DRAFT

STATE OF CALIFORNIA
ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF TOXIC SUBSTANCES CONTROL

In the Matter of: Santa Susana Field Laboratory Simi Hills Ventura County, California CA1800090010 (NASA) CAD000629972 (Boeing/DOE) CA3890090001 (Boeing/DOE) The National Aeronautics & Space Administration and The U.S. Department of Energy, (Respondents)	Docket No. CONSENT ORDER FOR RESPONSE ACTION Health and Safety Code Sections 25187, 25355.5(a)(1)(C), 25359.20, 58009 and 58010

INTRODUCTION

1.1. Parties. The California Department of Toxic Substances Control (DTSC), the National Aeronautics & Space Administration (NASA), a federal agency, and the U.S. Department of Energy (DOE), a federal agency (Respondents) enter into this Consent Order for Response Action.

1.2. Background. Respondents are the owners and/or operators of hazardous waste management units and facilities at the approximately 2,850-acre Santa Susana Field Laboratory (SSFL), also referred to under this Order as "the Facility" and "the Site," located in the Simi Hills in southeastern Ventura County, California as shown on Attachment 1. The Simi Hills are bordered to the east by the San Fernando Valley and to the north by the Simi Valley. The SSFL is located

approximately three miles south of the San Fernando Valley Freeway (118) and approximately five miles north of the Ventura Freeway (101). The SSFL was established in 1947. Activities at the SSFL have included but were not limited to rocket engine testing and research and development of fuels, propellants, nuclear power, and lasers. The SSFL is divided into four administrative areas – Area I, Area II, Area III, and Area IV - and two undeveloped areas. A 41.7-acre portion of Area I and all of Area II, which is 409.5 acres, are owned by the federal government, administered by NASA and operated by Boeing. Historical operations in Area II and the government-owned portion of Area I included rocket engine testing, propellant and fuel storage and loading, and non-hazardous waste incineration (Area II) and production of liquid oxygen (Area I), Additional information about the history of these operations is available at http://www.nasa.gov/ssfl. The Department of Energy (DOE) owns facilities on a 90-acre site within Area IV, which is known as the "Energy Technology Engineering Center" (ETEC), while Boeing owns the underlying land. The 90-acre ETEC consists primarily of facilities and structures built and owned by DOE and operated by Boeing. Area IV was used for nuclear power research. The history of these operations is described at various places, including DOE's ETEC Closure Project web site at http://www.etec.energy.gov/ and in the "Historical Site Assessment of Area IV, Santa Susana Field Laboratory, Ventura County, California", May 2005 at).

The postclosure permit for Areas I and III addresses five surface impoundments and five groundwater treatment systems or towers. The postclosure permit for Area II addresses four surface impoundments and three groundwater treatment systems or towers. The RCRA closure process for these units was initiated in 1985. Evaluations of the surface impoundments continue as part of the investigative work described in this Order. The Thermal Treatment Facility (TTF) located in the

southern portion of Area I, in the eastern portion of the Area I Burn Pit, is subject to RCRA closure. Closure requirements may be addressed through the characterization and remediation procedures specified in this Order.

In Area IV, DOE-owned/Boeing-operated facilities include the Hazardous Waste Management Facility (the HWMF) and the Radioactive Materials Handling Facility (RMHF). DTSC issued a permit for the HWMF in 1993 to DOE as owner and Rockwell International Corporation as facility operator (Permit Number: 93-3-TS-002), EPA I.D. Number: CAD000629972). This permit authorized the continued operation of a treatment unit (the Building 133 sodium burn facility) and a storage unit (the Building 29 sodium storage facility). The HWMF is inactive and remains subject to closure requirements. DTSC has approved DOE's closure plan for the HWMF; however, implementation of the closure plan is on hold. The RMHF is a mixed waste facility for which Interim Status authority first went into force with the March 22, 1989 Part A submittal to the U.S. Environmental Protection Agency (Interim Status Document EPA I.D. Number: CA3890090001). In September 1997, DTSC required DOE and Boeing to submit a revised Part A application to clarify the hazardous waste operating units at the RMHF eligible for Interim Status and to include a closure plan and schedule for closure. A revised Part A application and Closure Plan for the RMHF were submitted on October 24, 1997. DTSC determined the Part A application complied with the administrative requirements for Interim Status. The RMHF consists of two hazardous waste management storage units (Building 4022, and Building 4621 and its accompanying yard) and a mixed waste treatment unit (Building 4021). Closure of the RMHF is on hold. In each of the Areas I, II, and IV described above there have been releases or potential releases of hazardous substances into the environment that require response actions.

1.3. Authorities.

1.3.1 DTSC issues and enters this Order pursuant to its authority and responsibilities under Health and Safety Code sections 25187, 25355.5(a)(1)(C), 25359.20, 58009 and 58010. Health and Safety Code section 25187 authorizes DTSC to issue an Order to require corrective action when DTSC determines that there is or has been a release of hazardous waste or hazardous waste constituents into the environment from a hazardous waste facility. Health and Safety Code section 25187 further authorizes DTSC, *inter alia*, to implement a response action pursuant to Chapter 6.8 (commencing with Health and Safety Code section 25300). Health and Safety Code section 25355.5 (a)(1)(C) authorizes DTSC to issue an Order establishing a schedule for removing or remedying the release of a hazardous substance, or for correcting the conditions that threaten the release of a hazardous substance, and authorizes DTSC to enter into an enforceable agreement with a potentially responsible party that requires the party to take necessary response action to remove the threat of a release, or to determine the nature and extent of the release and adequately characterize the site, prepare a response action plan, and complete the necessary response actions as required in the approved response action plan. Health and Safety Code section 25359.20 authorizes DTSC to use any legal remedies available pursuant to Chapter 6.8 (commencing with section 25300) or Chapter 6.5 (commencing with section 25100) to compel a responsible party or responsible parties to take or pay for appropriate response action necessary to protect the public health and safety and environment at the SSFL site. Health and Safety Code section 25359.20(b) requires that any response action at the Site be taken in accordance with the provisions of Chapter 6.8.

Health and Safety Code section 58009 authorizes DTSC to commence and maintain all proper and necessary actions and proceedings to enforce its rules and regulations; to enjoin and abate

nuisances related to matters within its jurisdiction which are dangerous to health; to compel the performance of any act specifically enjoined upon by any person, office, or board by any law of this State relating to matters within its jurisdiction; or on matters within its jurisdiction, to protect and preserve the public health. Health and Safety Code section 58010 authorizes DTSC to abate nuisances related to matters within its jurisdiction.

Nothing in this Order shall be construed as a concession by DTSC regarding the Federal Respondents' statement of authorities in section 1.3.2 below, and DTSC expressly reserves all rights as specified under section 1.6 below.

1.3.2. NASA and DOE enter into this Order pursuant to their federal authority and responsibilities under sections 104 and 120 of CERCLA, 42 U.S.C. sections 9604 and 9620, the National Contingency Plan (NCP), 40 C.F.R. Part 300, Executive Order 12580, and section 6001 of RCRA, 42 U.S.C. section 6961. Nothing in this Order shall be construed as constituting submission by Federal Respondents to any State authority or jurisdiction under California Health and Safety Code sections 58009 and 58010 or any State authority or jurisdiction beyond the extent that Congress has expressly waived the sovereign immunity of the United States.

1.3.3. Additional Statement of Authorities Related to DOE. In addition to the authorities cited in Section 1.3.2 above, DOE also enters into this Order pursuant to its authority and responsibilities under the Atomic Energy Act of 1954, as amended (AEA), 42 U.S.C. 2011, et seq, the Energy Reorganization Act of 1974, 42 U.S.C. 5801, et seq., and the Department of Energy Organization Act of 1977, 42 U.S.C. 7101, et seq. It is DOE's legal position that California does not have regulatory authority over DOE with respect to radioactive material. DOE and DTSC agree that the cleanup of the SSFL needs to move forward and wish to cooperate to achieve this end. DOE believes that its

legal position is not an obstacle to achieving a cooperative and timely cleanup of the site, including the radioactive materials, in a manner consistent with SB990 due to factors unique to the site, including the fact that DOE is not the landowner. Without waiving its legal position or the rights reserved in this Order, and as an exercise of comity between DOE and the State of California, DOE agrees to cooperate with implementation of this amended Consent Order. Therefore, DOE agrees to comply with and be bound by the terms and conditions of this Order. If necessary, DTSC and DOE will engage in the dispute resolution process described in this Order, and, subject to that process, may also utilize such other informal dispute resolution procedures as the parties agree are appropriate in order to achieve the shared goal of moving the cleanup forward, and resolving any environmental or legal conflicts, without litigation.

1.3.4. No provision of this Order is intended to nor shall be construed to interfere with or supersede the authority of the Los Angeles Regional Water Quality Control Board or State Water Resources Control Board pursuant to the Porter-Cologne Water Quality Control Act, Water Code Section 13000 et seq., or other provisions of law, or of the California Department of Public Health or other appropriate State agencies. No provision of this Order is intended to limit or interfere with the enforcement powers of the District Attorneys for the Counties of Los Angeles and Ventura for matters within their respective jurisdictions.

1.4. Definition of Terms. The terms used in this Order are as defined in California Health and Safety Code, Division. 20, Chapters 6.5 and 6.8, and California Code of Regulations, Title 22, Division. 4.5, except as otherwise provided.

"Chemical of Potential Concern (COPC)" shall mean a chemical that is present in the environment at levels that exceed background levels and may cause adverse human health effects and is a result of a release at the Site,.

"Chemical of Potential Ecological Concern (COPEC)" shall mean a chemical that is present in the environment at levels that exceed background levels and may cause adverse health effects in animals or plants and is the result of a release at the Site.

"Mixed Waste" shall mean a waste that contains both hazardous waste and radioactive waste, i.e., source, special nuclear, or byproduct material subject to the Atomic Energy Act of 1954, as amended.

"Radionuclide of Potential Concern (ROPC)" shall mean a radionuclide that is present in the environment at levels that exceed background levels and may cause adverse human health effects and is the result of a release at the Site.

"Radionuclide of Potential Ecological Concern (ROPEC)" shall mean a radionuclide that is present in the environment at levels that exceed background levels and may cause adverse health effects in animals or plants and is the result of a release at the Site.

"Respondent(s)" shall mean one or more of the Respondents identified in Section 1.1 of this Order.

"Remedial Investigation" or "RI" under Chapter 6.8 shall be the functional equivalent to "RCRA Facility Investigation" or "RFI" discussed in sections 3.4 through 3.4.4 of the Consent Order for Corrective Action issued August 16, 2007.

"Feasibility Study" or "FS" under Chapter 6.8 shall be the functional equivalent to "Corrective Measures Study" or "CMS" discussed in sections 3.5 through 3.5.4 of the Consent Order for Corrective Action issued August 16, 2007.

"Response Action Plan" or "RAP" shall be the functional equivalent to the corrective measures selection documentation discussed in sections 3.6 through 3.6.3 of the Consent Order for Corrective Action issued August 16, 2007.

"Remedial Design/Response Action Implementation" or "RD/RA Implementation" shall be the functional equivalent to "Corrective Measures Implementation" or "CMI" discussed in sections 3.7 through 3.7.3 of the Consent Order for Corrective Action issued August 16, 2007.

1.5. Attachments. All attachments to this Order are incorporated herein by this reference.

1.6. Denial of Liability; Reservation of Rights; No Admissions. By issuance of this Order, DTSC does not waive the right to take further enforcement actions. In addition, by entering into this Order, Respondents do not admit to any fact, statement, or recitation set forth in this Order, or to any fact, fault or liability under any federal or State statute or regulation or other provision of law. This Order shall not constitute a release, waiver, covenant not to sue or limitation of any kind, and Respondents and DTSC expressly retain all rights, remedies, defenses, causes of action, powers and authorities, civil or criminal, that Respondents or DTSC have – with respect to any disputes or claims amongst each other or against any other parties – under any statutory, regulatory, constitutional or common law authority, nor shall it be construed or applied in any way to affect the ability of Respondents to seek or obtain relief in federal court or any other court of competent jurisdiction. Without limitation of the aforementioned reservation of rights, Respondents do not admit or consent to the constitutionality, legality, enforceability, or validity of California Health and Safety Code section

25359.20 in whole or in part. DTSC asserts that California Health and Safety Code section 25359.20 s constitutional, legal, enforceable and valid. To the extent that California Health and Safety Code section 25359.20 or any federal or State law or regulation incorporated into, referenced in, or authorizing this Order is subsequently modified, amended, repealed, invalidated, declared unenforceable or superseded, in whole or in part, Respondents' obligations under this Order shall be modified accordingly, including as further provided below in section 4.27 (Severability).

