



Site Environment Report for Calendar Year 2010

DOE Operations at The Boeing Company
Santa Susana Field Laboratory
Area IV

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**Site Environmental Report
for Calendar Year 2010 DOE Operations at
The Boeing Company
Santa Susana Field Laboratory, Area IV**

**Prepared by the Staff of
The Boeing Company
Santa Susana Field Laboratory**

September 2011

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CERTIFICATE OF ACCURACY

I certify that I have personally examined and am familiar with the information submitted herein and, based on inquiry of those individuals immediately responsible for preparing this report, I believe that the submitted information is true, accurate, and complete.

A handwritten signature in cursive script that reads 'Phil Rutherford'.

Phil Rutherford
Manager, Health, Safety & Radiation Services
The Boeing Company
Santa Susana Field Laboratory

September 6, 2011

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Department of Energy
Washington, DC 20585

September 6, 2011

Subject: 2010 Site Environmental Report for the Energy Technology Engineering Center
(ETEC)

Dear Sir or Madam:

The Boeing Company has prepared the subject report for the U.S. Department of Energy (DOE). It is a comprehensive summary of the Department's environmental protection activities at ETEC in Canoga Park, California for Calendar Year 2010. Site Environmental reports are prepared annually for all DOE sites with significant environmental activities and distributed to external regulatory agencies, interest organizations, and individuals.

To the best of my knowledge, this report accurately summarizes the results of the 2010 environmental monitoring and restoration program at ETEC for DOE. This statement is based on reviews conducted by DOE-ETEC staff and by the staff of the Boeing Company.

A reader survey form is provided with this report to provide comments. Write directly to:

U.S. Department of Energy
Energy Technology Engineering Center
P.O. Box 10300
Canoga Park, CA 91309

Questions may also be directed to me at (818) 466-8959

Sincerely,

John B. Jones
Federal Project Director

cc: Thomas Johnson, Jr.
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ACKNOWLEDGMENT

Preparation of this report has been a collaborative effort of many members of Boeing's Environment, Health and Safety (EHS) Department.

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1. EXECUTIVE SUMMARY

This Annual Site Environmental Report (ASER) for 2010 describes the environmental conditions related to work performed for the Department of Energy (DOE) at Area IV of Boeing's Santa Susana Field Laboratory (SSFL). The Energy Technology Engineering Center (ETEC), a government-owned, company-operated test facility, was located in Area IV. The operations in Area IV included development, fabrication, and disassembly of nuclear reactors, reactor fuel, and other radioactive materials. Other activities in the area involved the operation of large-scale liquid metal facilities that were used for testing non-nuclear liquid metal fast breeder reactor components. All nuclear work was terminated in 1988, and all subsequent radiological work has been directed toward decontamination and decommissioning (D&D) of the former nuclear facilities and their associated sites. Liquid metal research and development ended in 2002. Since May 2007, the D&D operations in Area IV have been suspended by the DOE, but the environmental monitoring and characterization programs have continued.

Results of the radiological monitoring program for the calendar year 2010 continue to indicate that there are no significant releases of radioactive material from Area IV of SSFL. All potential exposure pathways are sampled and/or monitored, including air, soil, surface water, groundwater, direct radiation, transfer of property (land, structures, waste), and recycling.

Due to the suspension of D&D activities in Area IV, no effluents were released into the atmosphere during 2010. Therefore, the potential radiation dose to the general public through airborne release was zero. Similarly, the radiation dose to a member of the public (maximally exposed individual) due to direct radiation from SSFL is indistinguishable from background.

All radioactive wastes are processed for disposal at DOE disposal sites and/or other licensed sites approved by DOE for radioactive waste disposal. No liquid radioactive wastes were released into the environment in 2010.

During 2010, seven regulatory agency inspections, audits, and visits were conducted in Area IV. These inspections and visits were carried out by the California Department of Public Health, Radiologic Health Branch (DPH/RHB), County of Ventura Environmental Health Division, and Ventura County Air Pollution Control District (VCAPCD).

In summary, this Annual Site Environmental Report provides information to show that there are no indications of any potential impact on public health and safety due to the DOE-sponsored operations conducted at Area IV of SSFL. The report summarizes the environmental and effluent monitoring results for the responsible regulatory oversight agencies.

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2. INTRODUCTION

This annual report describes the environmental monitoring programs related to the Department of Energy's (DOE) activities at the Santa Susana Field Laboratory (SSFL) facility located in Ventura County, California during 2010. Part of the SSFL facility, known as Area IV, had been used for DOE's activities since the 1950s. A broad range of energy related research and development (R&D) projects, including nuclear technology projects, was conducted at the site. All the nuclear R&D operations in Area IV ceased in 1988, and the efforts were directed toward decontamination and decommissioning (D&D). By 2007, all that remained to be completed were the D&D of two former nuclear facilities and removal of two liquid metal facilities. In May 2007, the D&D operations in Area IV were suspended until DOE completes the SSFL Area IV Environmental Impact Statement (EIS). The environmental monitoring and characterization programs were continued throughout 2010.

As required by DOE Order 231.1B, "*Environment, Safety and Health Reporting*," this report is used to communicate internally to DOE, and externally to the public, the environmental monitoring results and the state of environmental conditions related to DOE activities at SSFL. The report summarizes:

- Environmental management performance for DOE activities (e.g., environmental monitoring of effluents and estimated radiological doses to the public from releases of radioactive materials)
- Environmental occurrences and responses reported during the calendar year
- Compliance with environmental standards and requirements
- Significant programs and efforts related to environmental management.

2.1 SITE LOCATION AND SETTING

The SSFL site occupies 2,850 acres located in the Simi Hills of Ventura County, California, approximately 48 km (30 miles) northwest of downtown Los Angeles. The SSFL is situated on rugged terrain with elevations at the site varying from 500 to 700 m (1,650 to 2,250 ft) above sea level (ASL). The location of the SSFL site in relation to nearby communities is shown in Figure 2-1. No significant agricultural land use exists within 30 km (19 miles) of the SSFL site. Undeveloped land surrounds most of the SSFL site.

The site consists of four administrative areas and undeveloped land. Figure 2-2 illustrates the arrangement of the site. Area IV has an area of about 290 acres. Boeing and DOE-operated facilities (Figures 2-3 and 2-4) share the Area IV portion of this site. While the land immediately surrounding Area IV is undeveloped, suburban residential areas are at greater distances. The community of Santa Susana Knolls lies 4.8 km (3.0 miles) to the northeast, the Bell Canyon area begins approximately 2.3 km (1.4 miles) to the southeast, and the Brandeis-Bardin Institute is adjacent to the north. Except for the Pacific Ocean, which is approximately 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; the closest one to SSFL (Bard Reservoir, near the west end of Simi Valley) is more than 10 km (6 miles) from Area IV.

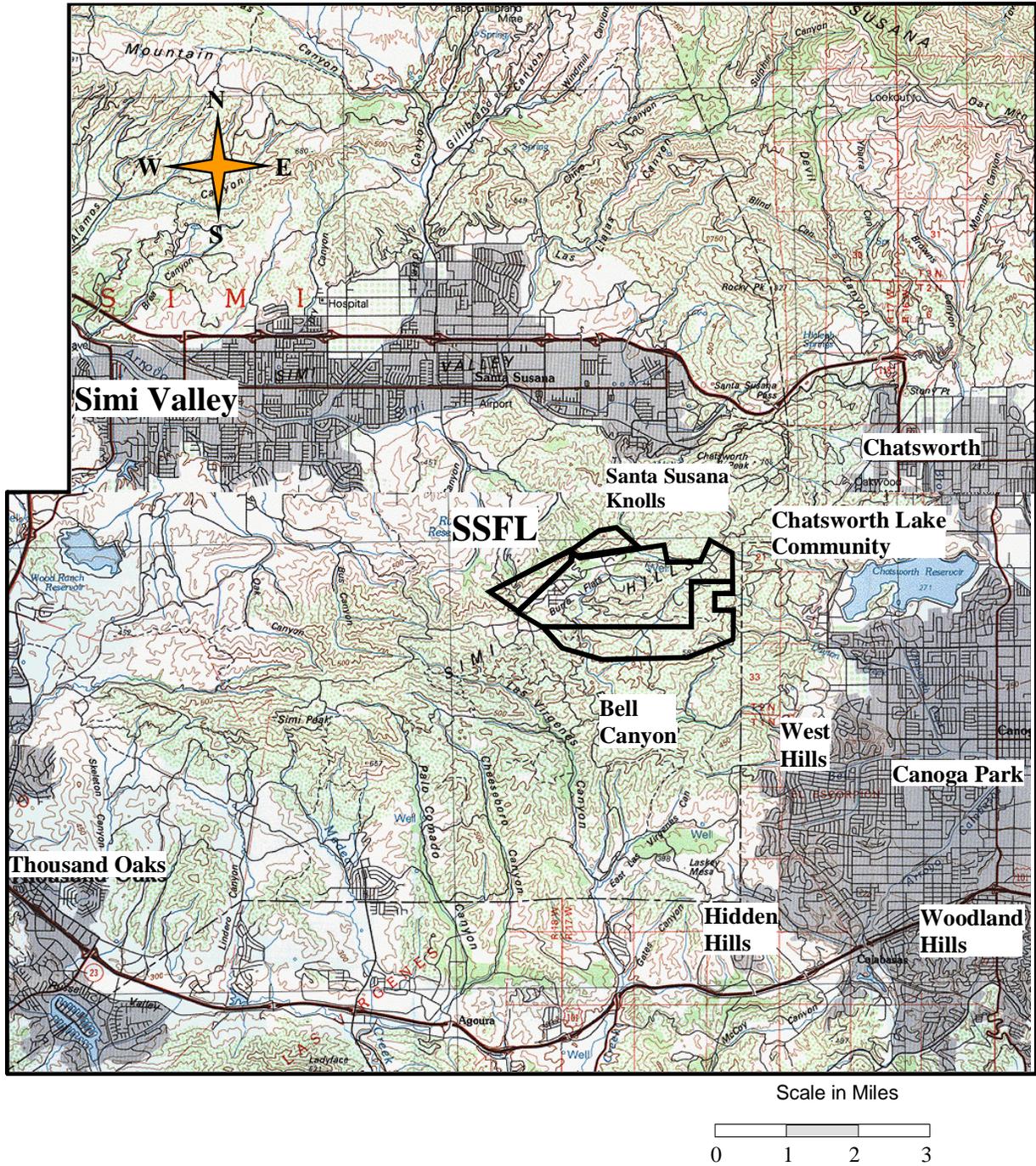


Figure 2-1. Map Showing Location of SSFL

| Subdivisions | | | |
|--------------|---------------------------|---------|-----------|
| Owner | Jurisdiction | Acres | Subtotals |
| Boeing | Boeing--Area IV | 289.9 | 2,399.3 |
| | Boeing—Area I and III | 784.8 | |
| | Boeing (Undeveloped land) | 1,324.6 | |
| Government | NASA (former AFP 57) | 409.5 | 451.2 |
| | NASA (former AFP 64) | 41.7 | |
| Total Acres | | | 2,850.5 |

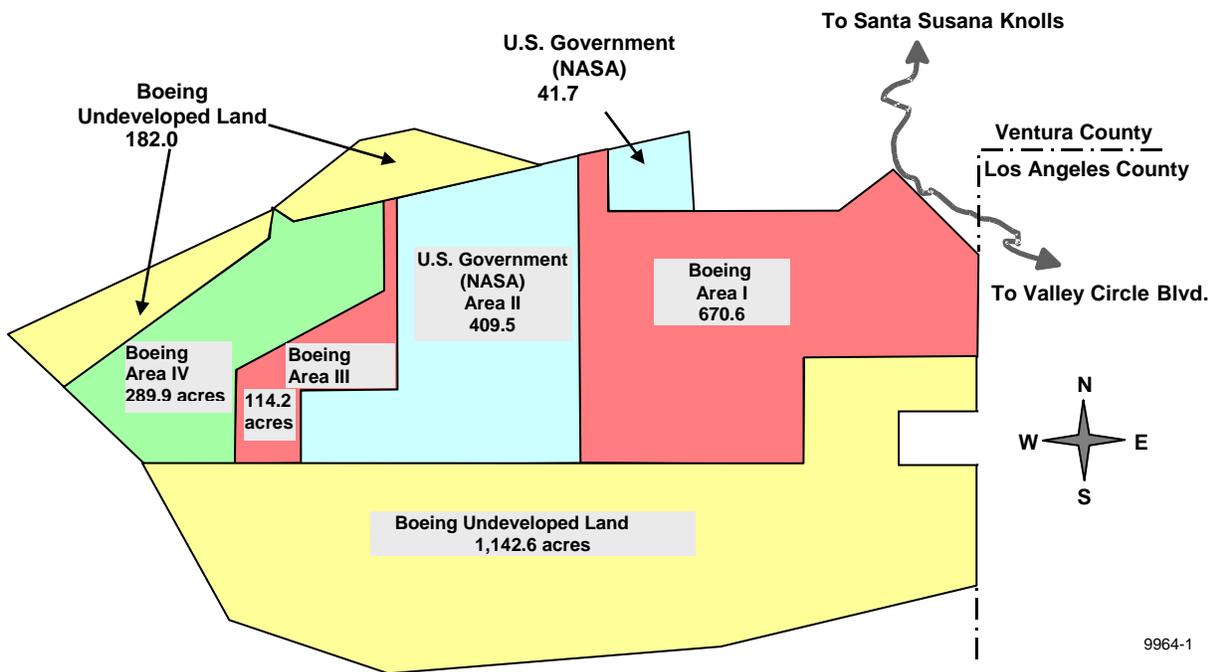


Figure 2-2. Santa Susana Field Laboratory Site Arrangement

2.2 OPERATIONAL HISTORY

The SSFL has been used for various research, development, and test projects funded by several U.S. government agencies, including DOE, Department of Defense (DOD), and National Aeronautics and Space Administration (NASA). Since 1956, various R&D projects had been conducted in Area IV, including small tests and demonstrations of reactors and critical assemblies, fabrication of reactor fuel elements, and disassembly and decladding of used fuel elements. These projects were completed and terminated in the course of the next 30 years. Details about these projects can be found in the DOE website devoted to the Energy Technology Engineering Center (ETEC) closure (<http://www.etc.energy.gov>).

All the nuclear R&D operations in Area IV ceased in 1988. The only work related to the nuclear operations after 1988 was the cleanup and decontamination of the remaining inactive radiological facilities and the off-site disposal of radioactive waste. In 1998, DOE awarded Boeing a contract for the closure of all DOE facilities in Area IV. Boeing performs the environmental remediation and restoration activities at SSFL for the DOE. In May 2007, the D&D activities in Area IV were suspended by the DOE, pending completion of an Environmental Impact Statement (EIS).

2.3 FACILITY DESCRIPTIONS

There were 27 radiological facilities that operated in Area IV (See Figure 2-4). As of the end of 2010, twenty of them have been released for unrestricted use, four have been declared suitable for unrestricted release by DOE, and one (the Building 4059 site) is pending release for unrestricted use. Demolition is pending for two facilities, Building 4024 and the RMHF. Six former radiological facilities have been declared free of contamination; they are 4009, 4100, 4019, 4055, 4011 and 4029.

In addition to radiological facilities, two sodium and related liquid metal test facilities remain in Area IV. They are the Sodium Pump Test Facility (SPTF) and the Hazardous Waste Management Facility (HWMF). These were constructed at SSFL to support development testing of components for liquid metal electrical power production systems. The facilities are no longer needed, and the objective is to dismantle the structural steel, concrete and utilities, and restore the land to previous conditions.

2.3.1 Radiological Facilities

Radioactive Materials Handling Facility (RMHF)

The RMHF complex consists of Buildings 4021, 4022, 4034, 4044, 4075, 4563, 4621, 4658, 4665 and 4688. Sump 4614 was a holdup pond located at the base of the drainage channel west of the RMHF complex. The use of the pond was discontinued, and the pond was excavated in 2006. The drainage channel and pond have been replaced with an above ground storage tank, and the tank receives storm water runoff from the RMHF via a drainage pipe.

Operations at RMHF included processing, packaging, and temporary storage of radioactive waste materials for offsite disposal at DOE approved facilities. The radioactive waste included uranium, plutonium, mixed fission products such as cesium-137 (Cs-137) and strontium-90 (Sr-90), and activation products such as cobalt-60 (Co-60), europium-152 (Eu-152), and tritium (H-3).

Since May 2007, the D&D operations at the RMHF have been suspended. In 2010, no effluents were released into the atmosphere through the stack at the RMHF, and no radioactive liquid effluents were released from the facility.



