	1.86
AC	69	0.60	1.06	2.43
GE	22	0.65	1.07	1.41
AU	75	0.37	1.07	2.20
CA	13	0.80	1.08	1.78
AT	16	0.87	1.09	1.30
PR	20	0.89	1.09	1.46
BA	33	0.91	1.09	1.57
ES	34	0.83	1.10	1.84
OS	28	0.66	1.10	2.20

Table 7-1. Summary of QAP-XXXVI and -XXXVII Results (Sheet 2 of 2)

Laboratory Identifier	Number of Results	Result Compared to Reference		
		Unweighted		
		Minimum	Average	Maximum
Rocketdyne	44	0.66	1.10	2.69
IE	32	0.85	1.11	1.81
TO	18	0.85	1.12	1.76
BR	30	0.62	1.15	2.67
MI	29	0.00	1.16	9.74
EE	22	0.44	1.17	2.35
KA	31	0.78	1.18	5.54
SA	13	1.02	1.20	1.29
LW	2	0.96	1.20	1.44
NJ	32	0.79	1.20	3.70
FN	49	0.81	1.22	10.3
UY	69	0.05	1.25	5.91
EN	83	0.71	1.25	21.6
CC	16	0.80	1.26	2.20
DC	18	0.81	1.27	2.20
ET	51	0.001	1.27	6.63
WS	3	0.94	1.30	1.70
HS	92	0.02	1.34	8.97
WV	63	0.17	1.36	9.44
IR	9	1.09	1.47	3.09
LL	53	0.08	1.48	10.1
EG	77	0.53	1.49	15.0
IN	15	0.23	1.51	3.78
NA	36	0.58	1.54	6.21
BM	67	0.43	1.60	16.0
CP	71	0.12	1.67	12.5
UK	42	0.24	3.15	91.9
RI	45	0.01	3.16	59.7
NL	23	0.00	5.24	1,100
LH	64	0.76	17.3	1,040
UC	42	0.39	25.5	1,030
IS	61	0.05	27.5	1,610
AS	40	0.58	29.1	1,120
Minimum	Total	0.00	0.71	1.00
Mean	3,345	0.52	2.68	62.6
Maximum		1.09	29.1	1,610

APPENDIX A

NPDES PERMIT CA0001309

The Board has notified the discharger and interested agencies and persons of its intent to renew waste discharge requirements for this discharge and has provided them with an opportunity to submit their written views and recommendations.

The Board, in a public hearing, heard and considered all comments pertaining to the discharge and to the tentative requirements.

This Order shall serve as a National Pollutant Discharge Elimination System permit pursuant to Section 402 of the Federal Water Pollution Control Act. or amendments thereto, and shall take effect at the end of 10 days from the date of its adoption, provided the Regional Administrator. EPA, has no objections.

IT IS HEREBY ORDERED, that Rockwell International Corporation, Rocketdyne Division, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Federal Water Pollution Control Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Effluent Limitations

7. The discharge shall be limited to filtered domestic wastewater and industrial wastewater only, as proposed.
8. The discharge of an effluent in excess of the following limits is prohibited:

		Discharge Limitations
Constituent	Units	Maximum
Total dissolved solids	mg/L	950
	lb/day*	1,267,680
BOD_5 20°C	mg/L	30
	lb/day*	40,035
Oil and grease	mg/L	15
	lb/day*	20,020
Chloride	mg/L	150
	lb/day*	200,160
Sulfate	mg/L	300
	lb/day*	400,320
Fluoride	mg/L	1.0
	lb/day*	1,340
Boron	mg/L	1.0
	lb/day*	1,340
Surfactants (as MBAS)	mg/L	0.5
	lb/day*	667
Residual chlorine	mg/L	0.1

*Based on a total waste flow of 160 million gal per day.

9. The daily discharge rate shall be obtained from the following calculation for any calendar day:

$$\text{Daily discharge rate} = \frac{8.34}{N} \sum_{1}^{N} Q_i \, C_i$$

in which N is the number of samples analyzed in any calendar day. Q_i and C_i are the flow rate (MGD) and the constituent concentration (mg/L), respectively, which are associated with each of the N grab samples which may be taken in any calendar day. If a composite sample is taken, C_i is the concentration measured in the composite sample and Q_i is the average flow rate occurring during the period over which samples are composited.

10. The pH of wastes discharged shall at all times be within the range 6.0 to 9.0.

11. The temperature of wastes discharged shall not exceed 100°F.

12. Wastes discharged shall not contain visible oil or grease, and shall not cause the appearance of grease, oil or oily slick, or persistent foam in the receiving waters or on channel banks, walls, inverts, or other structures.