FINDINGS OF FACT

DTSC hereby finds:

2.1. Region IX of the U.S. Environmental Protection Agency (U.S. EPA) issued an Interim Final RCRA Facility Assessment Report (RFA) in July 1991 that identified 122 areas of the SSFL for designation as Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs). On November 12, 1992, DTSC issued a Stipulated Enforcement Order to Rockwell International Corporation (Rockwell International, predecessor to Boeing)[1] to impose corrective action requirements at the SSFL based on the 1991 RFA. The 1992 Order required Rockwell International to submit a Current Conditions Report analyzing each area identified in the RFA. The Current Conditions Report was to contain an in-depth investigation of waste generation and release at each area and a determination of necessary further actions for each area, with a basis for each conclusion. The 1992 Order also required Rockwell International, after submittal of the Current Conditions Report, to submit a draft RCRA Facility Investigation Workplan (RFI Workplan), including plans for each area

[1] Boeing became subject to the Order through its 1996 acquisition of the Rockwell International Corporation, Rocketdyne Division after the Order was issued.

identified in the Current Conditions Reports as areas appropriate for investigation. The parties contemplated that approval of the RFI Workplan would result in an RFI Report, Corrective Measures Studies and final cleanup of the areas identified in the final Corrective Measures Studies. A Current Conditions Report was prepared by ICF Kaiser Engineers in 1993, on behalf of Rockwell International.

In May 1994, U.S. EPA finalized the RCRA Facility Assessment Report (RFA). When finalized in 1994, the RFA identified three additional areas for a total of 125 SWMUs and AOCs at the SSFL that either have released or may release hazardous wastes or hazardous waste constituents into the environment. During the subsequent RFI phase, 10 additional AOCs were identified at the SSFL. All 135 SWMUs and AOCs are summarized in Attachment 4. They include all five of the Area I and III closed RCRA surface impoundments, the four Area II closed RCRA surface impoundments, the Area IV HWMF, and the Area IV RMHF. Leach fields are typically associated with individual SWMUs and not shown individually except in Area IV where they are independent units.

2.2. Based on the RFA, DTSC concluded that further investigation was needed to determine the nature and extent of releases of hazardous wastes or hazardous waste constituents in or from the SWMUs and AOCs listed in Attachment 4. Identified SWMUs and AOCs have been grouped by location for investigation purposes and the groups are called “RFI Sites.” A total of 51 RFI Sites have been identified for investigation under the RFI process. The RFI Sites are listed in Attachment 5 and as of the effective date of this Order shall be deemed “RI Sites.” A comprehensive description of tasks performed for the RFI surficial media investigation, RFI scope, workplans prepared, and expansion and changes to the RFI, are described in the RCRA Facility Investigation Program Report, Surficial Operable Unit, Santa Susana Field Laboratory dated July 2004 (Program Report).

Laboratory information for samples collected through December 31, 2003 is provided in the Program Report.

2.3. Since the early 1980s, SSFL site characterization has proceeded along two parallel paths, one for Chatsworth Formation groundwater and the other for soils and related surficial media. This approach was formalized by defining the groundwater and surficial media as two Operable Units (OUs) for investigation and other response action purposes. The OUs at the Site are:

I. The Surficial Media OU comprising saturated and unsaturated soil, sediment, surface water, near-surface groundwater, soil vapor, air, biota, and weathered bedrock. Near-surface groundwater is groundwater that occurs within the alluvium or weathered bedrock.

II. The Chatsworth Formation OU, comprising the Chatsworth formation aquifer, and both saturated and unsaturated unweathered (competent) bedrock.

A discussion of the RFI and OUs is presented in the Program Report.

2.4. Based on a September 1990 Comprehensive Monitoring Evaluation (CME) for Chatsworth Formation groundwater conducted by DTSC, Boeing and its predecessor were required to implement a DTSC-approved Site Characterization Plan under the corrective action program. Between 1990 and 2000, several groundwater monitoring wells were installed and sampled, rock core sampling was performed at two locations in the northeast and southeast portions of the site, site fracture data were analyzed, aquifer tests were conducted, and a hydraulic communication study was conducted. The results from these activities were presented in several documents submitted over this period. In September 2000, DTSC approved an investigation of the fractured bedrock and Chatsworth Formation groundwater at the SSFL (Workplan for Additional Field Investigations, Chatsworth

Formation Operable Unit, Santa Susana Field Laboratory dated October 2000). Further site characterization is intended to provide an understanding of the complex fracture-dominated groundwater system at SSFL and the movement of constituents of concern (COCs) in the groundwater. As of February 1, 2009, more than 400 shallow and deep wells, and piezometers had been installed on and off the SSFL for the purpose of monitoring and characterizing the groundwater and COCs.

2.4.1. On May 2, 2007, the U. S. Federal District Court of Northern California issued an order granting plaintiff's motion for summary judgment in the case Natural Resources Defense Council, Inc. et al. vs. DOE [Civ. No. 04-CV-04448 SC (BZ)]. On the following day the Court permanently enjoined DOE from transferring ownership or possession, or otherwise relinquishing control over any portion of Area IV until DOE completes an Environmental Impact Statement (EIS) for Area IV and issues a Record of Decision pursuant to the National Environmental Policy Act.

2.4.2. On November 1, 2007, DTSC issued an Imminent and Substantial Determination and Order and Remedial Action Order to Boeing and NASA requiring the removal of asbestos-containing material and other debris associated with SSFL operations from a stream bed on public property ("Sage Ranch"), located adjacent to SSFL, and removal of polycyclic aromatic hydrocarbon-containing clay pigeon fragments from a former shooting range which was operated by the former Rocketdyne-Atomics International Rifle and Pistol Club, an organization that was separate and independent from Boeing and its predecessors, and also located on Sage Ranch. Soil and debris removal related to the aforementioned asbestos containing-material and other debris from Sage Ranch was completed on December 20, 2007. Although Rockwell International conducted voluntary cleanup of the polycyclic aromatic hydrocarbon-containing clay pigeon fragments and associated lead

shot from the former Rocketdyne-Atomics International Rifle and Pistol Club shooting range in 1993, and Boeing conducted voluntary cleanups of these materials in 1998 and 2006, these materials are not the result of SSFL research activities or operations. In 2008, during the removal of the clay pigeon fragments from the former shooting range area, Respondent Boeing discovered 1,163 small rocket motor igniters, lab glassware, and other debris beneath the surface. Some of the rocket motor igniters resulted from SSFL research activities or operations.

2.4.3. In 2007, U.S. EPA conducted a Preliminary Assessment/Site Investigation under CERCLA to determine whether additional federal response at the Site was necessary. The Site scored above the threshold score for listing on the National Priority List (NPL). By letter dated December 6, 2007, U.S. EPA requested the State of California's position on placement of the Site on the NPL. In January 2009, the State of California notified U.S. EPA that it did not concur in placing the Site on the NPL, but reserved the right to change its position on this issue if circumstances change.

2.4.4. On August 16, 2007, Respondents, along with Boeing and DTSC entered into a Consent Order for Corrective Action. Among other things, the August 16, 2007 Order required Respondents to submit a corrective action schedule, and to take other steps necessary to complete the cleanup of all surficial media by June 30, 2017. As of the date of this Order, Respondents have met all obligations under the Consent Order for Corrective Action.

2.4.5. Pursuant to the provisions of the 2008 Consolidated Appropriations Act, 2008 (H.R. 2764, Public Law 110-161), DOE and U.S. EPA signed an interagency agreement to conduct a comprehensive radiological site characterization for Area IV and a radiological background study for the SSFL. Under this Agreement, DOE transferred $1.5 million to U.S. EPA to fund a radiological

background study for the Site and to develop a scope of work for the radiological characterization survey for Area IV. The DOE/EPA Interagency Agreement was amended on February 17, 2009 to reflect the transfer of an additional $1.7 million to U.S. EPA by DOE. On April 23, 2009, DOE and U.S. EPA Region IX signed an amendment to the Interagency Agreement providing for the transfer of $38.3 in DOE American Reinvestment and Recovery Act funding to U.S. EPA that fully met DOE's commitment to fund U.S. EPA's December 2008 estimate of costs to develop the radiological characterization survey for Area IV.

2.4.6. DOE's completion of the EIS mentioned in section 2.4.1 of this Order is dependent on and must follow U.S. EPA's completion of the radiological survey of Area IV mentioned in section 2.4.5 of this Order.

2.4.7. Senate Bill (SB) 990 (Health and Safety Code sections 25359.20 (a) through (e)) was signed into law on October 14, 2007 and became effective on January 1, 2008. Section 25359.20(b) requires that "[a] response action taken or approved at the Santa Susana Field Laboratory site shall be conducted in accordance with the provisions of [Chapter 6.8]." This Consent Order for Response Action incorporates terms specific to the response action procedures prescribed by Health and Safety Code, Division 20, Chapter 6.8 rather than the corrective action process carried out under Health and Safety Code Chapter 6.5. Section 25359.20(c) states: "A response action taken or approved pursuant to this chapter for the Santa Susana Field Laboratory site shall be based upon, and be no less stringent than, the provisions of Section 25356.1.5. In calculating the risk, the cumulative risk from radiological and chemical contaminants at the site shall be summed, and the land use assumption shall be either suburban residential or rural residential (agricultural) whichever produces the lower permissible residual concentration for each contaminant. In the case of radioactive

contamination, [DTSC] shall use as its risk range point of departure the concentrations in the Preliminary Remediation Goals issued by the Superfund Office of the United States Environmental Protection Agency in effect as of January 1, 2007" and presented in Attachment 6. Sections 25359.20(d) and (e) prohibit the sale, lease, sublease, or other transfer of SSFL property unless the Director of DTSC or his or her designee certifies that the land has undergone complete remediation pursuant to the most protective standards in sections 25359.20(a) through (c), inclusive.

2.5. Potential human and ecologic exposures to chemicals and radionuclides can occur either onsite or as a result of migration to offsite areas. A generalized conceptual site model (CSM) of potential exposure pathways to COCs at SSFL was developed based on field observations, current and future site use scenarios, and data collected during the investigations at the SSFL. The CSM for SSFL is described in the 2005 Standardized Risk Assessment Methodology (SRAM) Work Plan (Rev. 2) approved by DTSC. The SRAM (Rev. 2) was approved before the enactment of SB 990 (see section 2.4.7 of this order) and shall be revised to reflect SB 990 requirements. Attachments 7 and 8 provide a list of potential chemical and radionuclide exposure pathways for human health and ecological risk assessment at the SSFL.

2.6. Types of chemicals associated with rocket engine testing and other research and development activities at the SSFL, and corresponding hazardous substances consequently generated or present at the SSFL are shown on Attachment 9.

2.6.1. A list of COCs has been developed for the nine closed surface impoundments addressed in the two postclosure permits for Areas I and III, and Area II. COCs from the postclosure permits are listed in Attachment 10.

2.7. Numerous investigations have been conducted to assess the presence of contaminants in groundwater beneath the Site. The SSFL is geologically complex consisting of dipping, fractured sandstone and siltstone with several faults. Releases of hazardous substances have migrated offsite through groundwater. Trichloroethylene (TCE) has been identified in the groundwater at the SSFL and in groundwater monitoring wells immediately northeast and offsite of the SSFL. Groundwater characterization activities are ongoing to further assess the nature and extent of groundwater contamination at the SSFL. Various radionuclides have been detected in groundwater at the Site. A list of chemicals and radionuclides in groundwater at the SSFL identified as of the issuance of this Order is provided in Attachment 11.

2.8. The SSFL is located in hilly terrain, with approximately 1,100 feet of topographic relief near the crest of the Simi Hills. Approximately 70 percent of the area within a 5-mile radius of the SSFL is undeveloped. The SSFL contains considerable cultural, historical and natural resources that are unique and valuable. Residential development is located north of the SSFL, and also to the east of the SSFL (on Woolsey Canyon Road and in Dayton Canyon). Residential areas located south of the SSFL are separated from active portions of the SSFL by an undeveloped area. New residential developments are proposed in Dayton Canyon to the east, Woolsey Canyon to the northeast, and in Runkle Canyon to the northwest.

2.9. Surface water from the SSFL drains primarily toward the south into Bell Creek and then eastward to the Los Angeles River with its confluence located in the San Fernando Valley. Surface water in the very north portion of the SSFL drains via various drainages into Meier Canyon and other drainages which lead to the Arroyo Simi located in Simi Valley. Surface water runoff from Happy

Valley on the east flows via Dayton Canyon Creek to Chatsworth Creek and then into Bell Creek. Bell Creek subsequently flows southeast to the Los Angeles River.

2.10. Water supply (drinking water) at the SSFL is provided by the Calleguas Water Company. There are currently no domestic water supply wells in use at the SSFL.