Figure 2-3. Santa Susana Field Laboratory Site, Area IV (2005)

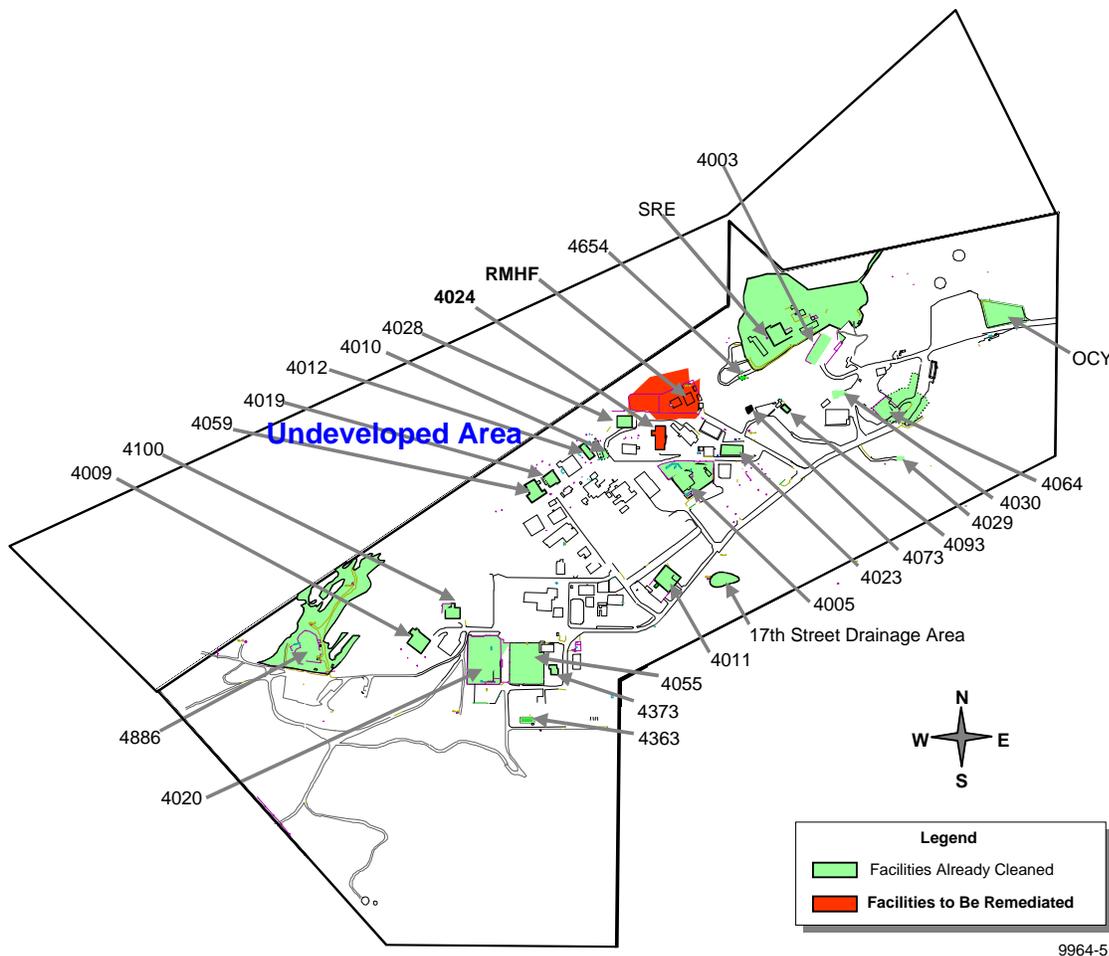


Figure 2-4. Map of Prior and Current Radiological Facilities in Area IV

Building 4024

Building 4024 housed four experimental reactor systems in the 1960s. Following termination of the experimental projects, all equipment and fuel were removed from the facility. The shielding concrete in the vaults has low levels of activation products including cobalt-60 and europium-152. Remediation of the building started in 2004: the portions of the building used to support the office space and the mechanical ventilation systems were demolished, the ventilation stack was removed, and a geophysical study supporting final building demolition was completed. In 2007, demolition of the building was put on hold by the DOE.

Building 4059

Building 4059 is the former Systems for Nuclear Auxiliary Power (SNAP) reactor ground test facility. The demolition of the entire building was completed in 2004, and radioactively contaminated building debris was shipped to either the Nevada Test Site. In 2005, site backfill was completed, and the final status MARSSIM survey was completed. Both DPH and ORISE

have completed their verification surveys at the Building 4059 site. Currently, the site is pending release for unrestricted use.

2.3.2 Former Sodium Facilities

Sodium Pump Test Facility (SPTF)

Activities at the SPTF, which consists of buildings 4462 and 4463, were limited to maintaining the facility in a safe shutdown condition. All utility connections to the buildings were severed in 2007. Demolition of building 4461 was completed in 2007.

In May 2007, DOE halted demolition of the SPTF, and the facility was placed into a safe shutdown condition.

Hazardous Waste Management Facility (HWMF)

The Hazardous Waste Management Facility, a permitted facility consisting of buildings 4133 and 4029, was approved for closure and demolition by the DTSC in 2006. In May 2007, DOE halted plans for demolition. This facility is maintained in a safe shutdown mode.

2.4 ASER CONTENTS

This ASER provides the following information related to ensuring protection of human health and the environment for DOE's operations at Area IV:

- Section 3 "Compliance Summary", identifies and provides status for applicable permits and other regulatory requirements for DOE's closure mission.
- Section 4 "Environmental Program Information" summarizes the DOE and Boeing programs that are in place to institutionalize the identification, monitoring and response to known or potential releases to the environment that may pose a threat to human health and the environment.
- Section 5 "Environmental Radiological Monitoring" summarizes the data collection activities and associated results for radiological contaminants.
- Section 6 "Environmental Non-Radiological Monitoring" summarizes the data collection activities and associated result for non-radiological contaminants.
- Section 7 "Environmental Monitoring Program Quality Control" summarizes the quality assurance/quality control elements incorporated into the Boeing data analysis program.

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3. COMPLIANCE SUMMARY

This section summarizes Boeing’s compliance with federal, state, and local environmental regulations. Two main categories are presented: Section 3.1 discusses compliance status, and Section 3.2 discusses current issues and actions.

3.1 COMPLIANCE STATUS

During 2010, seven regulatory agency inspections, audits, and visits were conducted in Area IV. These inspections and visits were carried out by the California Department of Public Health, County of Ventura Environmental Health Division (EHD), and Ventura County Air Pollution Control District (VCAPCD).

A list of inspections, audits, and site visits by the various agencies overseeing the SSFL sites is given in Table 3-1.

Table 3-1. 2010 Agency Inspections/Visits Related to DOE Operations

| Date (2010) | Agency | Subject Area | Results |
|-------------|---|---|-----------|
| January | State of CA, DPH | Quarterly Environmental TLD Exchange | Compliant |
| March | Ventura County Air Pollution Control District | Inspect permit to Operate #00232 (<i>for DOE operations in Area IV</i>) | Compliant |
| April | State of CA, DPH | Quarterly Environmental TLD Exchange | Compliant |
| April | State of CA, DPH | Observation of Sodium Reactor Experiment piezometers with Haley & Aldrich (contractor) | Compliant |
| April | County of Ventura, EHD | (1) Observation of Hazardous Material Tank Cleaning (2) Annual Business Plan and Hazardous Waste Inspection (3) Inspection of GET System (including Outfalls 6 & 7) | Compliant |
| June | State of CA, DPH | Quarterly Environmental TLD Exchange | Compliant |
| October | State of CA, DPH | Quarterly Environmental TLD Exchange | Compliant |

3.1.1 Radiological

The radiological monitoring programs at the SSFL comply with the applicable federal, state, and local environmental regulations. The monitoring results indicate that the SSFL does not pose any significant radiological impact on the health and safety of the general public. All potential pathways, as illustrated in Figure 3-1, are monitored. These include airborne, direct exposure, groundwater, surface water, waste disposal, and recycling.

3.1.1.1 Airborne Activity

Due to the suspension of all DOE's Decontamination and Decommissioning (D&D) operations at SSFL, no effluents from the RMHF stack were released into the atmosphere in 2010. As a result, the potential radiation exposure dose from the airborne release was zero.

For the airborne releases from the RMHF exhaust stack, the maximum radiation exposure dose to an offsite individual is limited at 10 mrem/yr, as specified in 40 CFR 61, the National Emission Standards for Hazardous Pollutants (NESHAPs), Subpart H (DOE facilities).

3.1.1.2 Groundwater

There are 10 DOE-sponsored near-surface groundwater wells and 49 DOE-sponsored Chatsworth Formation wells in and around Area IV. Groundwater is sampled and analyzed periodically for radiological constituents, which include gross alpha, gross beta, tritium (H-3), potassium-40 (K-40), strontium-90 (Sr-90), isotopic uranium, and man-made beta/gamma emitters. Both 2010 and all historical analytical results are presented in the 2010 Annual Groundwater Report:

http://www.etec.energy.gov/Cleanup/Groundwater_Monitoring.html

3.1.1.3 Surface Water

Surface water is regulated under the Los Angeles Regional Water Quality Control Board (LA RWQCB) National Pollutant Discharge Elimination System (NPDES). The existing NPDES Permit (CA0001309) for SSFL was revised on June 16, 2010 and became effective on July 19, 2010. The NPDES permit allows the discharge of storm water runoff, treated groundwater and fire suppression water into Bell Creek, a tributary to the Los Angeles River. The permit also regulates the discharge of storm water runoff from the northwest slope (Area IV) locations into the Arroyo Simi, a tributary of Calleguas Creek. Discharge along the northwest slope (RMHF: Outfall 003, SRE: Outfall 004, FSDF #1: Outfall 005, FSDF #2: Outfall 006, and Building 4100: Outfall 007) generally occurs only during and immediately after periods of heavy rainfall. The permit applies the numerical limits for radioactivity established for drinking water supplies to discharges through these outfalls. The permit requires radiological measurements of gross alpha, gross beta, tritium, strontium-90, total combined radium-226 and radium-228, potassium-40,

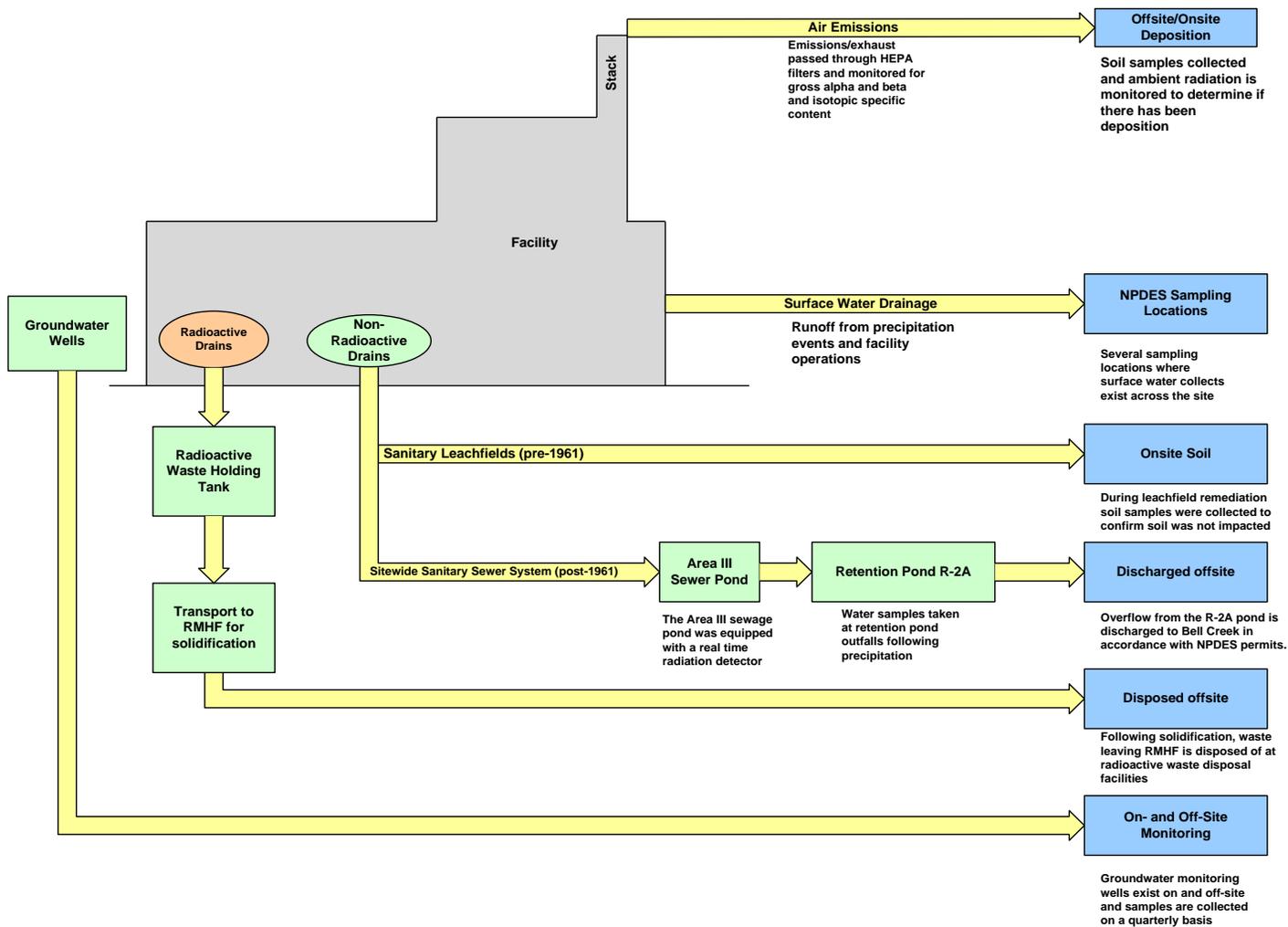


Figure 3-1. Conceptual Model of Potential Pathways

cesium-137 and uranium isotopes. Detailed monitoring results are provided in the 2010 Annual NPDES Discharge Monitoring Report (Boeing, 2011). The report may also be viewed at:

http://www.boeing.com/aboutus/environment/santa_susana/ents/monitoring_reports.html

3.1.1.4 Direct Radiation

The external exposure rate at Boeing SSFL's northern property boundary, the closest property boundary to the RMHF, was indistinguishable from natural background. This property line is approximately 300 meters from the RMHF and separated by a sandstone ridge, effectively shielding the boundary from any direct radiation from the RMHF. Dosimeters placed on the RMHF side of this sandstone ridge, approximately 150 meters from the RMHF, read an average of 4.3 mrem/year above local background. This is considerably below DOE's 100 mrem/year limit.

3.1.1.5 Protection of Biota

There is no aquatic system in the Area IV of SSFL. Storm water discharge from the site is monitored in accordance with the NPDES permit (see Section 3.1.1.3 above).

The terrestrial biota, i.e., vegetation and small wild animals, are abundant at SSFL. They are subject to potential exposure to the radioactivity in soil. Screening analysis indicates that the potential radiation exposure is less than the dose limit recommended by the DOE. Section 5.4 provides detailed information on biota protection.

3.1.2 Chemical

3.1.2.1 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) gives the Environmental Protection Agency (EPA) broad authority to regulate the handling, treatment, storage, and disposal of hazardous wastes. This authority has been delegated to the California EPA and DTSC. DOE owns and co-operates two RCRA-permitted Treatment, Storage, and Disposal Facilities within ETEC. Permit numbers are listed in Section 3.1.3.

Radioactive Materials Handling Facility (RMHF)

In 2010, the RMHF continued to be permitted as an Interim Status (Part A) facility. This facility is used primarily for the handling and packaging of low-level radioactive and mixed wastes. Interim status is required for the storage and treatment of the small quantities of mixed waste (waste containing both hazardous and radioactive constituents) resulting from D&D activities at ETEC. The final disposition of mixed waste is addressed under the DOE and DTSC-approved Site Treatment Plan, which is authorized by the Federal Facilities Compliance Act

(FFCAct). Currently there is no mixed waste at RMHF. The RMHF is in a non-operational, safe shutdown mode since May 2007.

Hazardous Waste Management Facility (HWMF)

The Hazardous Waste Management Facility (HWMF) includes an inactive storage facility (Bldg 4029) and an inactive treatment facility (Bldg 4133) that was utilized for reactive metal waste such as sodium. The facility is no longer in operation and is awaiting final closure.

RCRA Facility Investigation

Under the Hazardous and Solid Waste Amendments of 1984, RCRA facilities can be brought into the corrective action process when an agency is considering any RCRA permit action for the facility. The SSFL was initially made subject to the corrective action process in 1989 by EPA, Region IX. The EPA has completed the Preliminary Assessment Report and the Visual Site Inspection portions of the RCRA Facility Assessment (RFA) process. ETEC is now within the RCRA Facility Investigation (RFI) stage of the RCRA corrective action process.

The DTSC has RCRA authorization and has become the lead agency in implementing the RCRA corrective action process for the SSFL, including ETEC. ETEC has performed soil sampling at various solid waste management units (SWMUs) and areas of concern that were identified in the RFI Work Plan.

In December 2010, DOE and DTSC signed an Administrative Order on Consent (AOC), which outlines a specific soil investigation and remediation program for all of Area IV. Groundwater investigation and remediation is still being completed under RCRA Corrective Action requirements specified in the 2007 Consent Order between DTSC, Boeing and DOE.

During 2010, 1,244 soil matrix, 113 soil vapor, 82 near-surface groundwater, and 16 spring/seep samples were collected within or near Area IV. Samples collected and analyses performed to date at DOE locations are summarized in Section 6 (Table 6-3). Data review and validation were completed in 2010.

Groundwater

Characterization of the groundwater at the site continues. Six distinct areas of TCE-impacted groundwater have been delineated inside the northwestern property boundary of Area IV, as shown in the shaded areas in Figure 6-3. In 2010, high concentrations of TCE continued to be detected in three of these areas. TCE was not detected in the fourth area, and the other two areas were not monitored in 2010. Detailed TCE results are provided in Section 6.3.

3.1.2.2 Federal Facilities Compliance Act

Boeing manages DOE's RCRA mixed wastes in accordance with FFC Act-mandated Site Treatment Plan (STP) approved in October 1995. All mixed wastes that require extended on-site storage are managed within the framework of the STP. Characterization, treatment, and disposal plans for each of several different waste streams are defined in the STP with enforceable milestones. Management of the mixed wastes has been in full compliance with the STP. In 2010 there were no mixed wastes in the inventory, and DTSC has agreed that no update on inventory and status of mixed wastes was necessary for 2010.