13. Wastes discharged shall not cause the formation of sludge deposits.

14. Neither the disposal nor any handling of waste shall cause pollution or nuisance.

15. Wastes discharged shall not damage flood control structures or facilities.

16. This discharge shall not cause a violation of any applicable water quality standard for receiving waters adopted by the Regional Board or the State Water Resources Control Board as required by the Federal Water Pollution Control Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the Federal Water Pollution Control Act, or amendments thereto, the Board will revise and modify this Order in accordance with such more stringent standards.

17. Wastes discharged shall not increase the natural turbidity of the receiving waters at the time of discharge.

18. Oil, oily material, chemicals, refuse, and other wastes shall not be stored or placed where they could be picked up by rainfall and discharged to surface waters.

19. The wastes discharged shall not contain phenols, mercaptans, or other substances in concentrations which would impart taste, odors, color, foaming or other objectionable characteristics to receiving waters.

20. The wastes discharged shall not cause receiving waters to contain any substance in concentrations toxic to human, animal, plant, or fish life.

21. Radioactivity shall not exceed the limits specified in Title 17, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269 of the California Administrative Code.

22. Domestic wastes discharged to watercourses shall at all times be adequately disinfected. For the purpose of these requirements, the wastes shall be considered adequately disinfected if the median number of coliform organisms at some point in the treatment process does not exceed 2.2 per 100 milliliters and the number of coliform organisms does not exceed 23 per 100 milliliters in more than one sample within any 30-day period. The median value shall be determined from samples taken on seven sampling days each week, at least one sample per sampling day, collected at a time when wastewater flow and characteristics are most demanding on the treatment facilities and disinfection procedures.

23. Domestic wastes discharged to watercourses shall have received treatment equivalent to that of a filtered wastewater.

    Filtered wastewater means an oxidized, coagulated, clarified wastewater which had been passed through natural undisturbed soils or filter media, such as sand or diatomaceous earth, so that the turbidity as determined by an approved laboratory method does not exceed an average operating turbidity of 2 turbidity units and does not exceed 5 turbidity units more than 5 percent of the time during any 24-hour period.

    Nothing herein shall be construed to prevent the use of any alternative treatment process(es) provided that they can be demonstrated to the satisfaction of the Executive Officer to achieve compliance with the effluent limitations and requirements.

24. The average final effluent concentrations shall not exceed 15 percent by weight of the average sewage treatment plant influent concentrations of BOD_5 20° C and suspended solids during periods of discharge.

25. Wastes discharged shall not contain heavy metals, arsenic, or cyanide in concentrations in excess of the mandatory limits contained in the current California Department of Health Drinking Water Standards.

26. The toxicity of the effluent shall be such that in a standard 96-hour static or flow-through bioassay in undiluted effluent at least 90 percent of test organisms shall survive at least 90 percent of the time with no single test producing 70 percent of survival.

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APPENDIX B

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APPENDIX C

OFF-SITE MULTI-MEDIA SAMPLING PROGRAM

The following is abstracted from the conclusion section of the McLaren/Hart report entitled "Multi-media Sampling Report for the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy."

"In this study, 118 soil/sediment samples, 9 fruit samples, 3 groundwater samples, and 7 surface water samples were collected from Study Areas at Brandeis-Bardin and the Conservancy. The soil/sediment samples were analyzed for 37 volatile organic compounds (VOCs) [USEPA Method 8240], 67 semi-volatile organic compounds (SVOCs) [USEPA Method 8270], 13 priority pollutant metals [USEPA Methods 6000 and 7000 series], tritium, isotopic plutonium (plutonium-238 and plutonium-239), iodine-129, strontium-90, and a gamma scan which measured 75 other radionuclides, both naturally occurring (e.g., potassium-40) and man made (e.g., cesium-137). Fruit samples were analyzed only for the radionuclides cited above. Surface water was analyzed for the full suite of chemicals and radionuclides listed above as well as for gross alpha/beta radioactivity. Groundwater was analyzed for the same compounds as surface water except for metals. The results were compared to 18 soil samples, 15 fruit samples, and 1 surface water sample from Background Areas analyzed for the same suites of compounds listed above to determine if the values in the Study Areas exceeded the values in the Background Areas.