2.11. Hazardous substances released from operations at the SSFL have migrated or may migrate into soil, surface water, air, and groundwater (including seeps and springs) pathways. Potential exposures to hazardous substances can occur from direct contact with soils, sediments, weathered bedrock, surface water, air, and groundwater, and by ingestion of plants and animals if any were grown or raised on the Site. The Site is currently not used for growing or raising plants or animals. With the exception of plants that could be maintained in an Engineered Natural Treatment System for surface water control (but would not be consumed), there is currently no known intent to use the Site to grow or raise plants or animals in the future and Respondents Boeing and NASA intend to restrict all future use of groundwater at the Facility.

WORK TO BE PERFORMED

Based on the foregoing legal and factual statements and assertions, it is hereby ordered and agreed that:

3.1. Without waiving its authority under Health and Safety Code section 25359.20 to use legal remedies under either Chapter 6.5 or 6.8, DTSC shall require and oversee Site investigation and remediation pursuant to the provisions of Health and Safety Code, Division 20, Chapter 6.8, Sections 25300-25395 (“Chapter 6.8”), as provided by SB 990 (Health and Safety Code section 25359.20(b)). Remediation under Chapter 6.8 shall continue to ensure that releases of hazardous substances at the Site are appropriately investigated and remediated, that the cleanup is protective of human health

and the environment, and that there will be public participation in the decision-making process. Upon the Effective Date of this Consent Order, work performed to date pursuant to the Chapter 6.5 corrective action process and referenced in section 3.4.1(a)-(z), shall continue under this Consent Order, but in accordance with the processes and terminology established by Chapter 6.8. The processes and terminology of Chapter 6.5 and Chapter 6.8 shall be deemed functionally equivalent under this Consent Order. All corrective action work for the Site performed prior to the Effective Date shall be deemed sufficient under this Consent Order, and no modifications of any submittals under the Consent Order for Corrective Action referenced in Section 2.4.3 shall be required, except and only to the extent as such modifications are required by Section 25359.20, or to the extent that new information indicates that such modifications are necessary and appropriate. Except as specified in this Order, Respondents shall perform the work required by this Order in a manner not inconsistent with the DTSC-approved RI workplans (including RFI workplans approved under Chapter 6.5 corrective action) and amendments or additions, Feasibility Study Workplan, Response Action Implementation Plan, any other DTSC-approved workplans, Health and Safety Code section 25359.20, other applicable State and federal laws and their implementing regulations, and applicable DTSC and U.S. EPA guidance documents identified in Attachment 12, to the extent such guidance documents are not inconsistent with the requirements of SB 990 or the terms of this Order.

3.1.1. Chemicals of potential concern (COPCs) and chemicals of potential ecological concern (COPECs) for input into, respectively, the human health and the ecologic risk assessments shall be determined following methods outlined in the SRAM (Rev. 3) described in section 3.2.4 of this Order. Chemicals of concern (COCs) and chemicals of ecological concern (COECs) shall be identified in each of the RI reports as they are prepared. Radionuclides of potential concern (ROPCs) and

radionuclides of potential ecological concern (ROPECs) for input into, respectively, the Human Health and the Ecologic Risk Assessments, shall be determined following methods outlined in the SRAM (Rev. 3) described in section 3.2.4 of this Order. Radionuclides of concern (ROCs) and radionuclides of ecological concern (ROECs) shall be identified in each of the RI reports as they are prepared. Respondents shall update already-submitted draft RFI reports with ROCs and ROECs, and the schedule required by section 3.2.1 of this Order shall specify dates for the submittal of those updates.

3.2. Response Action Schedule.

3.2.1. All parties desire to expedite the completion of the investigation and implementation of the final remedy so that the Site can be returned to beneficial use as soon as practicable. DTSC and the Respondents acknowledge and agree that a critical objective of the schedule is to remediate contaminated soils by 2017, and the parties shall work to address issues that could have a substantial impact on Respondents' ability to meet the schedule (e.g., U.S. EPA's Area IV radiological survey). Within 90 days of the effective date of this Order, Respondents shall submit to DTSC for review and approval, in hard copy and electronic format, a revised schedule (with tasks, specific deliverables, lead Respondents, milestones and timelines) for completion of the following by June 30, 2017 in compliance with the terms and conditions of this Order:

1. Completion of DTSC-approved remedies for contaminated soils and weathered bedrock.
2. Completion of construction of DTSC-approved groundwater cleanup remedies in the Chatsworth Formation OU and Surficial Media OU.

3. Completion of construction of any DTSC-approved long-term soil and weathered bedrock cleanup remedy in the Surficial Media OU and unweathered bedrock cleanup remedy in the Chatsworth Formation OU.

Upon approval by DTSC, the revised schedule required by this section shall be incorporated by reference into this Order and all parties to this Order shall comply with the approved schedule. If DTSC disapproves the revised schedule submitted by Respondents, DTSC shall explain the reasons for its disapproval in writing. Respondents shall amend the schedule in response to DTSC's written explanation and resubmit the amended schedule to DTSC within 30 days for review and approval.

3.2.2. Historical Site Assessment. In accordance with the DTSC-approved schedule specified in section 3.2.1 of this Order, Respondents shall prepare and submit to DTSC for review and approval a comprehensive historical site assessment (HSA) of all operations in Areas I and II involving the management of radioactive materials, including a submittal of historical documents, as specified in section 3.4.4 of this Order, that describe the management of radioactive materials. The HSA shall address the potential for placement of soil borrow with radiological contamination from Area IV to other areas of the Site. The U.S. EPA Area IV HSA and survey shall address not only the 290 acres of Area IV but also the 182 acre northern undeveloped land and any drainages that originate from Area IV and extend into adjacent downstream areas of SSFL potentially impacted by Area IV operations. The HSA shall also include summaries of prior radiological sampling conducted in Areas I and II. The purpose of the HSA is to assist in determining the appropriate scope of the workplan for characterization of radionuclides required by section 3.2.3.

3.2.3. Workplan for Preliminary Assessment of Presence of Radionuclides. In accordance with the DTSC-approved schedule specified in section 3.2.1 of this Order, Respondents shall prepare

and submit a preliminary assessment workplan to determine if radionuclide contamination is present in Areas I and II.

3.2.3.1. The HSA shall provide information on the scope, type, quantity and location of use of radioactive materials in Areas I and II. The workplan required by Section 3.2.3 shall use this information to classify areas as either Class 1, Class 2, Class 3 or non-impacted according to Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (EPA 402-R-97-016, Revision 1, August 2000) guidelines. The sample density and surface scanning fractions shall then be determined using MARSSIM guidance.

3.2.3.2. Much of Areas I and II is either precipitous, rocky cliffs, steep hillsides or dense vegetation with no ready access. In preparing the workplan under Section 3.2.3, Respondents shall consider and document the nature and degree of accessibility to these areas and potential investigation technologies that can access these areas. The workplan shall consider radiological data previously collected by Respondents to assist in determining the amounts and types of sampling required. The workplan shall utilize MARSSIM criteria in the sampling/survey design, including accessibility, survey unit classification, and availability of agency approved prior sampling data. In addition, equipment, accessibility criteria, and analytical techniques shall be comparable to those utilized in the U.S. EPA Area IV radiological survey. Respondents may propose to DTSC that no survey be conducted in non-impacted areas, inaccessible areas, or areas where DTSC has determined that prior radiological sampling has sufficiently established the absence of radionuclide contamination.

3.2.4. Standardized Risk Assessment Methodology for Radionuclides and Chemicals. In accordance with the DTSC-approved schedule specified in Section 3.2.1 of this Order, Respondents

shall prepare and submit to DTSC for approval a Standardized Risk Assessment Methodology for Radionuclides and Chemicals (SRAM (Rev. 3). The SRAM (Rev. 3) shall incorporate the suburban residential and open space (recreational) exposure evaluations of SRAM (Rev. 2) with amendments and addenda necessary to meet the requirements of this Order. The SRAM (Rev. 3) shall describe procedures and methods to identify and quantify estimated ecological and cumulative human risks associated with both chemicals and radionuclides at the Site, consistent with the requirements of Health and Safety Code section 25359.20. The SRAM (Rev. 3) shall include evaluation procedures for suburban residential and open space (recreational) from SRAM (Rev. 2) as well as the rural residential (agricultural) land use scenarios, and methods to be used to estimate chemical RBSLs and cumulative radionuclide and chemical risk, as required by Health and Safety Code sections 25356.1.5(d) and 25359.20(c). The SRAM (Rev. 3) shall be subject to public review and comment before it is approved by DTSC.

3.2.4.1. Respondents shall submit a revised generalized Site Conceptual Model (SCM) of potential exposure pathways to include potential exposures to radionuclides and chemicals. Attachment 7 provides a list of potential radionuclide and chemical exposure pathways to be evaluated for use in human health risk assessments at the SSFL. Attachment 8 provides a list of potential radionuclide and chemical exposure pathways to be evaluated for use in ecological risk assessments at the SSFL.

3.2.4.2. Consideration of Background in Selection of COPCs/COPECs and ROPCs/ROPECs in SRAM (Rev. 3). If the concentrations of soil/sediment/weathered bedrock COPCs/COPECs or ROPCs/ROPECs in an area under evaluation are consistent with background concentrations from the

SSFL chemical or radionuclide background studies, then those chemicals and radionuclides shall be excluded from further evaluation in the risk assessment for that area.

3.2.5. Compliance with Health and Safety Code section 25359.20. Section 25359.20 specifies a risk based approach to remediation. Under this approach, risk calculations shall be used to determine the response action necessary to achieve acceptable risk levels. The SRAM (Rev. 3) specified in Section 3.2.4 of this Order shall be used to calculate risk for the purpose of determining the response actions specified in sections 3.5, 3.6 and 3.8 of this order. The standards and approach set forth in sections 3.2.5 through 3.2.5.6 are consistent and compliant with the requirements of section 25359.20. Sections 3.2.5.1 through 3.2.5.6 of this Order outline elements of the SRAM (Rev. 3), required by section 3.2.4 of this Order, specify the standards governing its application in the implementation of this Order, and cite guidance documents that Respondents shall use in meeting the requirements of Health and Safety Code section 25359.20

3.2.5.1. Human Health Risk Range and Point of Departure. U.S. EPA CERCLA Guidance shall be used to determine the acceptability of risks. See 40 CFR 300.430(e)(2)(i)(A)(2), incorporated by reference in California Health and Safety Code section 25356.1(d) (incorporating requirements of the NCP). The NCP provides that "for known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response. The 10^{-6} risk level shall be used as the point of departure for determining remediation goals for alternatives when Applicable or Relevant and Appropriate Requirements (ARARs) are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure." Respondents shall use the 10^{-6} cumulative risk level as the point of

departure for determining remediation goals for cancer-causing chemicals and radionuclides. Risk Based Screening Levels (RBSLs) for chemicals and the Preliminary Remediation Goals specified in Health and Safety Code section 25359.20(c) for radionuclides will be used as screening levels for purposes of this Order.

3.2.5.2. Human Health Risks Incremental to Background. The estimated chemical and radionuclide cumulative cancer risk shall be compared to cumulative risk at background levels. Evaluation of chemicals and radionuclides shall be performed as described in SRAM (Rev. 3) specified in Section 3.2.4 of this Order. Cleanup of chemicals and radionuclides below background concentrations shall not be required. Risk management decisions shall be determined by comparison of site cumulative risk to background cumulative risk. Chemical background shall be determined by the chemical background study described in section 3.4.12 of this Order. The radionuclide background dataset that shall be used in the performance of risk assessments pursuant to the SRAM (Rev. 3) shall consist of the data from the U.S. EPA radionuclide background study described in section 2.4.5 of this Order. Incremental risk shall be compared to the 10^{-6} point of departure, when making preliminary recommendations regarding the need for evaluation of an RFI/RI site in the feasibility study (FS). RFI/RI sites with an incremental risk higher than 10^{-6} shall be evaluated in the Feasibility Study discussed in section 3.5 of this Order. Implementation of a remedial alternative that achieves a cleanup goal with a target incremental risk between 10^{-6} and 10^{-4} shall be based on risk management decisions using the nine evaluation criteria specified in section 3.5.4..

3.2.5.3. Detection Limits. The detection limits employed by U.S. EPA during the survey specified in section 2.4.5 of this order shall be used for all radionuclide testing at the Site. Similarly, reporting limits for chemicals shall be the lowest reasonably attainable in an effort to meet agricultural

RBSLs. Detection limits and (chemical) reporting limits shall be set forth in the SRAM (Rev. 3). In cases where a PRG or RBSL falls below the limit of detection (for radionuclides) or the reporting limit (for chemicals), cleanup below the detection limit (for radionuclides) or the reporting limit (for chemicals) shall not be required .