3.1.2.3 National Environmental Policy Act

The National Environmental Policy Act (NEPA) establishes a national policy to ensure that consideration is given to environmental factors in federal planning and decision-making. For those projects or actions expected to either affect the quality of the human environment or create controversy on environmental grounds, DOE requires that appropriate NEPA actions (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 issued a Finding of No Significant Impact and the final EA report on March 31, 2003. Subsequently, the Natural Resources Defense Council, City of Los Angeles, and the Committee to Bridge the Gap filed a lawsuit in federal court, claiming DOE had violated NEPA, CERCLA and the ESA. Pursuant to a court order, an EIS is being prepared to comply with NEPA. More details about the EIS are provided in Section 3.2, Current Issues and Actions.

3.1.2.4 Clean Air Act

The original 1970 Clean Air Act (CAA) authorized the Federal EPA to establish National Ambient Air Quality Standards (NAAQS) to limit the levels of pollutants in the air. EPA has promulgated NAAQS for six criteria pollutants: sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. All areas of the United States must maintain ambient levels of these pollutants below the ceilings established by the NAAQS; any area that does not meet these standards is considered a "non-attainment" area (NAA). Under this law, states are required to develop state implementation plans (SIPs) that explain how each state will carry out its responsibilities under the CAA. However, the EPA must approve each SIP, and it may enforce the CAA itself if it deems a state's SIP unacceptable. Other requirements include National Emissions Standards for Hazardous Air Pollutants (NESHAPs), New Source Performance Standards (NSPSs), and monitoring programs established to achieve air quality levels beneficial to the public health and environment.

Area IV of the SSFL is regulated by the Ventura County Air Pollution Control District (VCAPCD) and must comply with all applicable rules, regulations, and permit conditions. DOE previously operated under Permit to Operate No.00271. In 2008, this Permit was consolidated

with the existing permit No. 00232. As a result, DOE currently operates under Permit to Operate No. 00232. The VCAPCD performed its annual inspection of Area IV on March 24, 2010. No violations or compliance issues were identified.

3.1.2.5 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 of surface water and the discharge of storm water runoff associated with industrial activities.

Surface water discharges from SSFL are regulated under the California Water Code (Division 7) as administered by the Los Angeles Regional Water Quality Control Board (LARWQCB). The existing NPDES Permit (CA0001309) for SSFL was revised on June 16, 2010 and became effective on July 19, 2010. The 2010 NPDES Permit incorporated the General Permit (No. CA0001309) for storm water, which includes the requirement for a site-wide Storm Water Pollution Prevention Plan (SWPPP). The SWPPP is revised as needed and includes by reference many existing pollution prevention plans, policies, and procedures implemented at the SSFL site. Several key elements of the plan, including maps, are continually updated. Another key element is the Boeing procedure "SSFL Storm Water Pollution Prevention Requirements." The Spill Prevention Control and Countermeasure (SPCC) plan serves to identify specific procedures for handling oil and hazardous substances to prevent uncontrolled discharge into or upon the navigable waters of the State of California or the United States. The U.S. EPA requires the preparation of an SPCC plan by those facilities that, because of their locations, could reasonably be expected to discharge oil in harmful quantities into or upon navigable waters. A revised SPCC plan was submitted as a part of the revised Hazardous Materials Release Response Business Plan to the County of Ventura Environmental Health Division on February 26, 2010.

3.1.3 Permits and Licenses (Area IV)

Listed below are the permits and licenses applicable to activities in Area IV.

| Permit/License | Facility | Valid |
|--|---|--|
| Air (VCAPCD) | | |
| Permit 00232 | Combined permit renewed | Current |
| Ventura County | | |
| Grading Permit 9225/CUP 02488 | Soil Borrow Area | Current. |
| Treatment Storage (EPA) | | |
| CAD000629972 (93-3-TS-002) | Hazardous Waste Management Facility (Bldg/133 and Bldg/029) | Inactive. The closure plan was approved on 12/22/06, but demolition has been suspended based on the DOE stop work order and DTSC direction. |
| CA3890090001 | Radioactive Materials Handling Facility (RMHF) | Draft closure plan submitted in 2007. |
| NPDES (LARWQCB) | | |
| CA0001309 | Santa Susana Field Laboratory | Revised on 6/16/2010 and became effective on 7/19/10. |
| State of California | | |
| Radioactive Materials License (0015-19) | All Boeing SSFL facilities | Current |
| Storm Water Pollution Prevention Plan 56C312650 | Area IV | Current |

3.2 CURRENT ISSUES AND ACTIONS

3.2.1 Area IV Environmental Impact Statement

Pursuant to a federal court order issued in May 2007, the DOE is preparing an Environmental Impact Statement (EIS) for Area IV. Activities conducted in support of this EIS during 2010-2011 are described below.

In February 2010, DOE published a draft Cultural Resources Survey Plan.

http://www.etec.energy.gov/library/Cultural_Resources/Draft_Cultural_Resources_Study_Plan_November_2009.pdf

In March 2010, DOE published the final Community Involvement Plan incorporating comments made on the draft version.

http://www.etec.energy.gov/EIS/Documents/SSFL_Area_IV_Community_Involvement_Plan_2-26-10.pdf

<http://www.etec.energy.gov/EIS/Documents/CIP%20Comment%20Table%202-2.pdf>

In March 2010, DOE issued a Community Involvement Annual Report. This report provided an overview of the range of community involvement tasks the U.S. Department of Energy undertook to reach out to, inform, and involve stakeholders of the Santa Susana Field Laboratory. It is part of the ongoing objective to work in an environment of transparency, accountability, and responsiveness.

<http://www.etec.energy.gov/EIS/Documents/Annual%20Report%202009.pdf>

As part of the Community Involvement Plan, DOE has invited past employees to participate in voluntary interviews, so that they could describe past practices at AEC and DOE funded operations at Area IV of SSFL. DOE anticipates releasing a report documenting these interviews later in 2011.

The federally listed endangered Quino Checkerspot Butterfly (QCB), *Euphydryas editha quino*, has been recorded from northern Los Angeles County to northern Baja California, Mexico. Although there are no recent records of Quino Checkerspot Butterflies from Ventura County, the U.S. Fish and Wildlife Service considers the species as potentially resident in Ventura County, and thus requires site assessments for the species in suitable habitats. In August 2010, DOE issued a report to assess the presence of potential QCB habitat in Area IV of the Santa Susana Field Laboratory.

http://www.etec.energy.gov/EIS/Documents/Quino_Butterfly_Report.pdf

Between March and August 2010, a cultural resources identification survey on approximately 182 acres of undeveloped land in the northern portion of Area IV of Santa Susana. The purpose of the study was to provide the DOE and the United States Environmental Protection Agency (EPA) with the necessary information to determine, in advance of the EPA's proposed gamma walkover survey of the Northern Undeveloped Land, if that survey could have an effect on any "historic properties," as defined by Section 106, National Historic Preservation Act. The final report was issued in January 2011.

http://www.etec.energy.gov/EIS/Documents/SSFL_NUL_Archaeology_Survey_2010.pdf

In a letter dated October 5, 2009 from the U.S. Fish and Wildlife Service (USFWS) to the U.S. Department of Energy (DOE), the California red-legged frog was identified as a listed species that may occur at or near the SSFL Area IV and two adjacent undeveloped land areas. A Habitat Site Assessment was performed for Outfall 004 (SRE Pond), Silvernale Pond, and Outfall 018. The assessment report was issued in January 2011.

http://www.etec.energy.gov/EIS/Documents/CRLF_Habitat_Assessment_Report_January_2011.pdf

In October 2010, DOE initiated planning for a “chemical co-located sampling” program. This program leverages the ongoing EPA radiological soil sampling initiated in October 2010 (see Section 3.2.5). The program involves split sampling and analysis for chemical constituents at a majority of the same locations at which EPA is taking soil samples for radiological analysis. Thus, the co-located sampling program benefits from the extensive “Historical Site Assessment” document review, geophysical surveys and aerial photograph interpretation, conducted by EPA to target sampling locations in areas of suspected contamination. It is anticipated that this program will not only fill in data gaps identified by the EIS Data Gap Analysis Report, completed in 2008, but also satisfy additional DTSC sampling requirements following the Area IV RFI group reports. The initial work plan for this program was published in February 2011.

http://www.etec.energy.gov/Cleanup/Co-Located_Sampling/Documents/Master_Draft_Chem_FSAP_Feb_2011.pdf

Subsequent addendums to the work plan and public meeting presentation materials may be found on the co-located sampling program web page at.

http://www.etec.energy.gov/Cleanup/Co-Located_Sampling.html

3.2.2 Radiological Decommissioning and Decontamination

Since May 24, 2007, the decommissioning and decontamination of the remaining DOE facilities in Area IV is on hold following the federal court order to conduct an EIS.

3.2.2.1 Radioactive Materials Handling Facility

The status of the D&D of the Radioactive Materials Handling Facility (RMHF) may be found at:

<http://www.etec.energy.gov/History/Major-Operations/Support-Ops/RMHF-History.html>

<http://www.etec.energy.gov/Reading-Room/Project-Updates/RHMFEECA.html>

Rainwater infiltrated into the Building 4022 vaults and sumps during the 2009-2010 rain seasons and was found to have low levels of cesium-137 and strontium-90 as a result of interaction with the vault floors. This water was stabilized (solidified) and shipped to the Nevada National Security Site (formally Nevada Test Site) as LLW in March 2011.

3.2.2.2 SNAP Environmental Test Facility

In January 2007, AREVA initiated a characterization survey of the SNAP Environmental Test Facility (Building 4024) and began preparations for the demolition of the building and foundations. The characterization survey was documented in January 2008.

http://www.etec.energy.gov/library/4024_Characterization/SETF_Char_Report_finalr_010908%202.pdf

The status of the D&D of the SNAP Environmental Test Facility (Building 4024) may be found at,

<http://www.etec.energy.gov/History/Major-Operations/SNAP-Environmental-Test-Facility.html>

<http://www.etec.energy.gov/Reading-Room/Project-Updates/Building24EECA.html>

Groundwater that infiltrates into the cells and French drain of Building 4024 is routinely pumped out into Baker tanks. This water is sampled for radionuclides, and periodically for chemicals, prior to being shipped off-site as non-hazardous waste water. No nuclear by-product materials have been detected in this groundwater.

3.2.3 Disposal and Recycling of Non-radiological Waste

In 2010, soil from various Area IV NPDES outfalls was surveyed and sampled for radioactivity and classified as “decommissioned material” as best management practice and sent to the Class 1 or 2 waste disposal facilities, in compliance with the Governor’s Moratorium of 2002.

Miscellaneous debris collected from Area IV was surveyed for radiation. No radiological contamination was detected and the debris was sent to Class 1 or 2 waste disposal facilities.

In 2010, no metal from DOE radiological facilities was recycled.

3.2.4 SB 990 and the SSFL Consent Orders

In September 2007, the California legislature passed into law, Senate Bill SB 990 (codified at Cal. Health & Safety Code § 25359.20). SB 990 prescribes cleanup requirements for both radiological and chemical contamination that are only applicable to SSFL and to no other site in the State. SB 990 attempts to assert state jurisdiction over the cleanup of DOE related radiological contamination at SSFL. SB 990 became effective January 2008.

In the first half of 2009, DTSC and the three responsible parties, DOE, NASA and Boeing conducted negotiations in an attempt to revise the previously signed SSFL Consent Order for

Corrective Action (August 2007) in order to incorporate the requirements of the new California law, SB 990.

The parties failed to reach agreement on a revised Consent Order and Boeing subsequently challenged the constitutionality of SB 990 in federal court in November 2009.

In December 2010, in an effort to, enforce and implement, the requirements of SB 990, the DTSC and DOE signed an Administrative Order of Consent for Remedial Action (AOC) that defines the process for characterization and the cleanup end-state for Area IV of the Santa Susana Field Laboratory (SSFL). As defined in the AOC, the end state of the site (Area IV and the Northern Buffer Zone) after cleanup will be background (i.e., at the completion of the cleanup, no contaminants will remain in the soil above local background levels). The EPA radionuclide background study (Section 3.2.5) will provide data sufficient for DTSC to determine “background threshold values” (BTV) for use in a look-up table to be used in making radiological remedial decisions following completion of the EPA Area IV Radiological Characterization Survey (Section 3.2.5). Likewise, the DTSC Chemical Background Study will provide data sufficient for DTSC to determine “background threshold values” (BTV) for use in a look-up table to be used in making remedial decisions for chemical contaminants.

http://www.etec.energy.gov/Cleanup/Administrative_Order_Consent.html

In an acknowledgement that the AOC ensures compliance with SB 990 in Area IV of SSFL, Section 1.6 of the AOC states,

“Compliance with State Law. DTSC agrees that compliance with this Order and the 2007 Order shall constitute DOE’s full and complete compliance with all applicable provisions of Chapters 6.5 and 6.8 of Division 20 of the California Health and Safety Code (the California Hazardous Waste Control Law, Sections 25100 et seq. of that Code, and the California Hazardous Substances Account Act, Sections 25300 et seq. of that Code), including specifically, but not limited to, California Senate Bill 990 (Stats. 2007, c. 729), which has been codified as Section 25359.20 of the California Health and Safety Code, but only with respect to the application of these provisions to radiologic or chemical contamination of soil at the Site or any contiguous radiologic or chemical contamination of soil emanating from within Area IV or the Northern Buffer Zone, within or without the SSFL boundaries, identified by EPA in its radiologic characterization survey or by DTSC as part of the investigation of chemical contaminants.”

In April 2011, notwithstanding the existence of the AOC, the United States District Court (Central District of California) struck down SB 990 as being “invalid and unconstitutional in its entirety” and “enjoined [DTSC] from enforcing or implementing SB 990.”

http://www.dtsc-ssfl.com/files/lib_boeinglawsuit/legaldocs/64928_show_temp_CA4R335S.pdf

http://www.dtsc-ssfl.com/files/lib_boeinglawsuit/legaldocs/64933_DTSCvTheBoeingCoJudgement05-05-2011.pdf

3.2.5 EPA Background Study and Characterization Survey of Area IV

In July 2008, the DOE and EPA signed an inter-agency agreement, making available \$1.5M for the EPA to conduct a radionuclide background study. Subsequently, the EPA published a “statement of work” describing the scope of this work and hosted a public meeting on December 11, 2008.

In April 2009, DOE and EPA signed a second interagency agreement, making available \$38.3M for the EPA to conduct “Radiological Characterization of Area IV at SSFL.” EPA conducted numerous planning and status meetings with DOE, Boeing, community members and other stakeholders to plan these studies.

In August 2009, Boeing and DOE provided EPA with historical documents in response to a CERCLA 104(e) document request to support an Area IV Historical Site Assessment (HSA). Both Boeing and DOE have supplemented this initial document provision with numerous additional document provisions in 2010 and 2011.

In March 2010, Boeing and EPA signed an Administrative Order of Consent (AOC) that describes the access agreement and requirements for EPA and its contractors to conduct work in Area IV.

Thus far, EPA has completed surface gamma scanning of over 60% of Area IV, taken approximately 1,300 surface and subsurface soil samples, completed two rounds of groundwater sampling in 2010Q3 and 2011Q1, completed a Historical Site Assessment Technical Memos for Subareas 5A, 5B, 5C, 5D, 6 and 8. Numerous public meeting have been conducted, on a monthly basis, presenting status and results to the public in a timely fashion.

Results of all background samples have been compiled and presented to the public in March and May 2011. EPA has proposed to DTSC and other stakeholders that “background threshold values” (BTV) be chosen for the AOC “look-up table” using the 95% upper simultaneous limit (USL95). USL95 represents that statistic such that all observations from the “established” background data set will be less than or equal to USL95 with a confidence coefficient of 95%.

All work plans, schedules, meeting materials, status reports, etc. may be found on the EPA website at,

<http://www.epa.gov/region09/santasusana>.

3.2.6 DOE CleanUpdate

DOE continued its quarterly newsletters called “CleanUpdate” to provide stakeholders with an update on its activities on the ETEC Closure Project. In 2010, three CleanUpdates were published in May, June and October. In 2011, one CleanUpdate has so far been published in February.

These CleanUpdates may be found at,

<http://www.etc.energy.gov/Cleanup/Cleanup-Status.html>

4. ENVIRONMENTAL PROGRAM INFORMATION

At SSFL, the DOE Site Closure Program Office has programmatic responsibility for the former radiological facilities, former sodium test facilities, and related cleanup operations. DOE Site Closure is responsible for environmental restoration and waste management operations in Area IV, where DOE funded programs conducted energy related research and development. Environmental restoration activities include decontamination and decommissioning (D&D) of radioactively contaminated facilities, building demolition, treatment of sodium, assessment and remediation of soil and groundwater, surveillance and maintenance of work areas, and environmental monitoring. Waste management activities include waste characterization and certification, storage, treatment, and off-site disposal. Waste management activities are performed at the Radioactive Materials Handling Facility (RMHF) for radioactive and mixed waste. The Hazardous Waste Management Facility (HWMF) has been used to handle alkali metal waste, but it is now inactive and awaiting closure pending completion of the EIS.