"Methylene chloride was detected in a trip blank, which was indicative of laboratory contamination. Zinc, copper, iron, and chromium were detected in a few of the equipment rinsate blanks at relatively low concentrations. Some matrix interferences were documented in the metals analyses for some of the soil/sediment samples. There was a high agreement between field duplicates, split samples and interlaboratory split samples with their respective scheduled sample, which indicated that overall matrix interferences were not that significant. None of these observations were large enough or consistent enough to affect the validity of the data.

"A comparison of the split field duplicates, the blind field duplicates, and the interlaboratory split duplicates with the scheduled samples indicated that the overall agreement of these QA/QC samples with the scheduled samples was 97%. The data in this report were determined to be valid and representative. The conclusions are based on the data in this report are summarized below.

"4-methylphenol, bis(2-ethylhexyl)phthalate, 4,4'-dichlorodiphenyldichloroethene (4,4'-DD- E), and zinc were reported in the soil/sediment at the Brandeis-Bardin and toluene was reported in the soil at the Conservancy. These were not related to off-site migration and/or deposition from the SSFL.

"Methylene chloride was reported in the second round of groundwater sampling at the Antenna Well (SM-05) at the Conservancy but not in the first or third rounds of sampling. The methylene chloride in the second round was most likely due to laboratory contamination. This well has been included in the ongoing groundwater monitoring program conducted at Rocketdyne.

"Trichloroethene (TCE) was reported in the groundwater in the Well by the Gate (SM-07). This was the result of off-site migration of this chemical, since it was well documented that the groundwater below the SSFL contains TCE. This well has been included in the ongoing groundwater monitoring program conducted by Rocketdyne.

"Lead was reported in the soil at the Former Rocketdyne Employee Shooting Range (SM-03) at the Conservancy. This lead was due to Rocketdyne Employee's Skeet and Trap Shooting Club activities. Rocketdyne assumed responsibility for the cleanup. Cleanup of the lead shot was begun by Rocketdyne on 19 October 1992.

"Mercury was reported in the one sediment sample in the Sodium Burn Pit Watershed (BB-18) at Brandis-Bardin. This mercury was from the SSFL, since mercury was known to be contained in the former Sodium Burn Pit. Excavation and cleanup of the former Sodium Burn Pit is in progress. The total volume of sediment at the sampling location where the mercury was detected was very small (approximately 1 cubic yard). It was recommended that it be removed by Rocketdyne and properly disposed.

"Tritium was detected in three sediment samples in the Radioactive Materials Disposal Facility (RMDF) Watershed (BB-16) and in two sediment samples in the Building 59 Watershed (BB-17) at Brandeis-Bardin. The tritium was due to off-site migration from the SSFL.

"The strontium-90 and tritium concentrations detected in the RMDF Watershed surface water were less than their corresponding maximum contaminant levels (MCLs) for drinking water.

"It could not be definitively concluded whether the concentrations of strontium-90, cesium-137 and plutonium-238 in the sediment samples detected above the 95th percentile of the measured background were due to off-site migration from the SSFL, because when the t-tests were run, the concentrations of these radionuclides in the ravines were not different from background.

"Additional sampling may be warranted, for example, to monitor the RMDF and Building 59 Watersheds areas. Recommendations will be solicited by Rocketdyne after review of this report by the regulatory agencies, the SSFL work group, and the public and appropriate follow-up activities will be conducted."

APPENDIX D

STATUS OF NEPA COMPLIANCE ACTIVITIES – FY 1992

STATUS OF NEPA COMPLIANCE ACTIVITIES
Fiscal Year 1992

ITEM	LEVEL/ DOE No.	NEPA DETERMINATION FOR:	REMARKS/ACTION
1	EA/EIS	Site Wide NEPA	Not recommended by DOE, DRF-0827, 5/5/92
2	CX	Construct Hazardous Waste Collection and Storage Facility at ETEC	Approved DRF-0459, 3/18/92 & DRF-0472, 3/18/92
3	CX	Sodium Disposal Facility Clean-up, B/886	Approved 3/5/92, DRF-0390

ADM - Action Description Memorandum, CX - Categorical Exclusion, EA - Environmental Assessment, EIS - Environmental Impact Statement