3.2.5.4. Reasonable Maximum Exposure (RME). For the rural residential (agricultural), RME conditions shall be the exposure assumptions used in the derivation of the PRGs specified in section 2.4.7 of this Order. The evaluation of the suburban residential and recreational scenario shall be consistent with procedures in the SRAM (Rev. 2), to be incorporated into SRAM (Rev. 3).

3.2.5.5. Risk assessments performed for both radionuclides and chemicals shall be based on exposure point concentrations estimated in accordance with U.S. EPA's statistical software program "Scout Version 1.00.01" or subsequent revisions developed by U.S. EPA up until the draft of the SRAM (Rev. 3) is submitted to DTSC. Notwithstanding the guidance referenced in this section, exposure point concentrations shall be estimated for each RFI/RI site. "Hot spot" evaluation for purposes of making risk management decisions shall be defined in the SRAM (Rev. 3).

3.2.5.6. Human Exposure Pathways and Parameters. Exposure pathways and parameters for both chemicals and radionuclides used in the development of the rural residential (agricultural) exposure scenarios shall be those used by U.S. EPA in the derivation of the PRGs specified in section 2.4.7 of this Order, except that chemical-specific exposure pathways and parameters shall be added or modified where appropriate. The evaluation of the suburban residential and recreational scenario shall be consistent with procedures in the SRAM (Rev. 2), to be incorporated into SRAM (Rev. 3). To calculate risk due to surface soil exposures of human receptors (excluding groundwater exposures), depths no greater than the top two feet from ground surface shall be considered. To

calculate risks due to subsurface exposures, depths no greater than the top ten feet shall be considered. The use of groundwater from beneath the SSFL shall be considered an incomplete exposure pathway if and when groundwater use is restricted through institutional controls, e.g., recordation of a land use covenant on the use of the groundwater underlying the facility for purposes including, but not limited to, domestic, residential and agricultural uses such as drinking, bathing, showering, food preparation, plant irrigation, and cleaning. An appropriate remedy to address groundwater contamination shall be approved by DTSC. Notwithstanding the recordation of a land use covenant or other institutional controls at the Site, direct exposures via seeps and springs, and indirect exposures via plant uptake and soil vapor at locations where the depth to groundwater is less than six feet shall be considered completed exposures pathways as appropriate.

3.3. Interim Response Actions (IRAs).

3.3.1. IRAs already completed by Respondents under RCRA corrective action are listed in Attachment 13 (Interim Measures Completed). Respondents shall evaluate available data and assess the need for IRAs in addition to those specifically required by this Order, or otherwise carried out by Respondents. IRAs shall be used whenever necessary, appropriate, and when directed by DTSC to control or abate immediate threats to human health or the environment, and to prevent or minimize the spread of contaminants while long-term response action alternatives are being evaluated. The completion of an IRA does not eliminate the area from further assessment.

3.3.2. In the event Respondents identify an immediate or potential threat to human health or the environment, or discover new releases of hazardous substances not previously identified, Respondents shall notify DTSC's SSFL Project Director orally within 48 hours of discovery, and notify DTSC's SSFL Project Director in writing within 10 days of discovery, summarizing the findings,

including the immediacy and magnitude of the potential threat to human health or the environment. If required, Respondents shall submit to DTSC an IRA workplan for approval within the time period specified by DTSC. The IRA workplan shall include a schedule for submitting to DTSC an IRA Operation and Maintenance Plan and IRA Plans and Specifications. The IRA workplan, IRA Operation and Maintenance Plan, and IRA Plans and Specifications shall be developed in a manner consistent with the Scope of Work for Interim Response Action Implementation approved by DTSC. If DTSC determines that immediate action is required, DTSC may orally authorize the Respondents to act prior to DTSC's receipt of the IRA workplan.

3.3.3. If DTSC identifies an immediate or potential threat to human health or the environment, discovers new releases of hazardous substances not previously identified, DTSC shall notify Respondents in writing. If required, Respondents shall submit to DTSC for approval within the time period specified by DTSC an IRA workplan that identifies interim response actions that will mitigate the threat. The IRA workplan shall include a schedule for submitting to DTSC an IRA Operation and Maintenance Plan and IRA Plans and Specifications. The IRA workplan, IRA Operation and Maintenance Plan, and IRA Plans and Specifications shall be developed in a manner consistent with the Scope of Work for Interim Response Action Implementation approved by DTSC. If DTSC determines that emergency action is required, DTSC may orally authorize Respondents to act prior to receipt of the IRA workplan.

3.3.4. All IRA workplans shall ensure that the IRAs are designed to mitigate current or potential threats to human health or the environment, and shall, to the extent practicable, be consistent with the objectives of, and contribute to the performance of, all final remedies that may be required at the Site.

3.3.5. Concurrent with the submission of an IRA workplan, Respondents shall submit to DTSC for approval a corresponding Health and Safety Plan.

3.4. Remedial Investigation (RI).

3.4.1. The Parties acknowledge that significant investigation and analysis has occurred during the corrective action investigation that will be used during completion of the RI/FS. DTSC has reviewed the following work plan-related documents associated with the RCRA Facility Investigation (RFI) and, except to the extent that such documents require amendments or addenda to comply with Health and Safety Code section 25359.20, documents may be used by Respondents in their development of the RI/FS for each OU:

a) Current Conditions Report and Draft RCRA Facility Investigation Work Plan, Areas I and III, Santa Susana Field Laboratory, Ventura County, California (ICF Kaiser Engineers, October 1993).

b) Current Conditions Report and Draft RCRA Facility Investigation Work Plan, Area II and Area I LOX Plant, Santa Susana Field Laboratory, Ventura County, California (ICF Kaiser Engineers, October 1993).

c) Current Conditions Report and Draft RCRA Facility Investigation Work Plan, Area IV, Santa Susana Field Laboratory, Ventura County, California (ICF Kaiser Engineers, October 1993).

d) Sampling and Analysis Plan, Hazardous Waste Facility Post-Closure Permit PC-94/95-3-02, Area II. Santa Susana Field Laboratory, Rockwell International Corporation, Rocketdyne Division (Groundwater Resources Consultants, Inc., June 1995).

e) Sampling and Analysis Plan, Hazardous Waste Facility Post-Closure Permit PC-94/95-3-03, Areas I and III. Santa Susana Field Laboratory, Rockwell International Corporation, Rocketdyne Division (Groundwater Resources Consultants, Inc., June 1995).

f) RCRA Facility Investigation Work Plan Addendum, Santa Susana Field Laboratory, Ventura County, California (Ogden, September 1996).

g) RCRA Facility Investigation Metals Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, California (Ogden, September 1996).

h) Revised Sodium Reactor Experiment (SRE) RFI Workplan Amendment, Santa Susana Field Laboratory, Ventura County, California (Boeing, December 1998).

i) Ecological Validation Sampling and Analysis Plan, Santa Susana Field Laboratory, Ventura County, California (Ogden, May 2000).

j) RCRA Facility Investigation Work Plan Addendum Amendment, Santa Susana Field Laboratory, Ventura County, California (Ogden, June 2000);

k) RCRA Facility Investigation Shallow Zone Groundwater Investigation Work Plan Final, Santa Susana Field Laboratory, Ventura County, California (Ogden, December 2000).

l) Workplan for Additional Field Investigations, Chatsworth Formation Operable Unit, Santa Susana Field Laboratory, Ventura County, California (Montgomery Watson, October 2000)

m) Workplan for Additional Field Investigations, Former Sodium Disposal Facility, Chatsworth Formation Operable Unit, Santa Susana Field Laboratory, Ventura County, California (Montgomery Watson, June 2000).

n) Work Plan for Additional Field Investigations, Former Sodium Disposal Facility (FSDF), Chatsworth Formation Operable Unit, Santa Susana Field Laboratory, Ventura County, California, Revision 2.2 (Montgomery Watson Harza, December 2001).

o) RCRA Facility Investigation Work Plan Addendum Amendment, Building 56 Landfill (SWMU 7.1) Investigation, Santa Susana Field Laboratory, Ventura County, California (Montgomery Watson Harza, May 2003).

p) Happy Valley Interim Measures Work Plan Addendum Amendment, Happy Valley and Building 359 Areas of Concern, Santa Susana Field Laboratory, Ventura County, California (Montgomery Watson Harza , August 2003).

q) RCRA Facility Investigation Work Plan Addendum, Area I and Area II Landfills Investigation Work Plan, Revised Final, SWMU 4.2 and SWMU 5.1, Santa Susana Field Laboratory, Ventura County, California (Montgomery Watson Harza, October 2003).

r) Perchlorate Characterization Work Plan (Revision 1), Santa Susana Field Laboratory, Ventura County, California (Montgomery Watson Harza, December 2003).

s) RCRA Facility Investigation Program Report, Surficial Media Operable Unit, Santa Susana Field Laboratory, Ventura County, California (Montgomery Watson Harza Inc., July 2004).

t) Proposed Drilling, Construction and Testing of Monitor Wells, Area IV, Santa Susana Field Laboratory, Ventura County, California (Haley & Aldrich, August 2004).

u) RCRA Facility Investigation Work Plan Addendum Amendment, Surface Flux and Ambient Air Monitoring, Former Liquid Oxygen (LOX) Plant Site (SWMUs 4.5 and 4.6), Ventura County, California, Revision 1 (MWH Americas, Inc., February 2005).

v) Standardized Risk Assessment Methodology (SRAM) Work Plan, Santa Susana Field Laboratory, Ventura County, California, Revision 2- Final (MWH Americas, Inc., September 2005).

w) RCRA Facility Investigation Vapor Migration Modeling Validation Study Work Plan, Santa Susana Field Laboratory, Ventura County, California (MWH Americas, Inc., November 2005).

x) Vapor Migration Modeling Validation Study Work Plan Amendment, Santa Susana Field Laboratory, Ventura County, California (Boeing, June 2006).

y) WorkPlan, Phase 2, Groundwater Site Conceptual Model, Santa Susana Field Laboratory, Ventura County, California (MWH Americas, Inc., April 2007)

z) WorkPlan, Phase 3, Groundwater Site Conceptual Model, Santa Susana Field Laboratory, Ventura Count, California (MWH Americas, In., June 2007.

3.4.2. Respondents shall submit to DTSC for approval RI Reports for the Surficial Media OU in accordance with the schedule specified in section 3.2.1 and approved by DTSC. The SSFL has been divided into 11 Surficial Media OU Group Reporting Areas as listed on Attachment 14 and shown on the map in Attachment 15. An Ecologic Large Home Range report shall also be prepared. The RI Reports for the Surficial Media OU and the Ecologic Large Home Range report shall address both COCs and ROCs, and shall be developed in a manner consistent with the approved workplans, workplan amendments, and SRAM (Rev. 3) described in section 3.2.4 of this Order. DTSC shall

review the Surficial Media OU Reports and notify Respondents in writing of DTSC's approval, conditional approval, or disapproval.

3.4.3. The comprehensive Surficial Media OU RI Reports shall summarize the findings from all investigative phases and areas of the SSFL. The Surficial Media OU RI Reports shall include all current and historical assessment data collected to date for the vicinity of the SWMUs and AOCs investigated in the RI program. The nine surface impoundments discussed in section 1.2 of this Order shall also be addressed and included in the Surficial Media OU RI Reports.

3.4.4. Each Respondent shall submit with each Surficial Media OU RI Report historical records and documentation, within its possession and control, of all activities associated with each SWMU and AOC in an electronic format searchable by keyword utilizing a search engine technology with capabilities specified in section 3.4.8. This shall include primary historical records that list or describe any known or suspected chemicals or radionuclides stored, handled or released in the study area. Historical information shall include, but need not be limited to, available photographs, drawings, manifests, memoranda, tabulations, lists and any other records regarding the operations conducted in the reporting areas, and the types and sources of chemicals or radionuclides that may have been handled or released in the reporting areas.

3.4.5. Respondents shall submit in a separate report historical and other documents as described in section 3.4.4 that are not submitted with individual Surficial Media OU RI Reports.

3.4.5.1. If Respondents assert that any document submitted pursuant to section 3.4.4 or 3.4.5 contains confidential business information, Respondents shall comply with the provisions of California Code of Regulations, title 22, section 66260.2 and the specific text on the page that Respondents consider to be confidential shall be identified. Documents containing confidential business information

are to be provided to DTSC only in hard copy. All other historical documents submitted pursuant to sections 3.4.4 and 3.4.5 of this Order are to be submitted in an electronic format with electronic reference list, searchable by key word.