4.1 ENVIRONMENTAL PROTECTION AND REMEDIATION

Oversight of environmental protection at SSFL is the responsibility of Boeing's Environment, Health and Safety (EHS) department. This department provides support for environmental management and restoration. The stated policy of EHS is "To support the company's commitment to the well-being of its employees, community, and environment. It is Boeing's policy to maintain facilities and conduct operations in accordance with all federal, state, and local requirements and contractual agreements. Boeing employees are responsible for implementing and complying with this policy." Responsibilities for environmental protection at Boeing SSFL fall under four sub-departments: Environmental Protection (EP), Environmental Remediation (ER), Radiation Safety (RS), and the ETEC Closure Program Office. The responsibilities for each are listed below.

Environmental Protection (EP) is responsible for developing and implementing cost-effective and efficient programs designed to ensure achievement of the policy objectives related to environmental protection. The EP responsibilities include:

- Ensuring compliance with applicable federal, state, and local rules and regulations, including maintaining a working knowledge of applicable environmental laws, performing compliance audits, reviewing new and modified facility projects, coordinating solid and hazardous waste disposal, maintaining required records, preparing and submitting required regulatory reports, applying for and maintaining permits, assuring compliance with permit conditions, and performing sampling and analysis.
- Responding to uncontrolled releases and reporting releases as required by law and contractual requirements.
- Suspending operations determined to be in violation of environmental regulations.

- Participating in rule and regulation development, including evaluating impacts on Boeing programs; coordinating with other Boeing functions, as appropriate; and informing management and staff of new or revised requirements.
- Providing a program, in conjunction with Technical Skills and Development, for motivating, informing, and training employees about their duties to comply with environmental regulations and protect the environment.
- Recognizing and responding to the community's concerns regarding the environmental impact of Boeing operations, including escorting and cooperating with regulatory officials interested in environmental matters and responding to requests for information referred to Communications.
- Working with Boeing customers and suppliers to minimize the use of materials and processes that impact the environment while maintaining product quality and competitive pricing.
- Making environmental concerns, including energy and raw material conservation, a priority when evaluating new and existing operations and products or when making decisions regarding land use, process changes, materials purchases, and business acquisitions.

The Radiation Safety (RS) function of Health, Safety & Radiation Services is responsible for providing radiological support for the D&D of radiological contamination at all Boeing SSFL facilities. The RS responsibilities include:

- Compliance with all federal, state, and local regulations pertaining to occupational and environmental radiation protection.
- Provision of health physics oversight of D&D and radioactive waste management activities.
- Performance of final surveys of D&D'd buildings and facilities to demonstrate acceptability for release for unrestricted use.
- Response to employee and public concerns regarding radiological activities and the impact of these activities on the health and safety of the community.

Environmental Remediation (ER) is responsible for remedial actions to clean up historical chemical contamination at all Boeing SSFL facilities. The ER responsibilities include:

- Compliance with all federal, state, and local regulations pertaining to environmental remediation.
- Remediation of historical chemically contaminated Boeing SSFL sites to achieve closure.

- Implementation of groundwater monitoring and treatment.
- Implementation of RCRA soil sampling and cleanup activities.

ETEC Closure is responsible for managing the D&D of former DOE nuclear, liquid metal test, and other (e.g., office and warehouse) facilities in support of the ETEC Closure program. ETEC Closure responsibilities also include:

- Responsibility for the management and shipment to DOE-approved disposal sites of radioactive waste generated during the D&D operations.
- Operation of the Radioactive Materials Handling Facility (RMHF) under an interim status Part A permitted facility for the management of mixed (radioactive and hazardous) wastes.
- Performance of the routine Surveillance and Maintenance (S&M) activities for DOE-owned facilities to ensure that the buildings are properly maintained such that the buildings do not create personnel or environmental safety hazards.
- Responsibility for identifying, removing, staging, and initiating documentation for DOE equipment being divested.

4.2 ENVIRONMENTAL MONITORING PROGRAM

The purpose of the environmental monitoring program is to detect and measure the presence of hazardous and radioactive materials, maintain compliance with federal, state, and local laws and regulations, and identify other undesirable impacts on the environment. It includes remediation efforts to correct or improve contaminated conditions at the site and prevent off-site impact. For this purpose, the environment is sampled and monitored, and effluents are analyzed. A goal of this program is to demonstrate compliance with applicable regulations and protection of human health and the environment. Environmental restoration activities at the SSFL include a thorough review of past programs and historical practices to identify, characterize, and correct all areas of potential concern. The key requirements governing the monitoring program are DOE Order 5400.5 (DOE, 1993), DOE Order 458.1 (DOE, 2011b), and DOE Order 231.1B (DOE, 2011a). Additional guidance is drawn from California regulations and licenses, and appropriate standards.

The basic policy for control of radiological and chemical materials requires that adequate containment of such materials be provided through engineering controls, that facility effluent releases be controlled to federal and state standards, and that external radiation levels be reduced to as low as reasonably achievable (ALARA) through rigid operational controls. The environmental monitoring program provides a measure of the effectiveness of these operational procedures and of the engineering safeguards incorporated into facility designs.

4.2.1 Historical Radiological Monitoring

Monitoring the environment for potential impact from our past nuclear operations has been a primary focus of Boeing and its predecessors.

In the mid 1950s, Atomics International (AI), then a Division of North American Aviation (NAA), began initial plans for nuclear research at its facilities in the west San Fernando Valley. In 1955, prior to initial operations, it started a comprehensive monitoring program to sample and monitor environmental levels of radioactivity in and around its facilities.

During the half century history of nuclear research and later environmental restoration, on-site and off-site environmental monitoring and media sampling have been extensive. In the early years, soil/vegetation sampling was conducted monthly. Sampling locations extended to the Moorpark freeway to the west, to the Ronald Reagan freeway to the north, to Reseda Avenue to the east, and to the Ventura freeway to the south. Samples were also taken around the Canoga and De Soto facilities as well as around the Chatsworth Reservoir. This extensive off-site sampling program was terminated in 1989 when all nuclear research and operations (except remediation) came to an end.

During the 1990s, extensive media sampling programs were conducted in the surrounding areas, including the Brandeis-Bardin Institute and the Santa Monica Mountains Conservancy to the north, Bell Canyon to the south, the Rocketdyne Recreation Center in West Hills to the east, and various private homes in the Chatsworth and West Hills areas. Samples were also taken from such distant areas as Wildwood Park and Tapia Park. In addition, monitoring of off-site radiation, groundwater, and storm water runoff from the site were routinely performed during this time. Figure 4-1 shows sampling and monitoring locations for these two time periods, and Table 4-1 shows a matrix of sampled media, organizations, and time periods for all historical off-site radiological monitoring.

Boeing's ongoing radiological environmental monitoring ensures that activities at the SSFL, including cleanup, do not adversely affect either its employees or its neighbors.

Additional details about onsite and offsite monitoring are available at:

<http://www.etec.energy.gov/Health-and-Safety/Environmental-Monitoring.html>

<http://www.etec.energy.gov/Health-and-Safety/Community.html>

In December 2007, Boeing issued a comprehensive Offsite Data Evaluation Report compiling all chemical and radiological offsite sample data taken during the last two decades.

<http://www.etec.energy.gov/Health-and-Safety/Offsite-Report.html>

In February 2008, Boeing issued a comprehensive GIS map based database of all chemical and radiological offsite and onsite sample data.

Extensive Radiological Monitoring Since 1956 Has Demonstrated that SSFL Operations Have Not Resulted in a Health Risk to Neighboring Communities

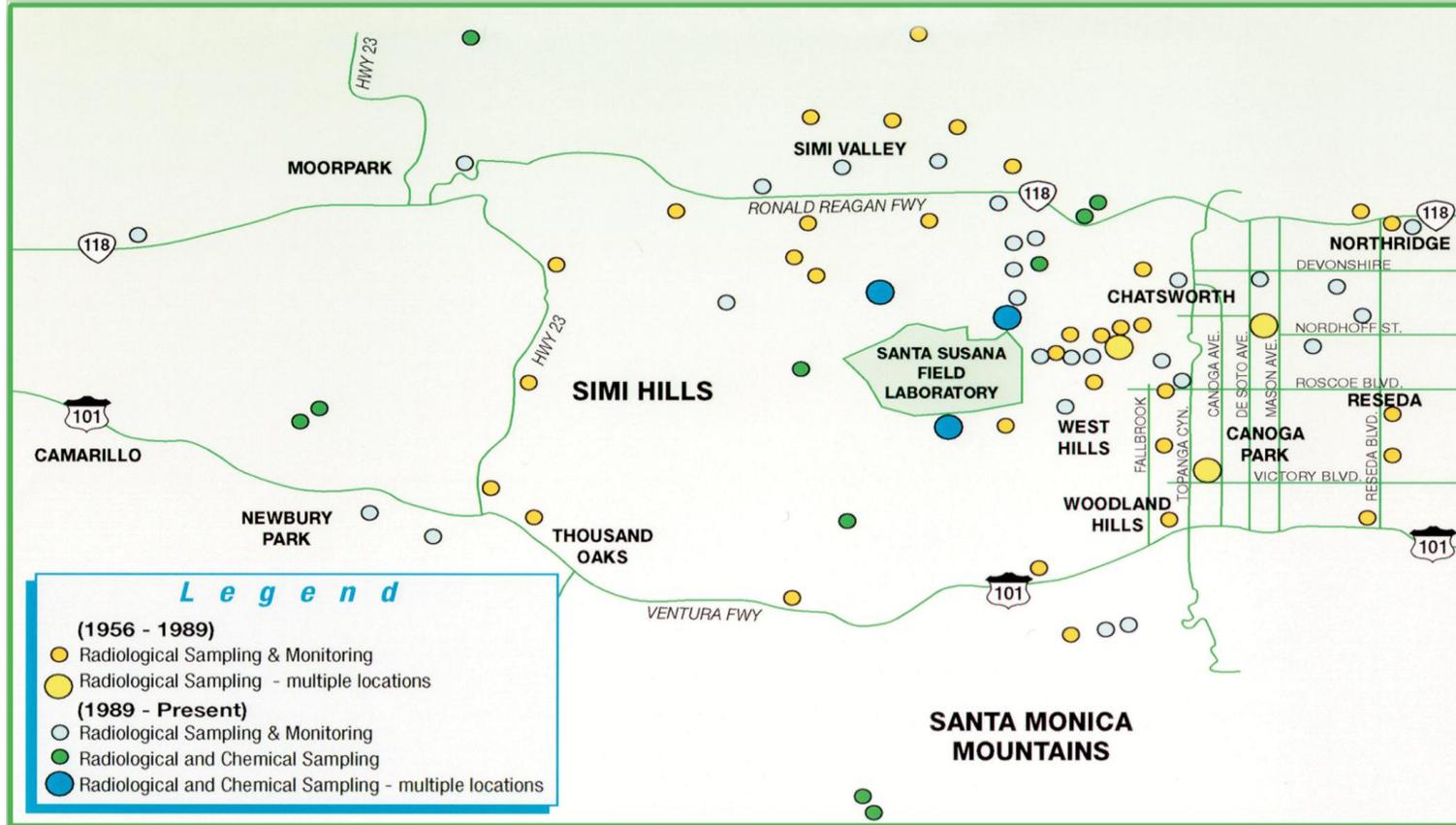


Figure 4-1. Radiological Sampling and Monitoring Locations

Table 4-1. Organizations Conducting Radiological Environmental Sampling

| Environmental Sampling for Radiation/Radioactivity Surrounding Santa Susana | | | | | |
|--|--|---|---|------------------------------|---|
| Location | Media Sampled (Date Range and Organization) | | | | |
| | Soil | Groundwater | Surface water | Airborne Particulates | Radiation Exposure |
| On-site | 1956-Present (Boeing ^a) 1975,81,84 (ANL) 1986-87 (ORAU) 1992-Present (ORISE) 1993 (RWQCB) 1992-Present (DPH-RHB) 1994-95 (DPH-EMB) | 1960-86 (Boeing) 1984-Present (GRC) 1998 (EPA-ORIA) | 1970-Present (Boeing) 1993-98 (RWQCB) | 1956-Present (Boeing) | 1971-Present (Boeing) 1975,81,84 (ANL) 1981-Present (DPH-RHB) 1986-87 (ORAU) 1992-Present (ORISE) |
| North Off-site | 1956-89 (Boeing) 1992-94 (McLaren-Hart) 1992-94 (EPA-ORIA) 1992-94 (DPH-EMB) 1991-97 (Cehn) 1995 (Boeing) 1995 (ORISE) | 1984-Present (GRC) 1991-96 (Cehn) 1998 (EPA-ORIA) | 1992-94 (McLaren-Hart) 1992-94 (EPA-ORIA) 1992-94 (DPH-EMB) 1992-94 (Cehn) | 1989 (DPH-RHB & LLNL) | 1974-Present (Boeing) 1992-94 (EPA-ORIA) 1995 (ORISE) |
| East Off-site | 1956-89 (Boeing) 1986 (ORAU) 1994 (Boeing) 1995 (ORISE) 1997 (LLNL) | 1984-Present (GRC) | 1961-71 (Boeing) | 1959-Present (Boeing) | 1974-Present (Boeing) 1986 (ORAU) 1995 (ORISE) |
| South Off-site | 1956-89 (Boeing) 1992-94 (McLaren-Hart) 1992-94 (EPA-ORIA) 1992-94 (DPH-EMB) 1992-94 (Cehn) 1995 (Boeing) 1998 (Ogden) | 1984-Present (GRC) | 1966-89 (Boeing) | 1989 (DPH-RHB & LLNL) | 1974-Present (Boeing) |
| West Off-site | 1956-64 (Boeing) 1992-94 (McLaren-Hart) 1992-94 (EPA-ORIA) 1992-94 (DPH-EMB) 1992-94 (Cehn) 1995 (Boeing) | 1984-Present (GRC) | None | None | 1974-Present (Boeing) |

a) Including Boeing and previous site operators, Rocketdyne Propulsion & Power and Atomics International.

4.2.2 Nonradiological Monitoring

Extensive monitoring programs for 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 the environment. Extensive soil sampling is being performed under the Resource Conservation and Recovery Act Facility Investigation and other site-specific remedial programs. Groundwater beneath Area IV was extensively monitored for chemical contaminants. Both Chatsworth Formation wells and shallow wells were utilized to monitor groundwater conditions in Area IV. First and second quarter groundwater analyses were conducted by Haley & Aldrich using a DTSC-approved sampling and analysis plan and EPA-approved analytical methods and laboratories. MWH assumed lead of the SSFL groundwater monitoring and sampling program in the third quarter of 2010.

All surface water discharges were monitored as specified in the National Pollutant Discharge Elimination System (NPDES) permit, which was most recently revised on June 16, 2010. All sources of air emissions were monitored as required by the Ventura County Air Pollution Control District (VCAPCD).

In addition to the environmental monitoring and restoration programs, current operational procedures reflect Boeing's commitment to a clean and safe environment. For example, solvents and oils are collected and recycled rather than being discarded. 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 available on the Boeing website to promote environmental awareness among all employees.

4.3 INTEGRATED SAFETY MANAGEMENT SYSTEMS (ISMS)

The ETEC *Integrated Safety Management System Description (ISMSD)* document strategically incorporates key safety principles into daily work processes. This document prescribes a formal, organized process to ensure worker health and safety, and includes a built-in mechanism for self-assessment and continuous improvement. In addition to noting accomplishments and improvements, the Annual ISMS Report reemphasizes the policies and procedures that help the organization comply with ISMS principles. The Annual ISMS Report also contains metrics monitored by Environment, Health and Safety (EHS) to assess improvement in safety practices. The CY 2009 Annual ISMS Report submittal was finalized in July 2010 (Boeing, 2010). The report for CY 2010 will be prepared for timely submittal.

During 2010, Boeing SSFL continued implementing ISMS principles. The self-assessment plan incorporates tools such as DOE Lessons Learned Reports, DOE ORPS (Occurrence Reporting and Processing System) Reports, and DOE Operating Experience Reports. Safety issues were emphasized with Boeing subcontractors by having an EHS representative present safety requirements and information prior to the start of each job. Periodic ISMS subcontractor audits were performed to ensure that safety requirements were being met while work was in progress.

To ensure that the ISMS continues to reflect current Boeing policies, procedures, processes and business organization within the context of the ISMS principles, related program documents are regularly reviewed and updated. Updates for the following documents were completed for 2010:

- ETEC Closure Contract Integrated Safety Management System Description (EID-04694, 7/28/2010)
- Health & Safety Plan for DE-AC03-99SF21530 (EPA-00060, 8/9/2010)
- 10 CFR 851 Compliance Plan (EPA-00062, 8/9/2010)

4.4 ENVIRONMENTAL TRAINING

Boeing conducts training and development programs as an investment in human resources to meet both organizational and individual goals. These programs are designed to improve employee performance, ensure employee proficiency, prevent obsolescence in employee capability, and prepare employees for changing technology requirements and possible advancement.

The Human Resources organization is responsible for the development and administration of formal training and development programs. Process managers are responsible for individual employee development through formal training, work assignments, coaching, counseling, and performance evaluation. Process managers and employees are jointly responsible for defining and implementing individual training development goals and plans, including on-the-job training.

The Boeing Santa Susana Environment, Health and Safety (EHS) organization currently maintains a list of 55 EHS courses for Boeing Santa Susana personnel. Classes are available as both computer-based training and instructor-lead training. Training is also available to employees through Boeing's Learning, Training and Development (LTD) website. Specialized training programs on new technological developments and changes in regulations are provided, as needed, to ensure effective environmental protection and worker health and safety. Additional off-site courses are also encouraged.