STATUS OF NEPA COMPLIANCE ACTIVITIES
Fiscal Year 1992

ITEM	LEVEL/ DOE No.	NEPA DETERMINATION FOR:	REMARKS/ACTION	
4	CX	D&D of R/A Facilities & Work Areas:		
		Building 005, Uranium Carbide Fuel Fab Fac.	Approved DRF-0997, 6/1/92	
		Building 064, Special Nuc Matls Storage Fac.	Approved DRF-0997, 6/1/92	
		Radioactive Materials Disposal Facility:	Approved DRF-0997, 6/1/92	
		Building 022, RA Materials Storage Vault		
		Building 021, Decontamination & Packaging		
		Building 034, Offices		
		Building 044, Health-Physics Services		
		Four storage structures & storage yard.		
		Building 023, Liquid Metals Chemistry Lab	Approved DRF-0997, 6/1/92	Approved
		SSFL Work Areas Decontamination:	Approved DRF-0997, 6/1/92	Approved
		SRE Moderator Shipping Cask in Bldg 064		
		Building 012, SNAP Critical Facility		
		Building 100 Area, Const. Work Trenches	Approved DRF-0997, 6/1/92	
		Old Conservation Yard Packaged Waste Disp'l	Approved DRF-0997, 6/1/92	
5	CX	SSFL Groundwater Clean-up:	Approved DRF-0997, 6/1/92	
		North Slope Off-site Remediation		
6	CX	SCTI Natural Gas Line Replacement	Approved DRF-0459, 3/18/92	
7	CX	SCTI Pump Upgrade & Related Modifications	Approved DRF-0735, 4/21/92	

ADM - Action Description Memorandum, CX - Categorical Exclusion, EA - Environmental Assessment, EIS - Environmental Impact Statement

STATUS OF NEPA COMPLIANCE ACTIVITIES
Fiscal Year 1992

ITEM	LEVEL/ DOE No.	NEPA DETERMINATION FOR:	REMARKS/ACTION
8	CX	Molten Salt Oxidation of Mixed Waste	Approved DRF-1188, 6/30/92
9	CX	FY91/92 General Plant Projects:	Approved DRF-0804, 4/30/92
		SCTI Upgrade Tasks to support SG testing: Plant Protection System Leak Detection System Uninterrupted Power Supply System Upgrade SCTI Instrument Air Compressor SCTI Power Pak Safety Items SCTI Natural Gas Supply Line Replacement/Upgrade TTF Computer System Engineering and I&S Lab Computer Systems Chemistry & Metallurgy Lab Equipment: Glove Box Refurbishment ION Chromatography Mass Spectrometer	
10	EA	SP100 Pressure Transducer Development Continuation of operations	Approved DRF-0715, 4/21/92
11	CX	Routine Maintenance Tasks for FY92	Approved DRF-1015, 6/03/92

ADM - Action Description Memorandum, CX - Categorical Exclusion, EA - Environmental Assessment, EIS - Environmental Impact Statement

STATUS OF NEPA COMPLIANCE ACTIVITIES
Fiscal Year 1992

ITEM	LEVEL/ DOE No.	NEPA DETERMINATION FOR:	REMARKS/ACTION
12	CX	Disposal of surplus tanks & sodium DOE acknowledged conduct of permitted operations without formal NEPA review	Approved DRF-1073, 6/10/92
13	CX	Bldg's 038 & 039 Restroom modifications for handicapped capability	Approved 9/29/92, DRF-1733
14	CX	SSFL Groundwater Clean-up: Drill extraction wells for North Slope Off-site Remediation	Approved 12/09/92, DRF-2183

ADM - Action Description Memorandum, CX - Categorical Exclusion, EA - Environmental Assessment, EIS - Environmental Impact Statement

STATUS OF NEPA COMPLIANCE ACTIVITIES
Fiscal Year 1992

ITEM	LEVEL/ DOE No.	NEPA DETERMINATION FOR:	REMARKS/ACTION
15	CX	Inactive Standby Facility Maintenance	Approved 9/29/92, DRF-1731

Bldg. No.	Facility Name
013	Thermal Transient Facility (TTF)
026	Sodium Component Test Loop (SCTL)
032	Liquid Metal Development Laboratory (LMDL-1)
057	ETEC General Test (LMDL-2)
226	SCTL Motor/Generator
462	Sodium Pump Test Facility (SPTF)
463	Components Handling & Cleaning
826	SCTL Test Facility
863	Hydraulic Test Facility (HTF)
923	Steam Accumulator Blowdown Evaluation Rig (SABER)

16	CX ET-NE-92-20	SCTI Pit Exhaust Fans (A GPP Project)	Approved DRF-1763, 10/05/92
17	CX	FY93 GPP - Instrumentation Projects and Equipment: SCTI Processes Controllers/Recorders PC Local Area Network (LAN) Upgrade	Approved 10/29/92, DRF-1918