3.4.5.2. Nothing in sections 3.4.4, 3.4.5, or 3.4.5.1 of this Order shall require Respondents to provide to DTSC any documents protected from disclosure by applicable legal protections, including without limitation the attorney-client privilege and the attorney-work product doctrine, or shall prevent Respondents from asserting that such applicable legal protections prevent disclosure.

3.4.6. Respondents shall demonstrate and certify that they have conducted a reasonable search for the documents required in sections 3.4.4 and 3.4.5 and include a signed copy of the Signature and Certification specified in section 4.4.3 of this Order to certify a reasonable search was completed for each Surficial Media OU RI Report.

3.4.7. Reports prepared by the Respondents or their consultants in support of the Surficial Media OU RI shall be submitted in both hard copy and electronically to DTSC. Electronic copies shall be submitted in an electronic format that allows them to be searchable by key word utilizing a search engine technology with capabilities specified in section 3.4.8.

3.4.8. Respondents shall index all investigative reports, workplans, technical memoranda, and supporting historical records specified in section 3.4.4, such that the entire content of all the documents and historical records are searchable, using key words.

3.4.9. Assessment of Potential Debris Areas Contiguous to SSFL - In accordance with the DTSC-approved schedule specified in section 3.2.1 of this Order, Respondents shall prepare and submit a workplan to DTSC for the evaluation of potential debris disposal areas outside the boundaries of the Facility to determine whether there are any locations where wastes associated with

Facility operations may have been disposed. Respondents shall implement the workplan upon DTSC's approval, and the results of the evaluation shall be reported to DTSC. If any wastes from SSFL operations are discovered outside the current boundaries of the Facility, Respondents shall submit workplans for response action with respect to the wastes, and shall implement those workplans within 180 days of approval by DTSC. If DTSC determines that implementation of a workplan for a response action to address such a potential debris area is necessary to control or abate immediate threats to human health or the environment, DTSC shall specify the time frame for workplan implementation in its approval and Respondents shall implement the approved workplan within that specified time frame.

3.4.10. If DTSC determines, based on its evaluation of the Offsite Data Evaluation Report submitted by Respondents on December 13, 2007, that additional work is required, DTSC shall notify Respondents of that work. Respondents shall then propose to DTSC a schedule and scope for further action consistent with any directions given by DTSC.

3.4.11. Respondents shall provide updates to base maps, shape files, and SSFL-related chemical and radiological data for the GIS mapping data base annually until all response actions required under this Order are completed. The first such update shall be submitted within 90 days after the effective date of this Order. Updates thereafter shall be provided to DTSC by January 31 of each year unless DTSC specifies in writing that no updates to the base maps, shape files, and SSFL-related chemical and radiological data for the GIS mapping data base are necessary, may be submitted at a later date, or response action is complete.

3.4.12. Respondents shall prepare a Chemical Background Study Workplan for the collection and analysis of offsite chemical soil and sediment samples, data interpretation and analysis, and

reporting on the study's results according to the workplan's project-specific data quality objectives (DQOs). Respondents shall coordinate preparation of this workplan with U.S. EPA's background survey of radioactive materials. The activities described in the Chemical Background Study Workplan shall be conducted in coordination with and at the direction of DTSC, including collecting the additional soil and sediment samples from offsite locations to be determined through a selection process that adheres to the DQOs. The new chemical background study shall supplement the existing DTSC-approved soil background dataset.

3.4.13. Respondents shall submit to DTSC for approval a draft Sitewide Groundwater Remedial Investigation (RI) Report for the Chatsworth Formation Operable Unit (CFOU) in accordance with Work Plan, Site-Wide Groundwater Characterization, Santa Susana Field Laboratory (CFOU RI Workplan) dated January 2008, as conditionally approved by DTSC on June 2, 2009 and in accordance with the schedule required under section 3.2.1 of this Order. The draft Sitewide Groundwater RI Report shall identify and characterize all sources of contamination, define the nature and extent of contamination in the CFOU, and characterize potential contaminant pathways, rate, and direction of migration. As part of the RI work, the Respondents shall develop a comprehensive Site Conceptual Model (SCM for the flow of Chatsworth Formation groundwater and transport in the vicinity of SSFL. The SCM shall be used to assist in the evaluation of the current and future transport and fate of contaminants. Respondents shall submit to DTSC a draft Sitewide Groundwater RI Report that shall contain a complete and comprehensive evaluation of all groundwater data collected from the Site.

The draft Sitewide Groundwater RI Report shall, at a minimum:

(a) Define the nature and extent of all contaminant releases in the entire groundwater system at the Site, including occurrences in the soil, weathered bedrock, and unweathered bedrock and occurrences in the unsaturated unweathered bedrock.

(b) Fully characterize the fracture network at the Site including the variability across the Site, near faults, and within different rock types (i.e. sandstones, siltstones, and shales) and within different geologic members of the Chatsworth Formation (e.g., Bowl Member and Canyon Member).

(c) Characterize lateral and vertical groundwater flow at the Site.

(d) Assess the effects of the individual faults at the Site on groundwater flow and contaminant movement.

(e) Adequately evaluate the groundwater quality at known seeps and springs.

3.4.13.2. The draft Sitewide Groundwater RI Report shall identify and address the uncertainties associated with all factors affecting groundwater flow and contaminant movement including, but not limited to, the following:

(1) groundwater recharge;

(2) bulk hydraulic conductivity;

(3) measurements of flows taken from seeps and springs and measurements of transpiration from phreatophytes;

(4) the degree of contaminant diffusion versus the effects of dispersion, adsorption, dilution, and degradation on retarding the movement of contaminants; and

(5) the effect of the historical groundwater pumping so that the effects of other natural retardation processes can be assessed and the future movement of the contaminant plumes predicted.

As part of the draft Sitewide Groundwater RI Report, Respondents shall address identified data gaps by inclusion of a Sampling and Analysis Plan (SAP) for additional field data collection. Respondents shall implement the SAP in accordance with the approved schedule and shall submit the results in a final Sitewide Groundwater RI Report for DTSC's review and approval.

3.4.14. Respondents NASA shall record, or cause to have recorded, a prohibition, to run with the land, on the use of the groundwater underlying the Facility for all purposes including, but not limited to, domestic, residential and agricultural uses such as drinking, bathing, showering, food preparation, plant irrigation, and cleaning.

3.5. Feasibility Study (FS)

3.5.1. Respondents shall prepare and submit FS workplans to DTSC for the Surficial Media OU and Chatsworth Formation OU (including both groundwater and the unsaturated zone) in accordance with the schedule specified in section 3.2.1 of this Order. The FS workplans for the Surficial Media OU and Chatsworth Formation OU (including both groundwater and the unsaturated zone) are subject to approval by DTSC and shall be developed in a manner consistent with Health and Safety Code Chapter 6.8.

3.5.2. The FS workplans shall detail the methodology for developing and evaluating potential response action measures to remedy chemical and radionuclide contamination at the Site utilizing the SRAM (Rev. 3). The FS Workplan shall identify the potential response action measures, including any innovative technologies that may be used for the containment, treatment, remediation, or disposal of contamination. Potential groundwater response action measures shall evaluate all state-of-the-art remedial technologies including but not limited to the following: TCE oxidation using potassium- or sodium-permanganate; nanoscale zero-valent iron particle technology; radio frequency

heating; blast-fractured enhanced permeability remediation; steam injection; and enhanced bioremediation. In evaluating response actions involving excavation and offsite disposal, Respondents shall evaluate whether the import fill results in equal or greater risk than in situ soils using risk assessment methodologies approved by DTSC for the Site. Respondents shall expend all reasonable efforts to identify clean import fill alternatives.

3.5.3. Respondents shall complete treatability studies for the viable potential response action technologies that involve treatment except where Respondents can demonstrate to DTSC's satisfaction that treatability studies are not needed. The FS workplans shall include, at a minimum, a summary of the proposed treatability studies including conceptual designs, a schedule for submitting treatability study workplans, or Respondents' justifications for not proposing treatability studies.

3.5.4. Respondents shall submit FS Reports to DTSC for approval in accordance with the DTSC-approved FS workplan schedule. Within 30 days, DTSC shall review the FS reports and notify Respondents in writing of DTSC's approval or disapproval. If DTSC disapproves of the FS reports in whole or in part, it shall explain in writing the reason(s) for its disapproval. The FS reports shall summarize the results of the FS including the following:

(a) documentation of all treatability studies conducted;

(b) development of OU-specific response action objectives, including legal requirements and other promulgated standards that are relevant;

(c) identification and screening of general response actions, response technologies, and process options on an OU specific basis;

(d) evaluation of alternatives based on the criteria contained in the NCP, 40 C.F.R. Part 300 including:

Threshold Criteria:

(1) overall protection of human health and the environment;

(2) compliance with legal requirements and other promulgated standards that are Relevant;

Primary Balancing Criteria:

(1) long-term effectiveness and permanence;

(2) reduction of toxicity, mobility, or volume through treatment;

(3) short-term effectiveness;

(4) implementability;

(5) cost;

Modifying Criteria:

(1) State acceptance;

(2) community acceptance;

(e) the response action criteria specified in Health and Safety Code sections 25356.1 and 25356.1.5.

3.5.4.1. If the use of imported fill as part of a response action involving excavation would result in risks at the Site exceeding the final cleanup levels, Respondents shall propose and DTSC shall consider feasible alternatives identified through the application of the NCP criteria outlined in section 3.5.4.

3.5.5. Impact on Resources. DTSC agrees that specific factors it will consider in its evaluation of the work required to be performed by Respondents under this Order may include, and not be limited to the following: (1) emissions footprint (determined by a quantitative analysis of emissions

from heavy equipment operation, transportation and offsite disposal); (2) natural capacity conservation and restoration (determined by a quantitative analysis for habitat preservation and restoration, biomass balance, biodiversity, local and regional watershed impacts, contaminant reduction and overall ecosystem impacts from excavation); and (3) resource conservation and usage (determined by an assessment of major resource requirements and potential natural resource impacts from heavy equipment operation, transportation and offsite disposal). In preparing and reviewing any FS report, Respondents and DTSC respectively shall further examine the net benefit associated with any remedies under consideration as supporting information for the evaluation criteria outlined in section 3.5.4, including 1999 U.S. EPA OSWER Directive 92857-28P and EPA 542-R-08-002 Green Remediation; Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites (EPA 542/R-08/002, April 2008).

3.6. Remedy Selection.

3.6.1. Respondents shall prepare a draft Response Action Plan (RAP). The draft RAP shall be consistent with the NCP and Health and Safety Code sections 25356.1 and 25356.1.5. The draft RAP shall be based on and summarize the approved RI/FS reports, and shall clearly set forth:

(a) health and safety risks posed by the conditions at the Site;

(b) the effect of contamination or pollution levels upon present, future, and probable beneficial uses of contaminated, polluted, or threatened resources;

(c) the effect of alternative response action measures on the reasonable availability of groundwater resources for present, future, and probable beneficial uses;

(d) site-specific characteristics, including the potential for offsite migration of hazardous substances, the surface or subsurface soil, and the hydrogeologic conditions, as well as preexisting background contamination levels;

(e) cost-effectiveness of alternative response action measures. Land disposal shall not be deemed the most cost-effective measure merely on the basis of lower short-term cost;

(f) the potential environmental impacts of alternative response action measures;

(g) a statement of reasons setting forth the basis for the response actions selected. The statement shall include an evaluation of each proposed alternative submitted and evaluate the consistency of the response actions proposed by the plan with the NCP; and

(h) a schedule for implementation of all proposed response actions.

The selection of the remedy from the potential response alternatives established during the FS shall consider: (1) overall protection of human health and the environment; and (2) the impact of the remedy on resources values including emission footprint, natural capacity conservation and restoration, and resource conservation and use. Following DTSC's review, DTSC shall specify any changes to be made in the RAP. The entire review of the RAP, including public review and comment, shall be completed in accordance with the DTSC-approved schedule specified in section 3.2.1 of this Order.

3.6.2. Following the public comment period, DTSC shall approve the final RAP or identify issues or provide comments to be added by Respondents to the RAP.

3.6.3. DTSC shall notify Respondents of the final response action(s) selected by DTSC in its approval of the final RAP. The RAP shall include DTSC's reasons for selecting the response action(s). In selecting any final response action, DTSC shall apply the NCP evaluation criteria

outlined in section 3.5.4 (and specified in 40 CFR section 300.400 et seq. and incorporated by reference in Health and Safety Code section 25356.1) and the requirements specified in Health and Safety Code section 25356.1.5 (a). DTSC's selection of the final response action(s) in its approval of the final RAP shall not be subject to the dispute resolution procedures of sections 4.20.1 through 4.20.6 but rather Health and Safety Code section 25356.1(g).

3.7. CEQA. Respondents shall provide all information necessary to facilitate DTSC's preparation of a CEQA analysis, including a Site-wide Environmental Impact Report (EIR).