4.5 WASTE MINIMIZATION AND POLLUTION PREVENTION

4.5.1 Program Planning and Development

A Waste Minimization and Pollution Prevention Awareness Plan is in place and serves as a guidance document for all waste generators at ETEC. The plan emphasizes management's proactive policy of waste minimization and pollution prevention, and outlines goals, processes, and waste minimization techniques to be considered for all waste streams generated at the former ETEC. The plan requires that waste minimization opportunities for all major restoration projects be identified and that all cost-effective waste reduction options be implemented.

The majority of waste currently generated at the former ETEC results from environmental restoration of surplus facilities (now on hold pending completion of EIS) and cleanup of contaminated sites from previous programs. The key components of waste generated at ETEC are:

- Low-level radioactive waste (LLW), mixed, hazardous, and non-hazardous wastes from D&D operations.
- Oils from ongoing remediation and O&M activities.

Waste minimization is accomplished by evaluating the waste generating processes, identifying waste minimization options, and finally conducting technical and economic evaluations to determine the best approach.

4.5.2 Training and Awareness Programs

The ETEC Waste Minimization and Pollution Prevention Awareness Program includes (1) orientation programs and refreshers, (2) specialized training, and (3) incentive awards and recognition. Employees are reminded about pollution prevention and waste minimization awareness. Posters are placed in work areas to notify employees about environmental issues or practices. Presentations using visual aids are provided, as needed, to review major changes in environmental issues.

4.5.3 Waste Minimization and Pollution Prevention Activities

The following are some significant activities related to waste minimization and pollution prevention:

- Oils used in motor vehicles and compressors are shipped to vendors who recycle them.
- Hazardous waste containers in acceptable condition are reused to the maximum extent possible.

- Empty product drums returned to the vendor for reuse when practical.

4.5.4 Tracking and Reporting System

Various categories of materials from procurement to waste disposal are tracked. Radioactive and mixed wastes are transferred to the RMHF, logged, characterized, and stored at the RMHF. Documents that accompany the wastes are verified for accuracy and completeness, and filed at the RMHF. Hazardous waste tracking and verification procedures (from generator to final off-site disposal) are followed by the EHS department. In March 2010, Boeing published the EPA Biennial Hazardous Waste Report.

4.5.5 Low Level Waste Shipment

Rainwater infiltrated into the Building 4022 vaults and sumps during the 2009-2010 rain seasons and was found to have low levels of cesium-137 and strontium-90 as a result of interaction with the vault floors. The waste water was absorbed in diatomaceous earth, packaged in 55-gallon drums, and shipped to the Nevada National Security Site (formally Nevada Test Site) as LLW in March 2011. Also included in the shipment was Personal Protective Equipment (PPE), such as gloves and protective clothing. The waste was non-hazardous and was slightly contaminated with radiological constituents.

4.6 PUBLIC PARTICIPATION

During 2010, DOE participated in numerous meetings with regulators and other government agencies, including DTSC and EPA to discuss technical issues, on-going studies, and public involvement issues. This included participation in SSFL Interagency Workgroup meetings, DTSC's Public Participation Group (PPG) meetings and other stakeholder meetings, such as those with the West Hills Neighborhood Council and the SSFL Community Advisory Group.

Six site tours were hosted by DOE during 2010, including two for Tataviam-Fernandeño neighbors, four co-sponsored with Boeing and NASA for the general public, and one for the Teens Against Toxins.

DOE continued its participation in biweekly meetings with NASA, Boeing, USEPA, DTSC, and the Los Angeles Regional Water Quality Board staff to coordinate public outreach efforts.

Following DOE's August 2009 community workshop on the Sodium Reactor Experiment (SRE), DOE committed to interview a broad spectrum of former workers. The objective was to ensure we have fully informed history of Area IV operations, including any records that may exist relevant to the Area IV cleanup. Over 100 former SSFL workers were interviewed in 2010. A report is scheduled for release this year.

In 2010, DOE published three CleanUpdate newsletters with articles on the latest project activities in March, June and October 2010 and distributed one press release and nine e-mail news flashes with SSFL Area IV updates during the year.

DOE added more than 39 new documents to the website (www.etec.energy.gov) last year and had 12,604 visitors, who made 17,060 visits. The majority of visits – 14,794 – were from internet users in the U.S. Additional visits came from 113 other countries or territories.

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5. ENVIRONMENTAL RADIOLOGICAL MONITORING

The environmental radiological monitoring program at SSFL started before the first radiological facility was established in 1956. The program has continued with modifications to suit the changing operations. The selection of monitoring locations was based on several site-specific criteria such as topography, meteorology, hydrology, and the locations of the nuclear facilities. The prevailing wind direction for the SSFL site is generally from the 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 Creek to the south, or it may be reused for industrial purposes. The runoff water from Area IV also flows to the northwest, which is monitored through five NPDES sampling locations.

Ambient and ventilation exhaust air samples are measured for gross alpha and gross beta for screening purposes. These screening measurements can quickly identify any unusual release and provide long-term historical records of radioactivity in the environment. At the end of each year, the air samples for the entire year are combined and analyzed for specific radionuclides. The isotopic analysis results are used for estimating the potential off-site dose from air pathway.

Groundwater and surface water samples are analyzed for radioactivity, and the results are compared with the limits established by the EPA for suppliers of drinking water. The analyses include gross alpha and gross beta, tritium, Sr-90, radium-226, radium-228, isotopic thorium, isotopic uranium, and gamma emitters.

Direct radiation is monitored by the thermoluminescent dosimeters (TLDs) located on the site boundary and throughout the site. To accurately measure low-level ambient radiation, “sapphire” TLDs, which are very sensitive to low-level radiation, are used. These TLDs are complemented by TLDs installed by the State of California Department of Health Services Radiologic Health Branch for independent surveillance.

5.1 AIR EFFLUENT MONITORING

The only potential emission source at the DOE facility at SSFL is the exhaust stack at the Radioactive Materials Handling Facility (RMHF). In May 2007, DOE suspended all Decontamination and Decommissioning (D&D) operations at SSFL. As a result, the entire facility was placed into a safe shutdown mode, and no effluents were released to the atmosphere through the stack in 2010.

The EPA limit for a DOE site is 10 mrem/yr, as specified in 40 CFR 61, Subpart H. The regulation also specifies that radiation exposure dose to the Maximally Exposed Individual (MEI) be calculated using the EPA’s CAP88PC computer model. Due to the fact that no effluents were released to the atmosphere from the DOE facility at SSFL in 2010, the potential radiation exposure dose to the MEI was zero.

5.2 ENVIRONMENTAL SAMPLING

5.2.1 Ambient Air

Due to the temporary suspension of D&D operations at SSFL, the number of environmental stations was reduced in 2009. The sampling locations, both operating and discontinued, are shown in Figure 5-1 and listed in Table 5-1.

During 2010, ambient air sampling was performed continuously at SSFL with air samplers operating on 7-day sampling cycles. Airborne particulate radioactivity was collected on glass fiber (Type A/E) filters that were changed weekly. The samples were counted for gross alpha and beta radiation following a minimum 120-hour decay period to allow the decay of short-lived radon and thoron daughters. The volume of a typical weekly ambient air sample was approximately 50.4 m³.

Weekly ambient air samples were 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 (2π) 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 were determined routinely with Technetium-99 (Tc-99) and Thorium-230 (Th-230) standard sources. The activities of the standard sources are traceable to the National Institute of Standards and Technology (NIST).

Filter samples for each ambient air sampling location were combined annually and analyzed for isotopic-specific activity. The ambient air sampling results, as shown in Table 5-2, had radionuclide concentrations far below the Derived Concentration Guide (DCG) values. The variability in the measurements was primarily due to weather effects, as well as analytical and background variations.

It should be noted 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 progeny. Polonium-210 is a long-lived progeny and is detected by these analyses.

The gross radioactivity guidelines for SSFL site ambient air are based on the reference values in DOE Order 5400.5 (DOE, 1993). The conservative guide value for alpha activity is 2×10^{-14} $\mu\text{Ci/mL}$, and the value for beta activity is 9×10^{-12} $\mu\text{Ci/mL}$. These values are the most restrictive airborne limits for plutonium-239 and strontium-90 respectively. A complete list of the results from the gross alpha and gross beta counting of the ambient air samples is given in Table 5-3.

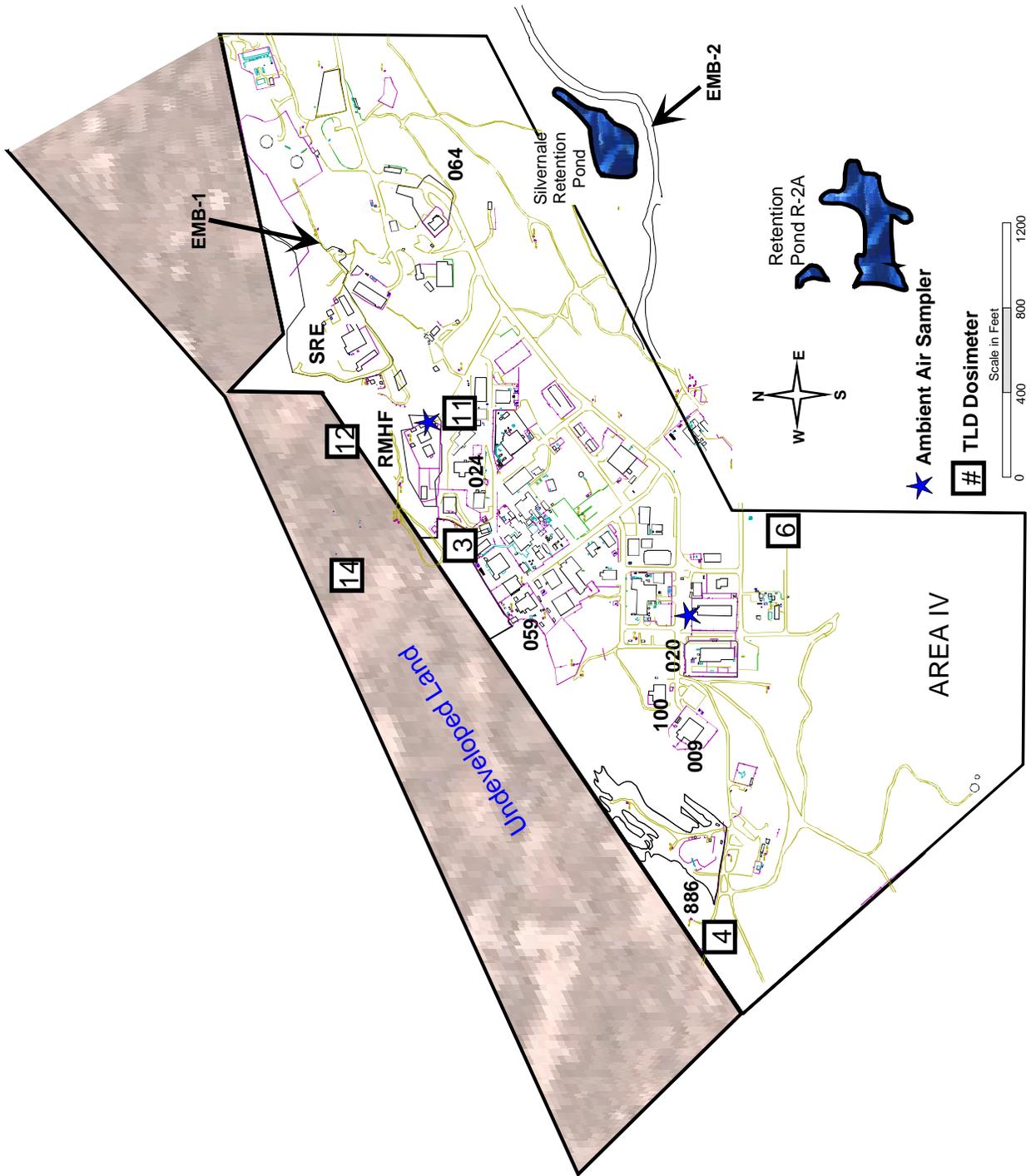


Figure 5-1. Map of Santa Susana Field Laboratory Area IV Sampling Stations

Table 5-1. Sampling Location Description

| Station | Location | Sampling Frequency |
|---|---|-------------------------------------|
| Ambient Air Sampler Locations | | |
| A-2 | SSFL Site, 4020, northeast of former 4020 site | (W) |
| A-3 | SSFL Site, RMHF Facility, next to 4034 | (W) |
| A-4 | SSFL Site, 4886, Former Sodium Disposal Facility | Discontinued |
| A-5 | SSFL Site, RMHF Pond, north side | Discontinued |
| A-6 | SSFL Site, 4100, east side | Discontinued |
| On-site - SSFL - Ambient Radiation Dosimeter Locations | | |
| SS-3 (CA) | SSFL Site, Electric Substation 719 on boundary fence | (Q) |
| SS-4 (CA) | SSFL Site, west boundary on H Street | (Q) |
| SS-6 (CA) | SSFL Site, northeast corner of 4353 | (Q) |
| SS-7 (CA) | SSFL Site, 4363, north side | Discontinued |
| SS-8 (CA) | SSFL Site, Former Sodium Disposal Facility north boundary | Discontinued |
| SS-9 (CA) | SSFL Site, RMHF northeast boundary at 4133 | Discontinued |
| SS-11 (CA) | SSFL Site, 4036, east side | (Q) |
| SS-12 (CA) | SSFL Site, RMHF northwest property line boundary | (Q) |
| SS-13 (CA) | SSFL Site, RMHF northwest property line boundary | Discontinued |
| SS-14 (CA) | SSFL Site, RMHF northwest property line boundary | (Q) |
| SS-15 (CA) | SSFL Site, RMHF northwest property line boundary | Discontinued |
| EMB-1 (CA) | SSFL Site, SRE area north of 4003 | Discontinued |
| EMB-2 (CA) | SSFL Site, south of Silvernale retention pond, off Test Area Road | Discontinued |
| Off-site Ambient Radiation Dosimeter Locations | | |
| OS-1 (CA) | SSFL Front Gate | (Q) |
| BKG-11 | Background Location, West Hills | (Q) |
| BKG-12 | Background Location, Somis | Discontinued |
| BKG-13 | Background Location, Hollywood | Discontinued |
| BKG-15 | Background Location, Calabasas | Discontinued |
| BKG-18 | Background Location, Agoura | Discontinued |
| BKG-19 | Background Location, Westlake Village | (Q) |
| BKG-22 | Background Location, Saugus | Discontinued |
| Codes | | Locations |
| A | Air Sampler Station | SS SSFL |
| W | Weekly Sample | OS Off-site |
| Q | Quarterly Sample | BKG Background |
| CA | State Confirmatory Location | EMB Environmental Management Branch |

Table 5-2. Ambient Air Specific Isotopes – 2010

| Radionuclide | Derived Conc. Guide (DCG) | RMHF | 4020 | Average (% of DCG) |
|--------------|---------------------------|----------|----------|--------------------|
| | (μCi/mL) | | | |
| H-3 | 1E-07 | NA | NA | NA |
| Be-7 | natural | ND | ND | NA |
| K-40 | natural | ND | ND | NA |
| Mn-54 | 2E-9 | ND | ND | NA |
| Co-60 | 8E-11 | ND | ND | NA |
| Sr-90 | 9E-12 | ND | ND | NA |
| Cs-137 | 4E-10 | ND | ND | NA |
| Po-210 | natural | ND | ND | NA |
| Th-228 | 4E-14 | ND | ND | NA |
| Th-230 | 4E-14 | 2.17E-16 | 2.44E-16 | 2.30E-16 (0.6%) |
| Th-232 | 7E-15 | ND | ND | NA |
| U-234 | 9E-14 | 3.42E-17 | 2.47E-16 | 1.41E-16 (0.2%) |
| U-235 | 1E-13 | ND | ND | NA |
| U-238 | 1E-13 | 1.14E-17 | 2.66E-17 | 1.90E-17 (0.02%) |
| Pu-238 | 3E-14 | ND | ND | NA |
| Pu-239/240 | 2E-14 | ND | ND | NA |
| Pu-241 | 1E-12 | ND | ND | NA |
| Am-241 | 2E-14 | ND | ND | NA |

NA = Not applicable
 ND = Not detected

Table 5-3. Ambient Air Gross Alpha and Gross Beta—2010

| Area | Activity | Number of Samples | Gross Radioactivity | |
|----------------------|----------|-------------------|--|---------------------------------------|
| | | | Average Concentrations ^a (μCi/mL) | Average Percent of Guide ^b |
| SSFL Area IV 4020 | Alpha | 51 | 7.07E-15 | 35.35% |
| | Beta | | 2.47E-14 | 0.27% |
| SSFL Area IV RMHF | Alpha | 51 | 6.76E-15 | 33.79% |
| | Beta | | 2.48E-14 | 0.28% |

^aValues include natural background.

^bGuidelines for SSFL site: 2E-14 μCi/mL alpha, 9E-12 μCi/mL beta, DOE Order 5400.5 (02/08/90).