ADM - Action Description Memorandum, CX - Categorical Exclusion, EA - Environmental Assessment, EIS - Environmental Impact Statement

STATUS OF NEPA COMPLIANCE ACTIVITIES
Fiscal Year 1992

ITEM	LEVEL/ DOE No.	NEPA DETERMINATION FOR:	REMARKS/ACTION
18	CX	FY93 GPP - Facilities Projects and Equipment: GPP Facilities: SCTI Pit Ventilation Fans (See #67) SCTI H1/H2 Heater Safety Upgrade B/029 Safety Shower SCTI 4160 Transformer Protection Equipment: RMDF HEPA Replacement Blower RKDF Air Monitoring System Compressor SCTI H2 Induced Draft Fan Motor SCTI Demineralizer Conductivity Cells SCTI Steam Pressure Reducing Valve SCTI ARC & Feedwater Valves	Approved 10/29/92, DRF-1918
19	CX	Valve Failure Demonstration Test	Approved 12-05-92, DRF-2184
20	CX	MSOP Treatability Studies	Approved 12-17-92, DRF-2235
21	CX	Space Station Freedom Assembly Support	Approved 12-07-92, DRF-2171

ADM - Action Description Memorandum, CX - Categorical Exclusion, EA - Environmental Assessment, EIS - Environmental Impact Statement

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APPENDIX E

ACRONYMS

ACM	asbestos–containing materials
ANL	Argonne National Laboratory
AOC	Areas of Concern
ASL	above sea level
BOD	biological oxygen demand
$BOD_5$20°C	biological oxygen demand, 5–day at 20°C
B/100	Building 100 at SSFL
CAA	Clean Air Act
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CRWQCB	California Regional Water Quality Control Board
CWA	Clean Water Act
CX	Categorical Exclusion
D&D	decontamination and decommissioning
DCG	Derived Concentration Guide
DHS	Department of Health Services
DL	detectable limit
DOE	Department of Energy
DOE–SF	Department of Energy–San Francisco Office
DS104	Building 104 at De Soto site
DTSC	Cal–EPA Department of Toxic Substances Control
EA	Environmental Assessment
EIS	Environmental Impact Statement
EML	Environmental Measurements Laboratory
EPA	Environmental Protection Agency
ETEC	Energy Technology Engineering Center
FONSI	Finding of No Significant Impact
GWRC	Groundwater Resources Consultants, Inc. (Tucson, AZ)
HAR	Hydrogeological Assessment Report
HEPA	high–efficiency particulate air
HRS	Hazard Ranking System
HSWA	Hazardous and Solid Waste Amendments of 1984
HWMF	Hazardous Waste Management Facility
LLD	lower limit of detection
MBAS	methylene blue active substances
MCL	Maximum Contamination Level
MGD	million gallons per day
MPC	maximum permissible concentration, air, or water
MSTF	Molten Salt Test Facility
NASA	National Aeronautics and Space Administration
ND	not detected
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants

NIST	National Institute of Standards and Technology
NOD	Notice of Deficiency
NOX	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NSPS	New Source Performance Standards
PA/SI	Preliminary Assessment/Site Investigation
PCE	perchloroethene
QA	quality assurance
QAP	Quality Assessment Program
QC	quality control
QUAP	Quality Assessment Plan
R&D	research and development
RHB	Radiological Health Branch
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RHB	Radiologic Health Branch
RIHL	Rockwell International Hot Laboratory
RMDF	Radioactive Materials Disposal Facility
RMMA	Radioactive Materials Management Areas
ROV	Report of Violation
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SBP1	Sodium Disposal Facility Burn Pit 1
SBP2	Sodium Disposal Facility Burn Pit 2
SCP	Site Characterization Plan
SCTI	Sodium Component Test Installation
SNAP	Systems for Nuclear Auxiliary Power
SPCC	Spill Prevention Control and Countermeasure
SPTF	Sodium Pump Test Facility
SRE	Sodium Reactor Experiment
SSFL	Santa Susana Field Laboratory
SSME	Space Shuttle Main Engine
STL-IV	Systems Test Laboratory, Area IV
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TCE	trichloroethylene
TLD	thermoluminescent dosimeter
TPCA	Toxic Pits Cleanup Act
TSDF	Treatment, Storage, and Disposal Facility
USEPA	United States Environmental Protection Agency
UST	underground storage tank
UV	ultraviolet
VCAPCD	Ventura County Air Pollution Control District
VCEHD	Ventura County Environmental Health Division
WDR	Waste Discharge Requirement