3.8. Remedial Design/Response Action Implementation Workplan (RD/RA Work plan) .

3.8.1. In accordance with the DTSC-approved schedule specified in section 3.2.1 of this Order, Respondents shall submit to DTSC a RD/RA workplan for the Surficial Medial OU and the Chatsworth Formation OU. The RD/RA workplan is the plan and schedule to design, construct, operate, maintain, and monitor the performance of the response action(s) selected in the final RAP. The RD/RA workplan is subject to approval by DTSC. If DTSC disapproves of the RD/RA workplan in whole or in part, it shall explain in writing the reasoning for its disapproval. The RD/RA workplan shall include the schedule for submittal to DTSC of the following documents:

1. Health and Safety Plan
2. Draft Plans and Specifications
3. Final Plans and Specifications
4. Construction workplan
5. Construction Completion Report
6. Operation and Maintenance Plan; and
7. Final Completion Report

3.8.2 The Operation and Maintenance Plan shall include documentation required to establish a financial assurance mechanism for operation and maintenance of the response action(s). Respondents shall include a detailed cost estimate for implementation of the operation and maintenance of the response action(s) for DTSC review and approval. The financial assurance mechanism(s) must be approved by DTSC as part of the final Operations and Maintenance Plan approval. The financial assurance mechanisms may include any mechanism described in Health and Safety Code section 25355.2. The purpose of establishing a financial assurance mechanism is to demonstrate that Boeing is financially capable of implementing the operations and maintenance of the response action(s) and to enable DTSC to undertake implementation of the operations and maintenance of the response action(s) in the event that Respondents are unable or unwilling to undertake the required actions. Boeing shall annually adjust the mechanism(s) for inflation in accordance with California Code of Regulations, title 22, sections 66264.142 or 66265.142, as those sections apply to owners and operators of facilities and sites subject to Health and Safety Code section 25355.2.

3.9. Land Use Covenants. A land use covenant shall be executed and recorded if limitations or restrictions are to be placed on any portion of the Site because residual hazardous materials, hazardous wastes or constituents, or hazardous substances remain at the property or in the groundwater at levels which are not suitable for unrestricted use of the land. If the approved remedy in the Final RAP includes deed restrictions, Boeing and NASA shall record, or cause to have recorded, the appropriate deed restrictions. Use of Land Use Covenants or any other institutional controls that prohibit use of groundwater shall not constitute a remedy or sole justification for a remedy, or prevent the transfer of land under Health and Safety Code section 25359.20(d).

3.10. Site Access. Recognizing the open nature of the Site, Respondents shall maintain reasonable precautions to restrict the possibility of unknowing or unauthorized entry of persons or livestock onto the Site.

3.11. Public participation activities shall be conducted in accordance with Health and Safety Code sections 25356.1 and 25358.7. DTSC issued a final Public Participation Plan (PPP) for the SSFL on March 27, 2009. DTSC may periodically update the PPP in consultation with Respondents and the public.

OTHER REQUIREMENTS AND PROVISIONS

4.1. Project Director. Within 14 days of the effective date of this Order, the Respondents shall each designate a Project Coordinator and shall notify DTSC in writing of the Project Directors selected. Each Project Director shall be responsible for overseeing the implementation of this Order and for designating a person to act in his/her absence. All communications between Respondents and DTSC, and all documents, report approvals, and other correspondence concerning the activities performed pursuant to this Order shall be directed through their respective Project Directors. Each party may change its Project Director with at least seven days prior written notice to the other parties.

4.2. Web Site. Respondents shall establish and maintain a web-based site which shall be used for posting of documents and information related to the investigation and cleanup of the SSFL. The content of the website shall be solely under the control of DTSC. No changes to the website shall be made without prior DTSC approval.

4.3. DTSC Approval.

4.3.1. Subject to the dispute resolution procedures in sections 4.20.1 through 4.20.6, Respondents shall revise any workplan, report, specification, or schedule in accordance with DTSC's written comments. Respondents shall submit to DTSC any revised documents by the due date specified by DTSC. Revised submittals are subject to DTSC's written approval or disapproval. If DTSC disapproves of any submittal in whole or in part, it shall explain in writing the reason(s) for its disapproval.

4.3.2. Upon receipt of DTSC's written approval, Respondents shall commence work and implement any approved workplan in accordance with the schedule and provisions contained therein.

4.3.3. Any DTSC approved workplan, report, specification, or schedule required by this Order shall be deemed incorporated into this Order.

4.3.4. Any requests for revision of an approved workplan requirement must be in writing. Such requests must be timely and provide justification for any proposed workplan revision. DTSC shall approve such proposed revisions absent good cause not to do so. Any approved workplan modification shall be in writing and shall be incorporated by reference into this Order.

4.3.5. Verbal advice, suggestions, or comments given by DTSC representatives shall not constitute an official approval or disapproval.

4.4. Submittals.

4.4.1. Respondents shall continue to provide DTSC with quarterly progress reports of response action activities conducted pursuant to this Order, in conjunction with the Hazardous Waste Facility Post Closure Progress Reports, on or before the last day of the month in August, November, February, and May.

4.4.2. Any report or other document submitted by each Respondent pertaining to its activities at the Site pursuant to this Order shall be signed and certified by a responsible corporate officer, or a duly authorized representative.

4.4.3. Certification

The certification required above, shall be in the following form:

> I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

4.4.4. Except as provided in section 3.4.5.1, all reports and other documents submitted by the Respondents or their consultants in response to this Order shall be submitted in both hard copy and electronically to DTSC as further described herein. Electronic copies of reports, workplans, technical memoranda, and other documents shall be submitted to DTSC in a format that allows them to be searchable by key word, in accordance with section 3.4.8. Respondents shall provide four hard copies and 12 electronic copies of all documents, including but not limited to, workplans, reports, and correspondence of 15 pages or longer to DTSC's Regional office in Sacramento, two hard copies and two electronic copies to DTSC's Regional office in Cypress, one electronic copy to the consultant or contractor who maintains the website specified in section 4.2.1 of this Order, and one hard copy and one electronic copy to DTSC's Administrative File for SSFL (currently DTSC's Regional Office located in Chatsworth). The number of hard copies required for submittal to DTSC's offices may be modified upon agreement between DTSC and Respondents. Progress reports and correspondence of less than 15 pages are specifically exempted from this copy requirement, and only one copy is required. If

progress reports or correspondence contain attachments larger than 8.5 x 11 inches in size, then each submittal must be accompanied by an electronic copy. For documents with very large files size (e.g., the historical documents for the RFI Group Reports) which cannot easily fit onto DVDs, the Respondents may, with prior DTSC approval, submit such documents electronically on hard drives in lieu of the four hard copies and 12 electronic copies specified above. DTSC may designate that additional hard copies or electronic copies (or both) be provided simultaneously to designated repositories. If Respondents assert that any document to be submitted may contain confidential business information, Respondents shall comply with the provisions of California Code of Regulations, title 22, section 66260.2 and the specific text on the page that Respondents consider to be confidential shall be identified. Documents containing confidential business information are to be submitted in hard copy to DTSC.

4.4.5. Unless otherwise specified, all reports, correspondence, approvals, disapprovals, notices, or other submissions relating to this Order shall be in writing and shall be sent to the current Project Directors.

4.5. Proposed Contractor/Consultant.

All work performed by Respondents pursuant to this Order shall be under the direction and supervision of a professional engineer or registered geologist, registered in California, with expertise in hazardous substance site cleanup. Respondents' contractors and consultants shall have the technical expertise sufficient to fulfill their responsibilities. Within 14 days of the effective date of this Order or any contract awarded to implement this Order, Respondents shall notify the DTSC Project Director in writing of the name, title, and qualifications of the professional engineer or registered geologist and of any contractors or consultants and their personnel to be used in carrying out the

requirements of this Order. Notifications submitted prior to the effective date of this Order in response to section 4.5 of the August 16, 2007 Consent Order for Corrective Action need to be resubmitted only if the information contained in the notification has changed.

4.6. Quality Assurance.

4.6.1. All sampling and analyses performed by Respondents under this Order shall follow applicable DTSC and U.S. EPA guidance for sampling and analyses. Workplans shall contain quality assurance/quality control and chain of custody procedures for all sampling, monitoring, and analytical activities. Any deviations from the approved workplans must be approved by DTSC prior to implementation, must be documented, including reasons for the deviations, and must be reported in the affected report. Each workplan submitted shall include:

(1) Project organization and responsibilities with respect to sampling and analysis;

(2) Quality assurance objectives for measurement including accuracy, precision, and method detection limits. In selecting analytical methods, Respondents shall consider obtaining detection limits at or below potentially applicable legal requirements or relevant and appropriate standards, such as Maximum Contaminant Levels (MCLs) or Maximum Contaminant Level Goals (MCLGs);

(3) Sampling procedures;

(4) Sample custody procedures and documentation;

(5) Field and laboratory calibration procedures;

(6) Analytical procedures;

(7) Laboratory to be used certified pursuant to Health and Safety Code section 25198;

(8) Specific routine procedures used to assess data (precision, accuracy and completeness) and response actions;

(9) Reporting procedure for measurement of system performance and data quality;

(10) Data management, data reduction, validation and reporting. Information shall be accessible to downloading into DTSC's system; and

(11) Internal quality control.

4.6.2. Except as provided below, Respondents shall use California State-certified analytical laboratories for all chemical and radiological analyses required to comply with this Order. If a California State-certified laboratory is not available for a particular test required by this Order, Respondents shall use an alternative laboratory identified by Respondents subject to approval by DTSC. The names, addresses, telephone numbers, and California Department of Public Health, Environmental Laboratory Accreditation Program (ELAP) certification numbers of the laboratories Respondents propose to use must be specified in the applicable workplans.

4.6.3. All workplans required under this Order shall include data quality objectives for each data collection activity to ensure that data of known and appropriate quality are obtained and that data are sufficient to support their intended uses.

4.6.4. Respondents shall monitor to ensure that high quality data are obtained by their consultants and contract laboratories. Respondents shall ensure that laboratories used by Respondents for chemical analyses perform such analyses according to the latest approved edition of "Test Methods for Evaluating Solid Waste, (SW 846)," or other methods deemed satisfactory to DTSC. If methods other than U.S. EPA methods are to be used, Respondents shall specify all such protocols in the affected workplan (e.g., RI workplan). DTSC shall reject any chemical data that do

not meet the requirements of the approved workplan, U.S. EPA analytical methods, or quality assurance/quality control procedures, and may require resampling and analysis. Respondents shall ensure that laboratories used by Respondents for radiological analyses perform such analyses according to the latest approved edition of "HASL-300, EML Procedures Manual" or other methods deemed satisfactory to DTSC. If methods other than HASL-300 methods are to be used, Respondents shall specify all such protocols in the affected workplan (e.g., RI workplan). DTSC shall reject any radiological data that do not meet the requirements of the approved workplan, HASL-300 methods, or quality assurance/quality control procedures, and may require resampling and analysis.

4.6.5. Respondents shall ensure that the laboratories used by Respondents for analyses have quality assurance/quality control programs. DTSC may conduct a performance and quality assurance/quality control audit of the laboratories chosen by Respondents before, during, or after sample analyses. Upon request by DTSC, Respondents shall have their selected laboratory perform analyses of samples provided by DTSC to demonstrate laboratory performance. If the audit reveals deficiencies in a laboratory's performance or quality assurance/quality control procedures, resampling and analysis may be required.

4.7. Sampling and Data/Document Availability.

4.7.1. Respondents shall submit to DTSC upon request the results of all sampling or tests or other data generated by its employees, agents, consultants, or contractors pursuant to this Order. Respondents shall follow the same signature and certification requirements of sections 4.4.2 and 4.4.3 above for information submitted pursuant to this section.

4.7.2. Notwithstanding any other provisions of this Order, DTSC retains all of its information gathering and inspection authority and rights, including enforcement actions related thereto, under the

Health and Safety Code, and any other State or federal law, subject to national security and other restrictions imposed under the Atomic Energy Act of 1954, as amended, applicable executive orders or any other applicable requirements.

4.7.3. Respondents shall notify DTSC in writing at least seven days prior to beginning each separate phase of field work approved under any workplan required by this Order. If Respondents believe they must commence emergency field activities without delay, Respondents shall seek emergency telephone authorization from the DTSC Project Director or, if the Project Director is unavailable, his/her designee, to commence such activities immediately.

4.7.4. At the request of DTSC, Respondents shall provide or allow DTSC or its authorized representative to take split or duplicate samples of all samples collected by Respondents pursuant to this Order. Similarly, at the request of Respondents, DTSC shall allow Respondents or their authorized representative(s) to take split or duplicate samples of all samples collected by DTSC under this Order.