5.2.2 Groundwater

Both Chatsworth Formation wells and shallow wells are utilized to monitor groundwater conditions in Area IV. The locations of these wells are shown in Figure 6-2. The purpose of these wells is to monitor concentrations of chemicals and/or radioactivity released by DOE operations. Water samples from these wells are periodically analyzed for gross alpha, gross beta, H-3, K-40, Sr-90, Ra-226, Ra-228, isotopic thorium, isotopic uranium, and man-made beta/gamma emitters. Complete sampling schedule and analytical results are presented in the 2010 Annual Groundwater Report, which can be found at:

http://www.etec.energy.gov/Cleanup/Groundwater_Monitoring.html

A small amount of Sr-90 was detected in well RD-98 in 2008. The well was installed at the RMHF leach field as a part of the on-going Data Gap Investigation for Radiological Constituents in groundwater in Area IV of the SSFL. The detected Sr-90 concentrations ranged from 2.18 to 2.63 pCi/L. In 2010, one sample was taken from RD-98, and preliminary result showed Sr-90 concentration of 9.7 pCi/L.

In previous years, relatively high tritium levels were detected in some of the wells located down gradient from the former Building 4010 site, including RD-87 -88, -90, -93, -94 and -95. These high tritium wells were not sampled for tritium during 2010. All other tritium results during 2009 were less than the drinking water MCL of 20,000 pCi/L and were comparable to past results.

In the third quarter of 2010, groundwater sampling utilized a new EPA analysis method identical to that used by EPA in its Area IV groundwater analysis. This method involved filtering the sample and then performing separate analyses of filtrate (liquid or dissolved sample) and solid residue (suspended solids). Results indicate that there was no detectable activity in the solid residue samples. This suggests that historical filtering of samples has had little effect on the results.

5.2.3 Surface Water

Most of Area IV slopes toward the southeast, and rainfall runoff is collected by a series of drainage channels and accumulates in the R2A Pond. Water from this pond is eventually released to Bell Creek under the NPDES permit. 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 of this runoff, five catch basins were installed in 1989 near the site boundary to accumulate runoff.

The NPDES Permit No. CA0001309 requires that a discharge monitoring report (DMR) for the Santa Susana Field Laboratory (SSFL) be published annually. This annual DMR provides information and data, including summary tables of surface water sample analytical results, rainfall summaries, liquid waste shipment summaries, and analytical laboratory QA/QC procedures and certifications. For the period of January 1, 2010 through December 31, 2010, the

NPDES discharge data are provided in the 2010 Quarterly and Annual NPDES Discharge Monitoring Report (Boeing, 2011).

The 2010 Quarterly and Annual NPDES Discharge Monitoring Reports are also available at:

http://www.boeing.com/aboutus/environment/santa_susana/ents/monitoring_reports.html

5.2.4 Soil

No radiological environmental soil sampling was conducted by Boeing in Area IV during 2010. See Section 3.2.5 for a discussion of the soil sampling conducted by EPA as part of the Area IV Characterization Survey.

5.2.5 Vegetation

No vegetation samples were collected in 2010.

5.2.6 Wildlife

No animal samples were collected in 2010.

5.2.7 Ambient Radiation

Boeing deploys environmental TLDs that use an aluminum oxide (“sapphire”) chip. These TLDs are capable of determining doses in increments of 0.1 mrem. Proper use of the control badges supplied with these dosimeters allows elimination of the natural and transportation exposure that occurs before, during, and after the deployment of the environmental dosimeters to measure the ambient radiation. This usage permits accurate determination of the net exposure received while the environmental TLDs are in the field, exposed to the ambient radiation.

The State DPH/RHB deploys calcium sulfate (CaSO₄) dosimeters for independent monitoring of radiation levels at SSFL and in the surrounding area. These dosimeters are placed at specific locations by DPH/RHB along with the Boeing TLDs. The State dosimeters are collected by the Radiologic Health Branch for evaluation each quarter. Data obtained in 2010 on these Boeing and State TLDs, are shown in Table 5-5. The small differences between the Boeing and State results are mainly due to the fact that two different types of TLDs were used in the measurement.

The natural background radiation level as measured by the off-site TLDs ranges from 53 to 69 mrem/yr. At SSFL, the local background ranges from 65 to 90 mrem/yr, based on the data from dosimeters SS-3, -4, -6, and -11 as shown in Table 5-5. The variability observed in these values can be attributed to differences in elevation and geologic conditions at the various sites. The altitude range for the dosimeter locations is from approximately 260 m (850 ft) ASL at two

off-site locations (BKG-11 and BKG-19) to a maximum of approximately 580 m (1,900 ft) ASL at SSFL. Many of the SSFL TLD locations are also affected by proximity to sandstone rock outcroppings, a condition that results in elevated exposure levels. Radiation doses measured at locations SS-12 and -14, north of the RMHF are within the range of the rest of the locations on-site.

Table 5-4. 2010 SSFL Ambient Radiation Dosimetry Data

| TLD-Locations | | Annual Exposure (mrem) By Boeing | Average Exposure Rate (μ R/h) | |
|--------------------|--------|-------------------------------------|------------------------------------|------------|
| | | | Boeing | State DPH |
| SSFL | SS-3 | 65.3 | 7.5 | 6.8 |
| | SS-4 | 77.8 | 8.9 | 8.1 |
| | SS-6 | 90.2 | 10.3 | 9.2 |
| | SS-11 | 75.9 | 8.7 | 8.7 |
| | SS-12 | 85.3 | 9.7 | 9.7 |
| | SS-14 | 77.7 | 8.9 | 8.9 |
| Mean Values | | 78.7 | 9.0 | 8.6 |
| Off-site | OS-1 | 68.6 | 7.8 | 8.1 |
| | BKG-11 | 58.8 | 6.7 | |
| | BKG-19 | 52.7 | 6.0 | |
| Mean Values | | 60.0 | 6.9 | 8.1 |

The external exposure rate at Boeing SSFL's northern property boundary, the closest property boundary to the RMHF, is indistinguishable from natural background. This property line is approximately 300 meters from the RMHF and separated by a sandstone ridge that effectively shields the boundary from direct radiation from the RMHF. Dosimeters placed on the RMHF side of this sandstone ridge (SS-12 and -14), approximately 150 meters from the RMHF, read an average of 4.3 mrem/year above the local background. This amount is considerably below the 100 mrem/year limit specified in DOE Order 458.1, *Radiation Protection of the Public and the Environment*. The TLD results demonstrate that the potential external exposure at the site boundary is below the DOE's dose limit.

The SSFL local background, calculated as the average of all onsite TLDs (excluding SS-12 and SS-14), is 77 mrem/year. This value is 17 mrem/year higher than the average of offsite background of 60 mrem/year. This result can be attributed to the contribution of higher elevation and different geology. Offsite TLDs are located in Boeing staff members' backyards, surrounded by natural soil. In contrast, SSFL lies atop the Chatsworth Formation. The Chatsworth Formation is composed of arkosic sandstone, rich in feldspar. Arkosic rocks are often high in uranium content. As a result, the Chatsworth Formation rocks produce higher radiation exposure than the soil of the surrounding valleys.

5.3 ESTIMATION OF RADIATION DOSE

5.3.1 Individual Dose

In accordance with regulations, the total effective dose equivalent (TEDE) to any member of the public from all pathways (combining internal and external dose) shall not exceed 100 mrem/yr (above background) for DOE facilities. Although the two TLD monitoring stations to the north of the RMHF, namely SS-12 and -14, recorded an external dose level at 4.3 mrem above the local background, the actual dose at the property boundary is likely to be indistinguishable from the natural background. This is because the high rocky terrain between the actual property line and the TLD monitoring stations acts as an effective shield and makes the exposure from direct radiation at the property line indistinguishable from background. Exposure from direct radiation at the nearest residence would also be indistinguishable from background for the same reason.

Due to the fact that no effluents were released to the atmosphere through the RMHF stack in 2010, the potential internal dose from airborne releases is zero mrem. For DOE operations, the air pathway standard is 10 mrem/yr (CEDE), as established by EPA.

Public exposure to radiation and radioactivity is shown in Table 5-6. The table presents the estimated exposures in comparison to the regulatory standards. Dose values in the tables represent both internal and external exposures.

Table 5-5. Public Exposure to Radiation from DOE Operations at SSFL

| | |
|--|-------------|
| 1. All pathways | |
| 1. Maximum estimated external dose to an individual from direct radiation | 0 mrem/yr |
| 2. Maximum estimated internal dose to an individual | 0 mrem/yr |
| Limit ("Radiation Protection of the Public and the Environment" DOE Order 5400.5) | 100 mrem/yr |
| 2. Air pathway (reported in NESHAPs report) | |
| | 0 mrem/yr |
| Limit (40 CFR 61, Subpart H) | 10 mrem/yr |

5.3.2 Population Dose

Since no effluents were released to the atmosphere during 2010, the potential collective dose the general population was zero person-rem.

5.4 PROTECTION OF BIOTA

Since 1990, DOE Order 5400.5, "Radiation Protection of the Public and the Environment", has required that populations of aquatic organisms be protected using a dose limit of 1 rad/day. While there is no formal DOE dose limit for terrestrial biota, DOE strongly recommends that its site activities meet the internationally recommended dose limits for terrestrial biota, which are:

- the absorbed dose to aquatic animals will not exceed 1 rad/day (10 mGy/day) from exposure to radiation or radioactive material,
- the absorbed dose to terrestrial plants will not exceed 1 rad/day (10 mGy/day) from exposure to radiation or radioactive material, and
- the absorbed dose to terrestrial animals will not exceed 0.1 rad/day (1 mGy/day) from exposure to radiation or radioactive material.
- There is no aquatic system in the Area IV of SSFL. Therefore, the protection of aquatic organisms on-site is not an issue.

The terrestrial biota, i.e., vegetation and small wild animals, are abundant at SSFL. They are subject to exposure to the radioactivity in soil. The DOE Technical Standard, *A Graded Approach for Evaluating Doses to Aquatic and Terrestrial Biota* (DOE, 2002), provides a methodology for demonstrating compliance with the requirement for protection of biota. RESRAD-BIOTA, a computer program developed by DOE, implements the graded approach for biota dose evaluation. There are three levels of dose evaluations in RESRAD-BIOTA. The first level is a conservative screening tool for compliance demonstration. Once the screening test in Level 1 is passed, no further action is necessary.

In the Level 1 dose evaluation, measured radionuclide concentrations in environmental media are compared with the biota concentration guides (BCGs). Each radionuclide-specific BCG represents the limiting concentration in environmental media that would not cause the biota dose limits to be exceeded.

Soil concentrations in Area IV are used for the Level 1 dose evaluation. During the past decades, thousands of soil samples were collected and analyzed, and the results were entered into the RESRAD-BIOTA to compare against the BCGs. Table 5-7, summarizes the comparison results. The total BCG fraction at SSFL, as shown in Table 5-7, is less than 1, indicating that the potential exposure is less than the dose limit recommended by the DOE.

Table 5-6. Terrestrial Biota Radiation Exposure as a Fraction of Dose Limit

| Nuclide | Soil | | |
|------------|--------------------|-------------------------------------|---------------------|
| | BCG Limit pCi/g | On-site Soil Concentration pCi/g | Partial Fraction |
| Am-241 | 3.89E+03 | 2.27E-02 | 5.83E-06 |
| Cm-242 | 2.05E+03 | 5.64E-03 | 2.75E-06 |
| Cm-244 | 4.06E+03 | 2.27E-03 | 5.59E-07 |
| Co-58 | 1.80E+03 | 4.79E-02 | 2.67E-05 |
| Co-60 | 6.92E+02 | 2.85E-02 | 4.12E-05 |
| Cr-51 | 5.34E+04 | 2.51E-01 | 4.70E-06 |
| Cs-134 | 1.13E+01 | 2.37E-02 | 2.10E-03 |
| Cs-137 | 2.08E+01 | 2.24E-01 | 1.08E-02 |
| Eu-152 | 1.52E+03 | 6.73E-02 | 4.42E-05 |
| Eu-154 | 1.29E+03 | 0.00E+00 | 0.00E+00 |
| Eu-155 | 1.58E+04 | 6.33E-02 | 4.00E-06 |
| H-3 | 1.74E+05 | 8.63E+00 | 4.96E-05 |
| K-40 | 1.19E+02 | 1.96E+01 | 1.65E-01 |
| Pb-210 | 1.39E+03 | 1.46E+00 | 1.05E-03 |
| Po-210 | 4.33E+03 | 1.32E+00 | 3.05E-04 |
| Pu-238 | 5.27E+03 | 1.04E-02 | 1.97E-06 |
| Pu-239 | 6.11E+03 | 9.70E-03 | 1.59E-06 |
| Ra-226 | 5.06E+01 | 1.18E+00 | 2.33E-02 |
| Ra-228 | 4.39E+01 | 1.24E+00 | 2.82E-02 |
| Sr-90 | 2.25E+01 | 2.22E-01 | 9.87E-03 |
| Th-228 | 5.30E+02 | 1.26E+00 | 2.38E-03 |
| Th-230 | 9.98E+03 | 1.05E+00 | 1.05E-04 |
| Th-232 | 1.51E+03 | 1.16E+00 | 7.70E-04 |
| Th-234 | 2.16E+03 | 1.11E+00 | 5.13E-04 |
| U-233 | 4.83E+03 | 7.78E-01 | 1.61E-04 |
| U-234 | 5.13E+03 | 8.77E-01 | 1.71E-04 |
| U-235 | 2.77E+03 | 7.54E-02 | 2.72E-05 |
| U-238 | 1.58E+03 | 8.50E-01 | 5.39E-04 |
| Zn-65 | 4.13E+02 | 7.84E-02 | 1.90E-04 |
| Sum | | | 2.46E-01 |

6. ENVIRONMENTAL NON-RADIOLOGICAL MONITORING

Boeing SSFL 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.

The discharge of surface water at SSFL results from storm water runoff or excess treated groundwater. The Los Angeles Regional Water Quality Control Board regulates discharges through a National Pollutant Discharge Elimination System (NPDES) permit. Most 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 NPDES permit. A small portion of the site within Area IV discharges storm water runoff to five northwest runoff channels where sampling locations (Figure 6-1) have been established and sampling is conducted in accordance with the northwest slope monitoring program. All discharges are regularly monitored for various constituents, including: volatile organics, heavy metals, and applicable radionuclides as well as other parameters necessary to assess water quality.

The major groundwater contaminants in Area IV are TCE and its degradation products. Three interim groundwater extraction systems were installed in Area IV between 1994 to 1998. The Building 4059 (B/059) interim system was turned off in 2005 following Building 4059 demolition. The FPDF interim system was shut off in 2003 to facilitate aquifer testing and to support the ongoing CFOU characterization program. The RMHF interim system was deactivated in September 2006. Since all interim groundwater extraction systems have been deactivated, further reporting will therefore be suspended.

The overall annual groundwater monitoring program at SSFL addresses collection and analysis of groundwater samples and measurement of the water levels. The locations of the wells and piezometers within and around DOE areas in Area IV are shown in Figure 6-2. Groundwater quality parameters and sampling frequency have been determined on the basis of 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, which are analyzed using the appropriate EPA methods: volatile organic constituents, base/neutral and acid extractable organic compounds, petroleum hydrocarbons, trace metals, and common ion constituents. Radiological analyses are performed on groundwater samples from DOE areas in Area IV and off-site (see section 5.2.2).