4.8. Access.

4.8.1. Subject to the Respondents' security and safety procedures, and except as provided in section 4.7.2 of this Order, Respondents shall provide DTSC and its representatives access at all reasonable times, following normal procedures for access onto any property under each Respondent's control to which access is required for implementation of this Order and shall permit such persons to inspect and copy all non-privileged records, files, photographs, documents, including all sampling and monitoring data, that pertain to the investigation and remediation of the Site and that are within the possession or under the control of Respondents or their contractors or consultants.

4.8.2. To the extent that work being performed pursuant to this Order must be conducted beyond the Facility boundary, Respondents shall use their best efforts to obtain access agreements necessary to complete work required by this Order from the present owners or possessors, as appropriate, of such property within 30 days of approval of any workplan for which access is required. "Best efforts" as used in this paragraph shall include, at a minimum, a letter by certified mail from the Respondents to the present owners or possessors of such property requesting an agreement to permit Respondents and DTSC and their authorized representatives access to such property. Respondents shall provide DTSC's Project Director with a copy of any access agreements in their possession. In the event that an agreement for access is not obtained within 30 days of approval of any workplan for which access is required, an unanticipated need for access becomes known to Respondents, or access is revoked by the property owner or possessor, Respondents shall notify DTSC in writing within 14 days thereafter regarding both the efforts undertaken to obtain access and the failure to obtain such agreements. DTSC may, at its discretion, assist Respondents in obtaining access.

4.8.3. Nothing in this section limits or otherwise affects DTSC's right of access and entry pursuant to any applicable State or federal law or regulation.

4.8.4. Nothing in this Order shall be construed to limit or otherwise affect Respondents' liability and obligation to perform response action including such action beyond the Facility boundary.

4.9. Record Preservation.

4.9.1. Respondents shall retain, during the implementation of this Order and for a minimum of ten years after the Acknowledgement of Satisfaction executed pursuant to section 6.0 of this Order, all data, records, and documents that relate to implementation of this Order or to hazardous

substance management or disposal. Respondents shall notify DTSC in writing 90 days prior to the destruction of any such records, and shall provide DTSC with the opportunity to take possession of any such records. Such written notification shall reference the effective date, caption, and docket number of this Order and shall be addressed to:

(insert name of designated Project Director)
SSFL Project Director
Department of Toxic Substances Control
P.O. Box 806
Sacramento, California 95812-0806

4.9.2. If Respondents retain or employ any agent, consultant, or contractor for the purpose of complying with the requirements of this Order, Respondents shall require any such agents, consultants, or contractors to provide Respondents a copy of all documents produced pursuant to this Order.

4.9.3. All documents pertaining to this Order shall be stored in a manner to afford ease of access by DTSC and its representatives.

4.10. Change in Ownership. No change in ownership or corporate or partnership status relating to the Facility shall in any way alter Respondents' responsibility under this Order. No conveyance of title, easement, or other interest in the Facility, or a portion of the Facility, shall affect Respondents' obligations under this Order. Unless DTSC agrees that such obligations may be transferred to a third party, Respondents shall be responsible for and liable for any failure to carry out all activities required of Respondents by the terms and conditions of this Order, regardless of Respondents' use of employees, agents, contractors, or consultants to perform any such tasks.

4.11. Notice to Contractors and Successors. Respondents shall provide a copy of this Order to all contractors, laboratories, and consultants retained to conduct or monitor any portion of the work

performed pursuant to this Order and shall condition all such contracts on compliance with the terms of this Order. Each Respondent shall give written notice of this Order to any successor in interest prior to transfer of ownership or operation of any portion of the Facility that the Respondents own or operate and shall notify DTSC at least 30 days prior to such transfer. Respondents or their contractors shall provide written notice of this Order to all subcontractors hired to perform any portion of the work required by the Order. Respondents shall nonetheless be responsible, to the extent reasonably within their control, for ensuring that their contractors and subcontractors perform the work contemplated herein in accordance with this Order. With regard to the activities undertaken pursuant to this Order, the defenses available to Respondents shall be those specified in Health and Safety Code section 25323.5 (incorporating by reference Sections 101(35) and 107(b) of CERCLA, 42 U.S.C., section 9601(35) and 9607(b).

4.12. Compliance with Applicable Laws and Regulations. All actions taken pursuant to this Order by any of the Parties shall be undertaken in accordance with applicable local, State, and federal laws and regulations. Respondents shall obtain or cause their representatives to obtain all permits and approvals necessary under such applicable laws and regulations.

4.13. Costs. Respondents are liable for all costs associated with the implementation of this Order, including all costs incurred by DTSC in overseeing the work required by this Order, in accordance with Health and Safety Code sections 25269 through 25269.6, including procedures for dispute resolution. DTSC shall retain all cost records associated with the work performed under this Order as required by State law. DTSC shall make all documents which support the DTSC's cost determination available for inspection upon request, as provided by the Public Records Act.

4.14. Endangerment During Implementation. In the event that DTSC determines that any circumstances or activities (whether or not pursued in compliance with this Order) are creating an imminent and substantial endangerment to the health or welfare of people at the Site or in the surrounding area or to the environment, DTSC may order Respondents to stop further implementation of this Order for such period of time as needed to abate the endangerment. Any deadline in this Order directly affected by an Order to Stop Work under this section shall be extended for the term of the Order to Stop Work.

4.15. Liability. Nothing in this Order shall constitute or be construed as a satisfaction or release from liability for any conditions or claims arising as a result of past, current, or future operations of Respondents. Notwithstanding compliance with the terms of this Order, Respondents may be required to take further actions as are necessary to protect public health or welfare or the environment.

4.16. Government Liabilities. The State of California shall not be liable for injuries or damages to persons or property resulting from acts or omissions by Respondents or related parties specified in section 4.20 in carrying out activities pursuant to this Order, nor shall the State of California be held as a party to any contract entered into by Respondents or its agents in carrying out activities pursuant to the Order.

4.16.1. Availability of Federal Funds -- DOE and NASA. It is the expectation of DTSC that the federal agencies under this Order shall seek sufficient funding through the federal budgetary process to fulfill the requirements under this Order. It is agreed that if inadequate funds are appropriated for such purposes, the federal agencies shall notify DTSC immediately and develop a plan in writing to secure additional funding to carry out the requirements of this Order. Nothing in this Order shall be

construed as precluding federal agencies from arguing either that the unavailability of appropriated funds constitutes a force majeure, or that no provisions of this Order shall be interpreted to require the obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. 1301 or 1341. The Parties agree that in any proceeding to enforce the requirements of this Order, federal agencies may raise as a defense that any failure or delay was caused by the unavailability of appropriated funds.

4.17. Reserved.

4.18. Incorporation of Plans and Reports. All plans, schedules, and reports that require DTSC approval and are submitted by Respondents pursuant to this Order and are not the subject of dispute resolution under paragraphs 4.20.1 through 4.20.6 are incorporated in this Order upon approval by DTSC.

4.19. Penalties for Noncompliance.

4.19.1. Respondents shall be liable for stipulated penalties in the amount of $15,000 per day for a material failure to comply with the requirements of this Order, including the making of any false statement or representation in any document submitted for purposes of compliance with this Order. If DTSC can discern that a specific Respondent(s) is responsible for a material failure to comply with the requirements of this Order, DTSC shall proceed only against the responsible Respondent(s) for associated stipulated penalties. “Compliance” by Respondents shall include, but shall not be limited to, completion of the activities under this Order or any workplan or other plan approved under this Order within the specified time schedules established by and approved pursuant to this Order or as otherwise directed by DTSC under this Order.

4.19.2. Following DTSC’s determination that Respondents have materially failed to comply with a requirement of the Order, DTSC shall give Respondents written notification of the violation and

describe the noncompliance. DTSC shall send Respondents a written notice of noncompliance with an opportunity to cure by a date designated by DTSC in lieu of or prior to a written demand for the payment of the penalties. Respondents, individually or collectively, may dispute DTSC's finding of noncompliance by invoking the dispute resolution procedures described in Sections 4.20.1 through 4.20.6 herein. All penalties assessed under section 4.19.1 shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. The accrual and payment of any proposed penalty shall be tolled during the dispute resolution period. If Respondents do not prevail in dispute resolution, any penalty shall be due to DTSC within 30 days of resolution of the dispute unless appealed to a court of law. If Respondents prevail in dispute resolution, no penalty shall be paid.

4.19.3. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Order and other applicable provisions of law, except that the same facts shall not be relied upon to generate separate and cumulative penalties against a single Respondent. Notwithstanding the provisions of section 4.19.1, 4.19.2, or 4.19.3, DTSC reserves the right to seek additional remedies or sanctions for knowing violations of this Order, including knowingly making any false statement or representation in any document submitted for purposes of compliance with this Order

4.20. Dispute Resolution.

4.20.1. The parties agree to use their best efforts to resolve all disputes informally. The parties acknowledge that the two Respondents to this Order each have differing ownership and operational responsibilities for various portions of the Site and the work addressed in this Order.

Each Respondent expressly reserves its right to dispute any finding of noncompliance or written decision, including but not limited to those for which it is not responsible or on which it relies in whole or in part on the actions of another Respondent(s). The parties agree that, except as otherwise specifically provided for by sections 25269.2 and 25269.5 of the Health and Safety Code for cost recovery disputes, and except for an action that challenges in whole or in part the validity, legality, enforceability or constitutionality of Health and Safety Code section 25359.20 (including the resolution of any legal or factual dispute related to or raised in such a challenge, or the determination of which provisions of this Order remain effective following such a challenge (see section 4.27 (Severability)), the procedures contained in this section are the required administrative procedures for resolving disputes arising under this Order. If any Respondent fails to follow the procedures contained in this section, that Respondent shall have waived its rights to further consideration of the disputed issue in any administrative proceeding initiated under this section. Respondents each reserve their respective legal rights to contest or defend against any final decision rendered by DTSC under this Order.

4.20.2. If any Respondent disagrees with any finding of noncompliance or written decision by DTSC pursuant to this Order, such Respondent's Project Director shall orally notify DTSC’s Project Director of the dispute. The Project Directors shall attempt to resolve the dispute informally.

4.20.3. If the Project Directors cannot resolve the dispute informally, the disputing Respondent(s) may pursue the matter by placing an objection in writing. Disputing Respondent's written objection must be forwarded to the DTSC Director or his/her designee, with a copy to the DTSC Project Director. The written objection must be mailed to the DTSC Director or his/her designee within 14 days of the disputing Respondent's receipt of DTSC's finding of noncompliance

or written decision. Disputing Respondent's written objection must set forth the specific points of the dispute and the basis for Respondent's position.

4.20.4. DTSC and the disputing Respondent(s) shall have 14 days from DTSC's receipt of each disputing Respondent's written objection to resolve the dispute through formal discussions. This period may be extended by DTSC for good cause. During such period, Respondent(s) may meet or confer with DTSC to discuss the dispute.

4.20.5. After the discussion period, DTSC shall provide the Respondent(s) with its written decision on the dispute, which shall constitute a final agency decision. DTSC's written decision shall reflect any agreements reached during the formal discussion period and be signed by the DTSC Director or his/her designee.

4.20.6. During the pendency of all dispute resolution procedures set forth in sections 4.20.3 through 4.20.5 of this Order, the time periods for completion of work to be performed under this Order that are affected by such a dispute shall be extended for a period of time not to exceed the actual time taken to resolve the dispute. The existence of such a dispute shall not excuse, toll, or suspend any other compliance obligation or deadline required pursuant to this Order except to the extent that such other compliance obligation or deadline is dependent upon the resolution of the matter which is the subject of such a dispute under this Order, in which case the time periods for completion of such other compliance obligations or deadlines required pursuant to this Order that are affected by such a dispute shall be extended for a period of time not to exceed the actual time taken to resolve the dispute.

4.21. Force Majeure. The Respondents shall cause all work to be performed within the time limits set forth in this Order unless an extension is approved or performance is delayed by events that

constitute an event of force majeure. For purposes of this Order, an event of force majeure is an event arising from circumstances beyond the control of the involved Respondents that delays performance of any obligation under this Agreement, provided the involved Respondents have undertaken all appropriate planning and prevention measures to avoid any foreseeable circumstances. Increases in cost of performing the work specified in this Order shall not be considered circumstances beyond the control of the involved Respondents. For purposes of this Order, events which constitute a force majeure shall include, without limitation, events such as acts of God; war; civil commotion; unusually severe weather; labor difficulties; shortages of labor; materials or equipment; government moratorium; delays in obtaining necessary permits due to action or inaction by third parties; failure to obtain access to non-SSFL properties, provided Respondents comply with section 4.8.2.; and earthquake, fire, flood or other casualty. The involved Respondents shall notify DTSC in writing immediately after the occurrence of the force majeure event. Such notification shall describe the anticipated length of the delay, the cause or causes of the delay, the measures taken and to be taken by the involved Respondents to minimize the delay and the timetable by which these measures shall be implemented. If DTSC does not agree that the delay is attributable to a force majeure event, then the matter may be subject to the dispute resolution procedures set forth in sections 4.20.1 through 4.20.6 of this Order.