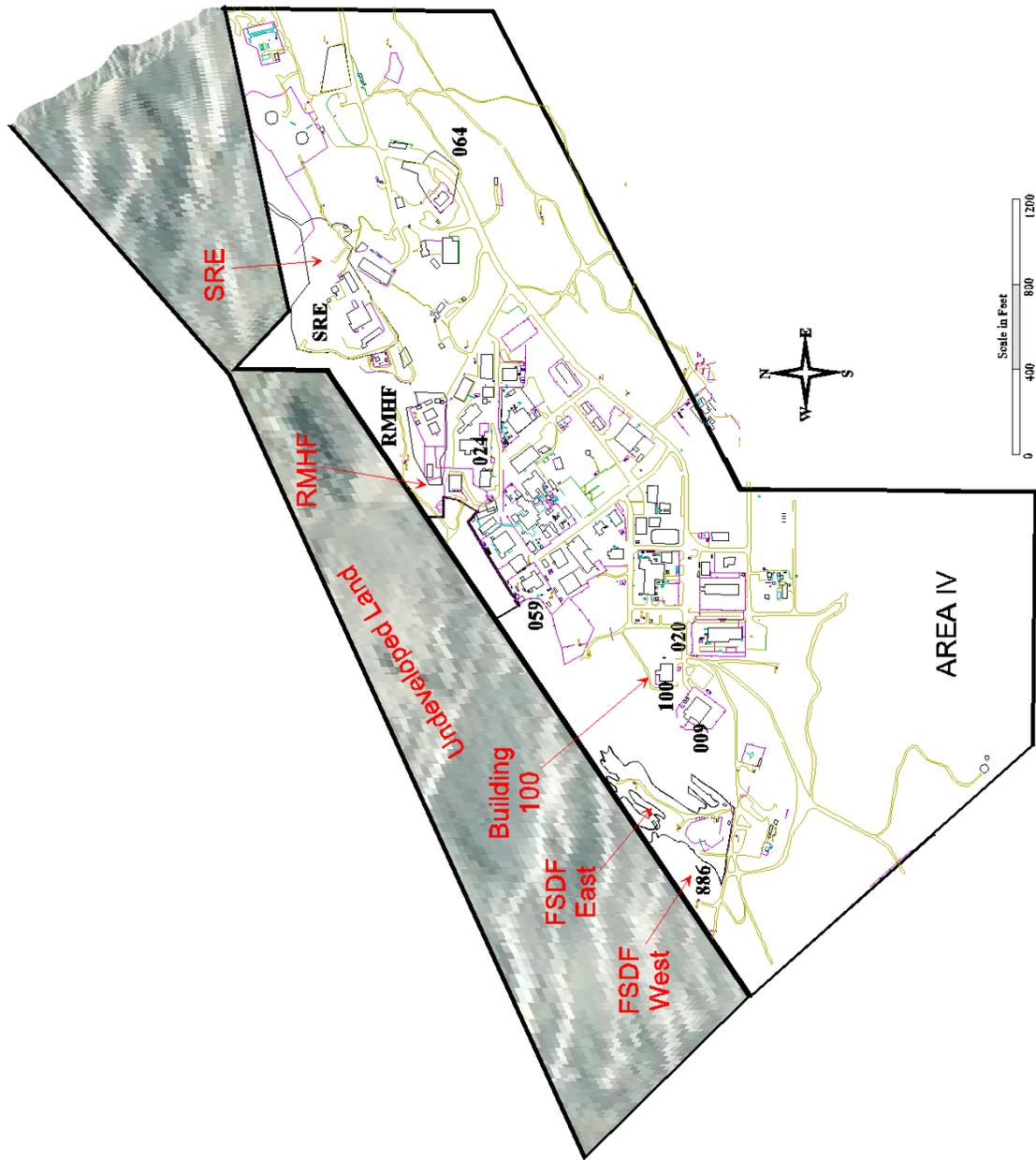


Figure 6-1. Locations of Surface Water Runoff Collectors

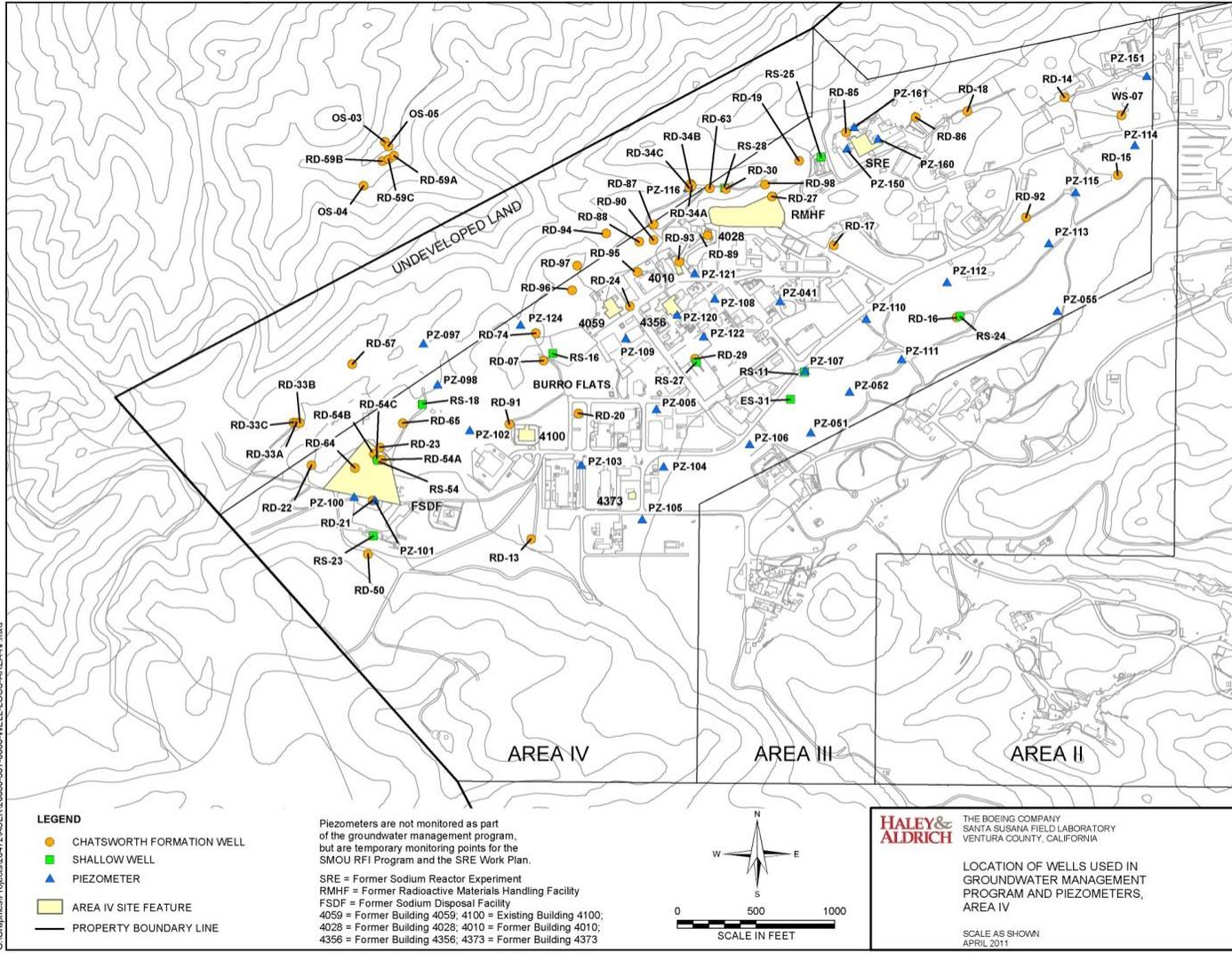


Figure 6-2. Well and Piezometer Locations

6.1 SURFACE WATER

The Los Angeles Regional Water Quality Control Board (LA RWQCB) has granted Boeing SSFL a discharge permit pursuant to the National Pollutant Discharge Elimination System and Section 402 of the federal Water Pollution Control Act. The permit to discharge, NPDES No. CA0001309, initially became effective on September 27, 1976, and was most recently renewed on June 16, 2010 and became effective on July 19, 2010.

The permit allows the discharge of storm water runoff from retention ponds into Bell Creek, a tributary of the Los Angeles River. Storm water from the southeastern portion of Area I is permitted to discharge to Dayton Creek and from the Northeastern locations of Area II into the Arroyo Simi, a tributary of Calleguas Creek. The permit also allows for the discharge of storm water runoff from the northwest slope (Area IV) locations into the Arroyo Simi, a tributary of Calleguas Creek. Discharge along the northwest slope (RMHF: Outfall 003, SRE: Outfall 004, FSDF #1: Outfall 005, FSDF #2: Outfall 006, and T100: Outfall 007) generally occurs only during and immediately after periods of heavy rainfall. The permit applies the numerical limits for radioactivity established for drinking water supplies to discharges through these outfalls. As of March 8, 2006 all rocket engine testing has ceased. No waste water currently generated from site operations is discharged. Discharges consist only of treated groundwater, storm water runoff and fire suppression water.

There is no sanitary sewer connection to a publicly owned treatment works from SSFL. Domestic sewage is temporarily stored in three inactive Sewage Treatment Plants (STP) and then trucked offsite for treatment and disposal, as summarized in the monthly Discharge Monitoring Reports (DMR) reports to the RWQCB. Boeing SSFL does not anticipate future use of any of the STPs. Area IV sewage is piped directly to the Area III Sewage Treatment Plant (STP III).

Of the two retention ponds at SSFL that discharge via the NPDES permit, only one, the R-2A Pond, receives influent from Area IV. Influent to the pond is from storm water runoff only. When there is discharge from either the Perimeter or R-2 ponds grab and composite samples are collected and sent to a California State certified testing laboratory for analysis. Analyses include chemical constituents such as heavy metals, volatile organics, base/neutral and acid extractables, general chemistry, E. Coli and Fecal Coliform, and specified radionuclides. Toxicity testing is also conducted in the form of acute and chronic toxicity bioassays.

In November 1989, a storm water runoff-monitoring program was developed and implemented in Area IV for runoff from the northwest portion of the site. The five monitoring locations selected include: the Radioactive Materials Handling Facility watershed (Outfall 003), Sodium Reactor Experiment watershed (Outfall 004), the Former Sodium Disposal Facility watershed (Outfalls 005 and 006), and the Building T100 watershed (Outfall 007). Runoff monitoring is currently conducted as set forth by the NPDES permit referenced above. Furthermore, all surface water program activities for the SSFL, including Area IV, have been addressed and incorporated into the current NPDES permit. A Storm Water Pollution Prevention Plan was prepared in accordance with the current federal and state regulations.

Details on the NPDES discharge from the SSFL for the period of January 1, 2010 through December 31, 2010 are available in 2010 Annual NPDES Discharge Monitoring Report (Boeing, 2011). This annual report provides information and data, including summary tables of surface water sample analytical results, rainfall summaries, liquid waste shipment summaries, and analytical laboratory QA/QC procedures and certifications. The report may also be viewed at:

http://www.boeing.com/aboutus/environment/santa_susana/ents/monitoring_reports.html

6.2 AIR

The SSFL is regulated by the VCAPCD and must comply with all permit conditions set forth in the air permit and applicable VCAPCD rules and regulations. During 2008, the former Permit to Operate No.00271 for DOE was consolidated into SSFL Permit to Operate No. 00232. As a result, the current Permit is No. 00232. No changes or modifications from the previous permit were made as a result of the permit consolidation. However, as equipment has been removed from the site, it is taken off the permit. Permit to Operate No.00232 covers all areas of the SSFL, which is inspected annually by VCAPCD. On March 24, 2010, the annual inspection was performed. No issues or violations were identified. Likewise, air emissions associated with this operating permit have continued to remain under the threshold limits contained the permit conditions. This area is not considered a major source and therefore is not captured under Title-V or the Aerospace NESHAP. Area IV, as well as the entire SSFL, does not meet the reporting threshold under SARA 313 Toxic Release Inventory Reporting.

6.3 GROUNDWATER

A groundwater monitoring program has been in place at the SSFL site since 1984. Currently, the monitoring system includes 268 Boeing SSFL installed on-site and off-site wells and 20 private off-site wells. An additional 162 piezometers are installed on- and off-site. Routine quarterly chemical and radiological monitoring of the wells is conducted according to the monitoring plan submitted to DTSC for the groundwater program. Quarterly reports are submitted to the regulatory agencies at the end of the first three quarters. An annual report is submitted to the lead agencies after the monitoring for the fourth quarter is completed. A summary of groundwater monitoring activities and sampling results for Area IV during 2010 is presented in Tables 6-1 and 6-2.

Table 6-1. Groundwater Monitoring at Area IV in 2010

| Item | Remediation | Waste Management | Environmental Surveillance | Other Drivers |
|-----------------------------------|-------------|------------------|----------------------------|---------------|
| Number of active wells monitored | 0 | 0 | 40 | 0 |
| Number of samples taken | 0 | 0 | 153 | 0 |
| Number of analyses performed | 0 | 0 | 542 | 0 |
| % of analyses that are non-detect | NA | NA | 88 | NA |

Table 6-2. Ranges of Detected Non-Radiological Analytes in 2010 Groundwater Samples

| Analytes | Ranges of Results for Positive Detections |
|---|---|
| Fluoride (mg/L) | 0.45 J to 0.77 |
| Metals (mg/L) | 0.000032 J to 2.3 |
| pH | 6.25 to 8.45 |
| 1,1-Dichloroethane (µg/L) | 0.19 J to 8.1 |
| 1,1-Dichloroethene (µg/L) | 0.24 J to 19 |
| 1,2-Dichloroethane (µg/L) | 0.17 J to 0.32 J |
| Acetone (µg/L) | 3 J to 5.5 J |
| Benzene (µg/L) | 0.19 J to 15 J |
| Carbon Disulfide (µg/L) | 0.46 J to 1 J |
| cis-1,2-Dichloroethene (cis-1,2-DCE) (µg/L) | 0.25 J to 360 |
| Tetrachloroethene (PCE) (µg/L) | 0.34 J to 0.36 J |
| Toluene (µg/L) | 0.18 J to 1.8 |
| trans-1,2-Dichloroethene (µg/L) | 0.29 J to 81 |
| Trichloroethene (TCE) (µg/L) | 0.16 J to 240 |
| Other Volatile Organic Compounds (µg/L) | 0.48 J to 2.5 |

J = Estimated value. Analyte detected at a level less than the reporting limit and greater than or equal to the MDL.

Groundwater occurs at SSFL in the alluvium, weathered bedrock, and unweathered bedrock. First-encountered groundwater may be observed in any of these media under water table conditions. For regulatory purposes, “near-surface groundwater” is defined to occur within the site’s unconsolidated deposits (e.g., alluvium) and shallow weathered bedrock, where as deep groundwater, referred to as “Chatsworth Formation groundwater,” occurs in the unweathered bedrock. The near-surface groundwater may be perched or vertically continuous with deeper groundwater. The alluvium is indicated to generally consist of unconsolidated sand, silt, and clay. Some portions of the alluvium and upper weathered Chatsworth Formation are saturated only during and immediately following a wet season. Within Area IV, there are 10 DOE-sponsored near-surface groundwater wells, 28 DOE-sponsored near-surface groundwater piezometers, three Boeing-sponsored near-surface groundwater piezometers, and one NASA-sponsored near-surface groundwater piezometer (Figure 6-2). The principal water bearing system at the Facility is the fractured Chatsworth Formation, predominantly composed of weak- to well-cemented sandstone with interbeds of siltstone and claystone. Several hydraulically significant features such as fault zones and shale beds are present at SSFL and may act as aquitards or otherwise influence the groundwater flow system. There are 49 DOE-sponsored Chatsworth Formation wells and 3 private off-site wells in and around Area IV (Figure 6-2).

The solvents found in Area IV groundwater include trichloroethene (TCE) and its family of degradation products. The results of the 2010 analyses of the Area IV wells were documented in the 2010 Annual Groundwater Monitoring Report (MWH, 2011). Boeing initiated a voluntary site-wide program to assess the occurrence and distribution of perchlorate in 1997. This assessment identified a limited area of groundwater in the vicinity of the FSDF that has been

impacted by perchlorate. Historical perchlorate concentrations in FSDF-area groundwater ranged from an estimated 1.6 µg/L (RD-65) to 56 µg/L (RD-54A).

Six distinct areas of TCE-impacted groundwater have been delineated in the northwest part of Area IV. These areas include the drainage below RMHF, the vicinity of former Building 4059, the FSDF area, the former Building 4028 area, the Building 4100 area, and the Sodium Reactor Experiment (SRE) area (Figure 6-3). These areas are roughly defined by the locations of monitor wells where results of laboratory analyses of water samples collected in 2010 or past years indicate concentrations of TCE equal to or above the MCL of 5 µg/L.

RMHF: The TCE occurrence associated with the RMHF canyon (the northern occurrence) has historically been detected in shallow wells and Chatsworth Formation wells. TCE was not sampled for in the groundwater samples collected from shallow wells in 2010. In 2010, maximum TCE concentrations exceeded the MCL at one Chatsworth Formation well: RD-63 (8.1 µg/L). RD-63 was installed in 1994 in the Chatsworth Formation for the pilot extraction test in the area. TCE was detected below the MCL in the groundwater samples collected from wells RD-17 (0.76 µg/L), RD-34A (3.3 µg/L) and RD-34B (1.5 µg/L) during 2010. Each of these concentrations was less than the historical maximum TCE concentration for its respective location.

Former Building 4059: TCE was detected in groundwater collected from one well located near former Building 4059 during the year. TCE was detected in well RD-07 at a concentration of 4 µg/L. The RD-07 samples were collected from a discrete interval groundwater monitoring system installed in April 2002. Since its construction in 1986, RD-07 generally contained TCE concentrations in the 1.5 to 81 µg/L range with a maximum TCE concentration of 130 µg/L.

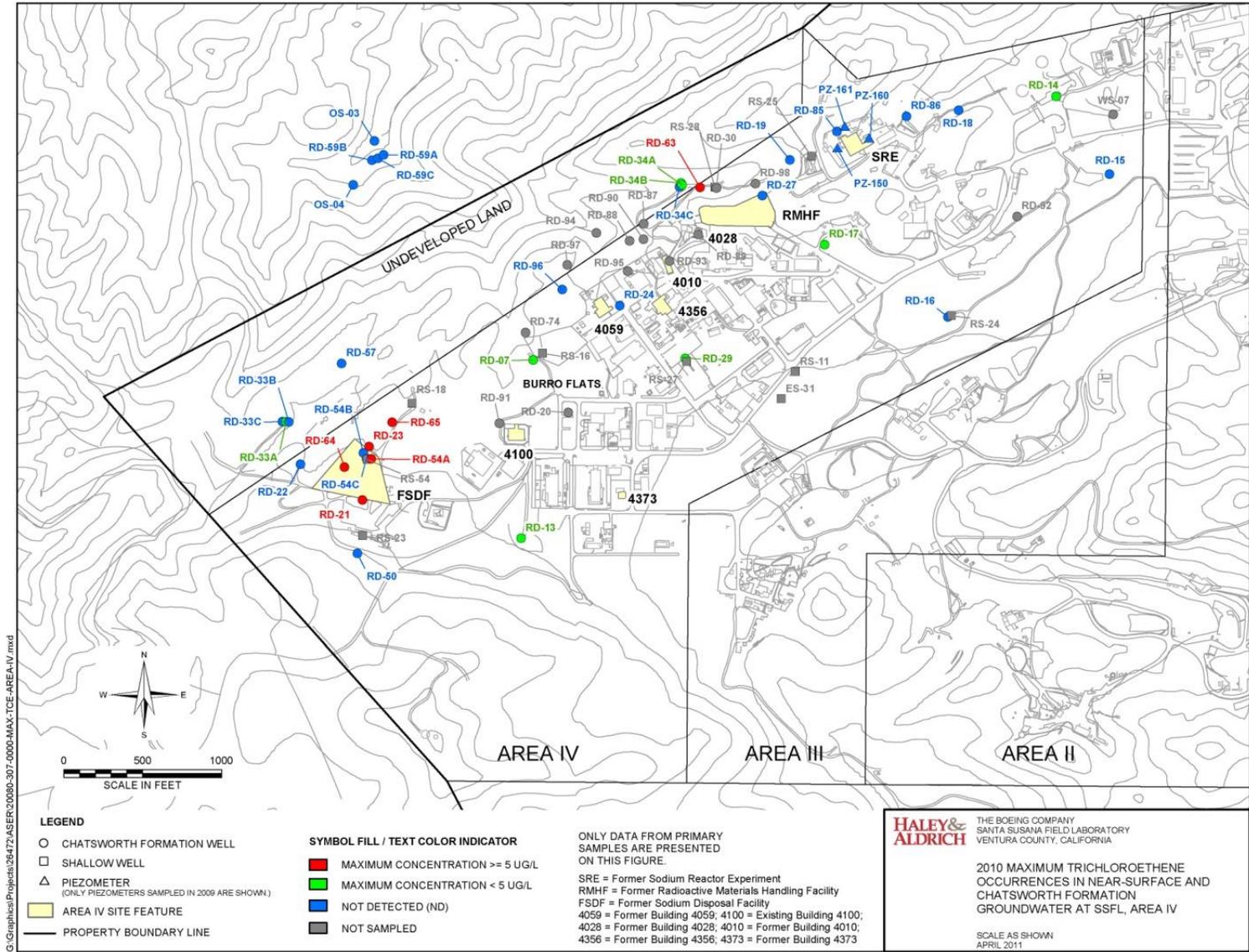


Figure 6-3. TCE Occurrences in Groundwater at SSFL, Area IV

FSDF: TCE was detected in groundwater collected from wells located near the FSDF area during the year. Chatsworth Formation wells containing maximum TCE concentrations exceeding the MCL included RD-21 (230 µg/L), RD-23 (240 µg/L), RD-54A (12 µg/L), RD-64 (60 µg/L), and RD-65 (130 µg/L). TCE was detected below the MCL in groundwater collected at wells RD-33A at estimated concentrations ranging up to 0.22 µg/L. Historical TCE concentrations in RD-33A have ranged from an estimated 0.1 to 14 µg/L. No TCE samples were collected from shallow wells or piezometers from this area in 2010.

Former 4028: No TCE samples were collected from this area in 2010.

Building 4100: No TCE samples were collected from this area in 2010.

SRE: TCE was not detected in groundwater samples collected from wells located in this area in 2010.

Other areas: TCE was detected in several wells outside of the six concentrated areas of TCE-impacted groundwater. TCE was detected below the MCL in groundwater collected at Chatsworth Formation wells RD-13, RD-14, and RD-29, which are located in the central part of Area IV near Burro Flats. Occurrence of TCE in RD-13 was determined to be the result of improperly decontaminated sampling equipment temporarily installed during the fourth quarter of 2000. TCE was detected in RD-13 groundwater at an estimated 0.25 µg/L in 2010. RD-14 and RD-29 contained TCE concentrations of an estimated 3.1 µg/L and 2.1 µg/L, respectively. These results were within historical detection ranges of 0.6 to 13 µg/L in RD-14 and, of 0.47 to 3.1 µg/L in RD-29.

The extraction activity at the FSDF occurred between 1995 and 2003. The groundwater extraction system at FSDF included extraction of impacted groundwater from wells RD-21 and RS-54 and treatment of the extracted groundwater in a GAC adsorption treatment unit. The FSDF system also used ion exchange resin in series to treat perchlorate-impacted groundwater prior to discharge. Groundwater has not been extracted from FSDF interim extraction wells RS-54 and RD-21 since 2003 in order to accommodate FSDF-area groundwater investigations.

In addition to groundwater monitoring activities, additional characterization efforts have been conducted in the FSDF area of Area IV. During 2010, discrete interval groundwater monitoring systems installed in eight FSDF-area wells were sampled for diesel range organics, fluoride, cyanide, radionuclides, filtered (dissolved solids) trace metals, perchlorate and VOCs. The data loggers monitored discrete-interval water level fluctuations, produced discrete-interval hydraulic head readings within the Chatsworth Formation groundwater system, and allowed the collection of discrete fracture connectivity testing data. Transducer data loggers installed in eight FSDF-area groundwater wells collected continuous water level data that supplemented discrete interval monitoring data.

The 2010 Annual Groundwater Monitoring Report may be found at:

http://www.etec.energy.gov/Cleanup/Groundwater_Monitoring.html

6.4 SOIL

The soils investigation program started at the SSFL site in 1996 and is currently ongoing. In 2010, potential chemically contaminated soils in Area IV were assessed under two environmental programs: the RCRA Facility Investigation (RFI) and DTSC/DOE Administrative Order on Consent (AOC) co-located sampling program. Prior to December 2010, investigation of chemical contamination in soil was performed as part of the RFI program under DTSC oversight. On December 6, 2010, the DTSC and DOE signed an AOC that outlines a different approach to investigate and clean up soil contamination in Area IV under DTSC oversight. The objective of the soil investigation is to investigate the nature and extent of chemicals in soil, and the potential threat to groundwater quality in Area IV and in contiguous areas where soil contamination has migrated. Per the AOC, investigation and cleanup of groundwater will continue under the RCRA Corrective Action program under DTSC oversight.

The AOC soil investigation fieldwork is currently in the first of three phases to complete chemical contaminant characterization in Area IV. The Phase 1 chemical soil sampling is being co-located with the United States Environmental Protection Agency (EPA) Phase 1 radiological sampling. Phase 1 sampling is currently scheduled to be completed in 2011, with subsequent Phase 2 and 3 work to be completed by the end of 2013 for all of Area IV. Field methodologies for the current soil investigation include soil matrix sampling with additional soil matrix, soil vapor, and surface water sampling, and trenching planned for subsequent phases. DTSC is onsite during much of the fieldwork to observe sampling protocols and select sampling locations and depths.

During 2010, a total of 1,244 soil matrix, 113 soil vapor 82 near-surface groundwater, and 16 spring/seep samples were collected in areas within and near DOE sites¹. Data review and validation for these samples are ongoing, with data being published in technical memoranda as work gets completed. Samples collected and analyses performed as part of the RFI and AOC programs to date at DOE locations are included in Table 6-3.

Table 6-3. Surficial Media Sampling Summary

| Date | Soil Matrix | | Soil Vapor | | Surface Water | | Groundwater | | Spring/Seep | |
|--------------------------|-------------|----------|------------|----------|---------------|----------|-------------|----------|-------------|----------|
| | Sample | Analysis | Sample | Analysis | Sample | Analysis | Sample | Analysis | Sample | Analysis |
| 1/1/10 to 12/31/10 | 1,244 | 12,363 | 113 | 113 | 0 | 0 | 82 | 246 | 16 | 45 |
| Total to date | 2,279 | 17,171 | 470 | 470 | 18 | 36 | 204 | 588 | 57 | 136 |

¹ Surficial media sampling counts are provided in this report for all media (including groundwater) since the AOC was not signed until December 2010. In the future, all groundwater investigation activities and sampling will be reported in Section 6.3.

Key activities completed in the year 2010 included the following:

Soil matrix and soil vapor sampling was conducted as part of the RFI following DTSC approval of the Group 6 Sampling and Analysis Plan (SAP) at four sites in the Group 6 area, including the Old Conservation Yard (OCY), the New Conservation Yard (NCY), the Building 4064 Leach Field (B064 LF), and the Sodium Reactor Experiment (SRE).

As part of the DTSC/DOE co-located sampling program, soil matrix and sediment sampling was conducted after DTSC approval of the Master Field SAP and addenda for portions of the Group 5 area. In conjunction with the EPA radiological sampling effort, chemical samples were collected at nine sites in the Group 5 area, including Environmental Effects Laboratory (EEL), Boeing Area IV Leach Field (LF), Coal Gasification Process Development Unit (PDU), Hazardous Materials Storage Area (HMSA), DOE LFs 2 and 3, Building 100 (B100) Trench, Building 65 Metals Lab Clarifier (B065 Clarifier), and Systems for Nuclear Auxiliary Power (SNAP) Facility. Chemical co-located sediment sampling was also performed in the drainages in the undeveloped land to the north of Area IV (Northern Buffer Zone).

Effort continued to address DTSC comments on previous RFI reports. The Group 8 SAP was prepared and submitted to DTSC for review, and preparation of the Group 5 SAP began. These documents will be used during Phase 2 and 3 AOC sampling to identify chemical characterization data needs in light of the new Phase 1 co-located sampling results in these areas. Also, work began on a site-wide information compilation for submittal to the agency to address DTSC comments on previous RFI reports. This site-wide deliverable includes compilation of all analytical data, field and laboratory information, agency correspondence, and presentation of historical aerial photographic review findings, surface water flow, and infrastructure systems (wastewater, natural gas pipelines, sewer system, tanks) in a geographic information system (GIS).

Implementation planning continued on the Chemical Soil Background Study Work Plan that was submitted to DTSC in 2009. The work plan was revised and re-submitted to DTSC in August 2010. DTSC determined that a new contractor would be retained for this work, and field implementation of the study is planned for 2011.

Work planned for 2011 includes completion of Phase 1 co-located sampling, preparation of technical memoranda presenting sampling results, and planning and conducting of Phase 2 chemical sampling. Phase 2 chemical sampling will include both co-located sampling at EPA radiological locations and chemical data gap sampling locations. Additional work planned for 2011 include the evaluation of offsite debris areas and the completion of addressing DTSC's request for site-wide information regarding analytical and field information, infrastructure systems, and aerial photographic review findings. Additional details on previous RFI soil sampling may be found at:

http://www.boeing.com/aboutus/environment/santa_susana/groundwater_soil.html

Recent information regarding the 2010 AOC requirements and co-located soil sampling efforts may be found at:

http://www.etc.energy.gov/Cleanup/Administrative_Order_Consent.html

http://www.etc.energy.gov/Cleanup/Co-Located_Sampling.html

7. ENVIRONMENTAL MONITORING PROGRAM QUALITY CONTROL

This section describes the quality assurance (QA) elements incorporated into the Boeing SSFL radiological monitoring program. The following elements of quality control are used for the Boeing SSFL program:

- Reagent Quality—Certified grade counting gas is used.
- Laboratory Ventilation—Room air supply is controlled to minimize temperature variance and dust incursion.
- Laboratory Contamination—Periodic laboratory contamination surveys for fixed and removable surface contaminations are performed. Areas are cleaned routinely and decontaminated when necessary.
- Control Charts—Background and reference source control charts for counting equipment are maintained to evaluate stability and response characteristics.
- Calibration Standards—Counting standard radioactivity values are traceable to NIST primary standards.
- Co-location of State DPH thermoluminescent dosimeters.

7.1 PROCEDURES

Procedures followed include those for selection, 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 measurement (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.

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APPENDIX A ACRONYMS

| | |
|----------|---|
| AI | Atomics International |
| ALARA | As Low As Reasonably Achievable |
| ASER | Annual Site Environmental Report |
| ANL | Argonne National Laboratory |
| AOC | Administrative Order on Consent |
| ASL | Above Sea Level |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| BCG | Biota Concentration Guides |
| CAA | Clean Air Act |
| CAL/OSHA | California Occupational Safety and Health Administration |
| CEQA | California Environmental Quality Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CWA | Clean Water Act |
| D&D | Decontamination and Decommissioning |
| DCG | Derived Concentration Guideline |
| DCGL | Derived Concentration Guideline Level |
| DPH/RHB | Department of Public Health/Radiologic Health Branch |
| DMR | Discharge Monitoring Report |
| DOD | Department of Defense |
| DOE | Department of Energy |
| DTSC | Cal-EPA Department of Toxic Substances Control |
| EA | Environmental Assessment |
| EEOICPA | Energy Employees Occupational Illness Compensation Program Act |
| EHS | Environment, Health and Safety |
| EIS | Environmental Impact Statement |
| EML | Environmental Measurements Laboratory |
| EP | Environmental Protection |

| | |
|---------|---|
| EPA | Environmental Protection Agency |
| ER | Environmental Remediation |
| ETEC | Energy Technology Engineering Center |
| FFCAct | Federal Facilities Compliance Act |
| FONSI | Finding of No Significant Impact |
| FSDF | Former Sodium Disposal Facility |
| GRC | Groundwater Resources Consultants, Inc. (Tucson, AZ) |
| HEPA | High-Efficiency Particulate Air |
| HPGe | High-Purity Germanium (Detector) |
| HWMF | Hazardous Waste Management Facility |
| ISMS | Integrated Safety Management System |
| LARWQCB | Los Angeles Regional Water Quality Control Board |
| LLNL | Lawrence Livermore National Laboratory |
| LLW | Low Level Waste |
| MAPEP | Mixed Analyte Performance Evaluation Program |
| MARSSIM | Multi-Agency Radiation Survey and Site Investigation Manual |
| MCA | Multichannel Analyzer |
| MCL | Maximum Contamination Level |
| MDA | Minimum Detectable Activity |
| MEI | Maximally Exposed Individual |
| MLLW | Mixed Low-level Waste |
| 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 |
| NPDES | National Pollutant Discharge Elimination System |
| NRC | Nuclear Regulatory Commission |
| NSPS | New Source Performance Standards |
| ORAU | Oak Ridge Associated Universities |
| ORISE | Oak Ridge Institute for Science and Education |

| | |
|-------|--|
| ORPS | Occurrence Reporting and Processing System |
| PCB | Polychlorinated Biphenyl |
| PCE | Perchloroethene |
| PEIS | Programmatic Environmental Impact Statement |
| QA | Quality Assurance |
| QAP | Quality Assessment Program |
| R&D | Research and Development |
| RCRA | Resource Conservation and Recovery Act |
| RESL | Radiological and Environmental Sciences Laboratory |
| RFA | RCRA Facility Assessment |
| RFI | RCRA Facility Investigation |
| RFP | Request for Proposal |
| RMHF | Radioactive Materials Handling Facility |
| ROD | Record of Decision |
| RS | Radiation Safety |
| RWQCB | Regional Water Quality Control Board |
| SARA | Superfund Amendments and Reauthorization Act |
| SIPs | State Implementation Plans |
| S&M | Surveillance and Maintenance |
| SNAP | Systems for Nuclear Auxiliary Power |
| SPCC | Spill Prevention Control and Countermeasure |
| SPTF | Sodium Pump Test Facility |
| SRAM | Standardized Risk Assessment Methodology |
| SRE | Sodium Reactor Experiment |
| SSFL | Santa Susana Field Laboratory |
| SWPPP | Storm Water Pollution Prevention Plan |
| STP | Sewage Treatment Plant or Site Treatment Plan |
| SWMU | Solid Waste Management Unit |
| TCE | Trichloroethylene |
| TEDE | Total Effective Dose Equivalent |
| TLD | Thermoluminescent Dosimeter |

| | |
|--------|---|
| TRU | Transuranic |
| UST | Underground Storage Tank |
| VCAPCD | Ventura County Air Pollution Control District |
| WVN | Water Vapor Nitrogen |

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California State University, Northridge
Attn: Robert Marshall
Urban Archives Center
Oviatt Library - Basement, Room 4
18111 Nordhoff Street
Northridge, CA 91330

Simi Valley Public Library
Attention: Gabriel Lundeen
2969 Tapo Canyon Road
Simi Valley, CA 93063

Platt Branch Library
Attn: Lynn Light
23600 Victory Blvd.
Woodland Hills, CA 91367

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Site Environmental Report Reader Survey--2010

To Our Readers:

The Annual Site Environmental Report publishes the results of environmental monitoring in support of DOE-sponsored programs at Boeing's Santa Susana Field Laboratory, and documents our compliance with federal, state, and local environmental regulations. In providing this information, our goal is to give our readership—regulators, scientists, and the public—a clear understanding of our environmental activities, the methods we use, how we can be sure our results are accurate, the status of our programs, and significant issues affecting our programs.

It is important that the information we provide is easily understood, of interest, and communicates Boeing's efforts to protect human health and minimize our impact on the environment. We would like to know from you whether we are successful in achieving these goals. Your comments are appreciated and will help us to improve our communications.

- 1. Is the writing too concise? too wordy? uneven? just right?
- 2. Is the technical content too concise? too wordy? uneven? just right?
- 3. Is the text easy to understand? yes no

If you selected "no," is it: too technical too detailed other: _____

- | | Yes | No |
|---|--------------------------|--------------------------|
| 4. Is the report comprehensive? (please identify issues you believe are missing in the comments section) | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Do the illustrations help you understand the text better? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are the figures understandable? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are there enough? | <input type="checkbox"/> | <input type="checkbox"/> |
| Too few? | <input type="checkbox"/> | <input type="checkbox"/> |
| Too many? | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Are the data tables of interest? | <input type="checkbox"/> | <input type="checkbox"/> |
| Would you prefer short summaries of data trends instead? | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Is the background information sufficient? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are the methodologies described reasonably understandable? | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Are the glossaries and appendices useful? | <input type="checkbox"/> | <input type="checkbox"/> |

Other comments:

Please return this survey to Radiation Safety - M/S T487, The Boeing Company, Santa Susana Field Laboratory, 5800 Woolsey Canyon Road, Canoga Park, CA 91304.

OPTIONAL INFORMATION

Name: _____ Occupation: _____

Address: _____



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