4.22. Schedule Changes. If Respondents are unable to perform any activity or submit any document by the date specified in the schedule developed pursuant to section 3.2.1 of this Order due to delays by DTSC in completing its review of or response to submittals by Respondents, upon DTSC's completion of such review of or response to such submittals, the schedule shall be automatically adjusted accordingly, unless DTSC and Respondents agree to an alternative schedule,

and the new schedule shall be incorporated by reference into this Order. In such event, the provisions of section 4.19 Penalties for Noncompliance shall not apply to Respondents' inability to perform any activity or submit any document under the original schedule; however, section 4.19 Penalties for Noncompliance shall apply to the new schedule unless the schedule is revised pursuant this section 4.22 or Section 4.23.

4.23. Extension Requests. If Respondents are unable to perform any activity or submit any document within the time required under the schedule developed pursuant to section 3.2.1 of this Order, Respondents shall, prior to expiration of the time, request an extension of the time in writing. The extension request shall include a justification for the delay and the proposed new Schedule. All such requests shall be in advance of the date on which the activity or document is due. If DTSC determines that good cause exists for an extension, it shall grant the request and specify a new schedule in writing. "Good cause" shall include delays by DTSC in completing its review of and response to submittals by Respondents to the extent that future deadlines are impacted as specified in the schedule. Respondents shall comply with the new schedule specified by DTSC, which shall be incorporated by reference into this Order.

4.24. Parties Bound. This Order shall apply to and be binding upon Respondents, and their officers, directors, agents, employees, contractors, consultants, receivers, trustees, successors, and assignees, including but not limited to individuals, partners, and subsidiary and parent corporations.

4.25. Compliance with Waste Discharge Requirements. Respondents shall comply with all applicable waste discharge requirements and other Orders issued by the State Water Resources Control Board or a California Regional Water Quality Control Board.

4.26. Time Periods. Unless otherwise specified, time periods begin from the effective date of this Order and "days" means calendar days. In computing any period of time under this Order, where the last day would fall on a Saturday, Sunday or federal or State holiday, the period shall run until the next business day.

4.27. Severability. The requirements of this Order are severable. Should a provision or provisions of this Order be determined by a court to be ineffective, or should a court determine that any federal or State law or regulation incorporated into, referenced in, or authorizing this Order is invalid or unenforceable in whole or in part, Respondents shall comply with each and every remaining effective provision.

MODIFICATION

5. 0. This Order may be modified by the mutual agreement of the parties. Any agreed modifications shall be in writing, shall be signed by all Parties, shall have as their effective date the date on which they are signed by DTSC, and shall be deemed incorporated into this Order.

TERMINATION AND SATISFACTION

6. 0. The provisions of this Order shall be deemed satisfied upon the execution by the parties of an Acknowledgment of Satisfaction (Acknowledgment). DTSC shall prepare the Acknowledgment for Respondents' signatories. The Acknowledgment shall specify that Respondents have demonstrated to the satisfaction of DTSC that the terms of this Order including payment of DTSC's costs have been satisfactorily completed. The Acknowledgment shall affirm Respondents' continuing obligation to preserve all records after the rest of the Order is satisfactorily completed.

EFFECTIVE DATE

7. 0. The effective date of this Order shall be the date on which the Order is signed by DTSC.

NO THIRD PARTY BENEFICIARY

8. 0. The Parties to this Order agree that there are no third party beneficiaries to any of the terms and conditions contained in, or rights and obligations arising out of, this Order.

PREVIOUS ORDER SUPERSEDED

9.0. This Order shall supersede the Consent Order for Corrective Action (P3-07/08-003) entered into by Respondents and DTSC on August 16, 2007.

SIGNATORIES

10.0. Each undersigned representative of the Parties to this Order certifies that he or she is fully authorized to enter into the terms and conditions of this Order and to execute and legally bind the Parties to this Order.

DATE: _____ _____

Maziar Movassaghi
Director
Department of Toxic Substances Control

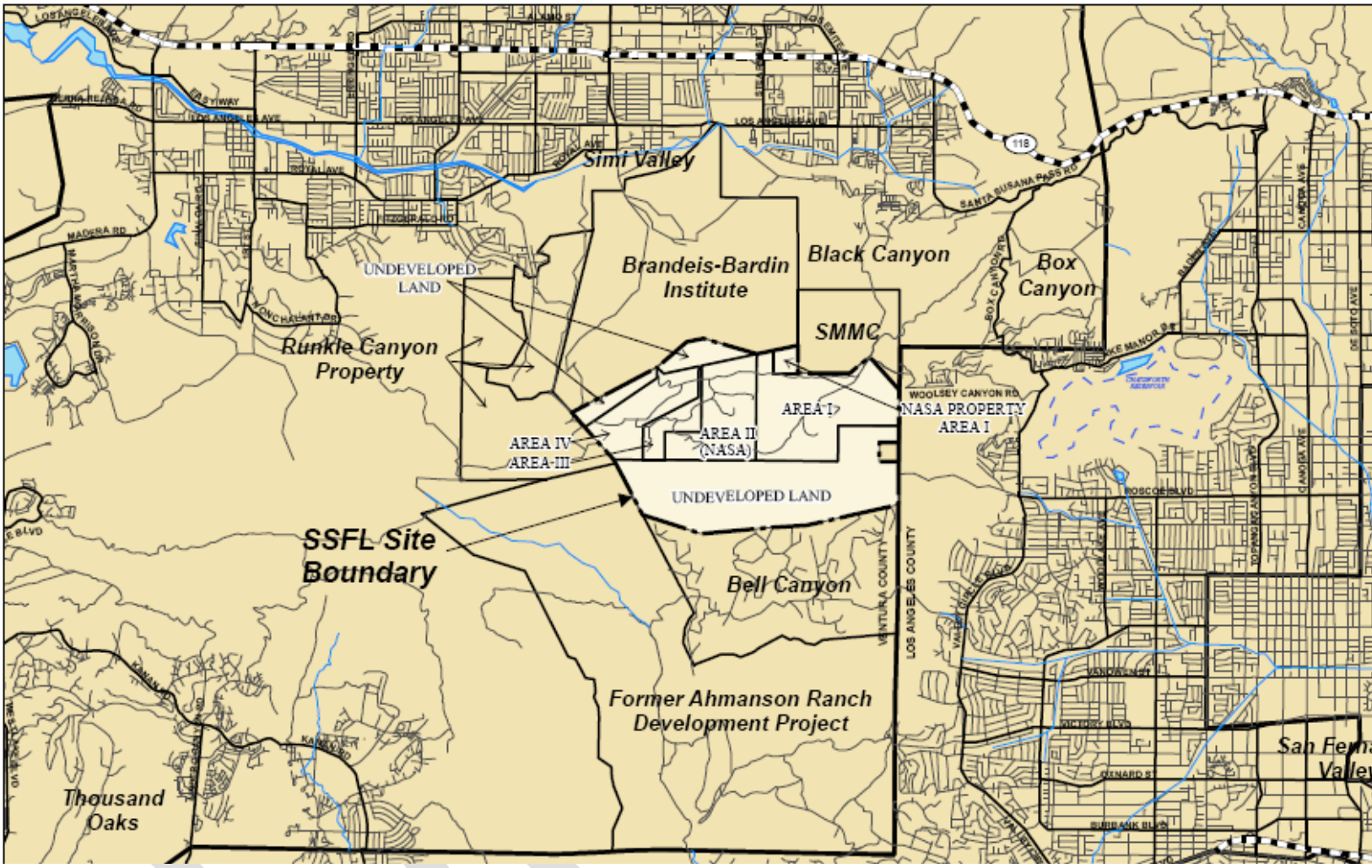
DATE: _____ _____

Cynthia V. Anderson
Deputy Chief Operations Officer
Office of Environmental Management
U.S. Department of Energy

DATE: _____ _____

Robert M. Lightfoot
Acting Director
Marshall Space Flight Center
National Aeronautics and Space Administration

ATTACHMENT 1
Santa Susana Field Laboratory
Regional Map



ATTACHMENT 2 – SSFL PERMITS AND INTERIM STATUS AUTHORIZATIONS

SSFL AREA	RCRA PERMIT	PERMIT TYPE	PERMITTED UNITS	OWNER / OPERATOR	STATUS	CURRENT ACTIVITY
I	**Interim Status Document** (CAD093365435)	T / S	Thermal Treatment Facility (TTF) OB/OD unit	Boeing	ISD & Facility Inactive, Undergoing Closure	Evaluating cleanup and Closure Plan
I & III	**Post-Closure Hazardous Waste Facility Permit** (CAD093365435)	T / S / D	5 surface impoundments - Advanced Propulsion Test Facility 1 (APTF-1) - Advanced Propulsion Test Facility 2 (APTF-2 - Systems Test Laboratory-IV 1 (STL-IV-1) - Systems Test Laboratory-IV 2 (STL-IV-2) - Engineering Chemistry Laboratory Pond 5 Groundwater Treatment Units (GWTU) and associated Air Stripping Towers (ASTs) - Alfa Test Area GWTU & ASTs - Canyon Area GWTU & ASTs - Area 1 Road Bowl Area GWTU & ASTs - STV-IV GWTU & ASTs - WS-5 Area GWTU UV/Peroxidation Unit	Boeing	Active Permit Effective Date: 05/11/1995 Expiration Date: 05/11/2005	Post-closure care of the surface impoundments. Operation and maintenance of the groundwater treatment facility.
II	**Post-Closure Hazardous Waste Facility Permit** (CA1800090010)	T / S / D	4 surface impoundments - Alfa Bravo Skim Pond (ABSP) - Storable Propellants Area Pond 1 (SPA-1) - Storable Propellants Area Pond 2 (SPA-2) - Delta Area Pond (Delta) 3 Groundwater Treatment Units (GWTU) and associated Air Stripping Towers (ASTs) - Bravo GWTU & ASTs - Delta GWTU & ASTs - RD-9 Area GWTU & UV/Peroxidation Unit	NASA / Boeing	Active Permit Effective Date: 05/11/1995 Expiration Date: 05/11/2005	Post-closure care of the surface impoundments. Operation and maintenance of the groundwater treatment facility.
II	**Hazardous Waste Facility Permit** (CA1800090010)	S	Hazardous Waste Container Storage Facility, and PCB Storage Area	NASA / Boeing	Clean Closed	Facility Certified Closed 09/30/1998
IV	**Hazardous Waste Facility Permit** (CAD000629972)	T / S	Hazardous Waste Management Unit (HWMF): - Building 133 (sodium treatment facility) - Building 29 (sodium storage facility)	DOE/ Boeing	Permit Active, Facility Inactive, Undergoing Closure Effective Date: 11/30/1993 Expiration Date: 11/30/2003	Closure Plan Approved
IV	**Interim Status Document** (CA6890090001)	T / S	Radioactive Materials Handling Facility (RMHF): -Bldg 4022 Mixed Waste Storage -Bldg 4021 Mixed Waste Treatment -Bldg 4621 Mixed Waste Storage	DOE / Boeing	ISD Active	Closure Plan on hold

TYPE: T = treatment, S = storage, D = disposal
OB/OD = Open Burn / Open Detonation
ISD = Interim Status Document

Boeing = The Boeing Company,
NASA = National Aeronautics and Space Administration
DOE = U.S. Department of Energy

ATTACHMENT 3
SSFL SURFACE IMPOUNDMENTS

Areas I & III

Advanced Propulsion Test Facility 1, (APTF-1)

Advanced Propulsion Test Facility 2, (APTF-2)

Systems Test Laboratory-IV 1, (STL-IV-1)

Systems Test Laboratory-IV 2, (STL-IV-2)

Engineering Chemistry Laboratory Pond, (ECL)

Area II

ALFA Bravo Skim Pond (ABSP)

Storable Propellants Area Pond 1 (SPA-1)

Storable Propellants Area Pond 2 (SPA-2)

Delta Area Pond (Delta).

==

ATTACHMENT 4
SOLID WASTE MANAGEMENT UNITS (SWMUs) and AREAS OF CONCERNS (AOCs)

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
AREA I						
4.5	LOX Plant Waste Oil Sump and Clarifier	NASA	DTSC	RCRA Corrective Action	RFI	Accelerated cleanup performed during 1993 (removal of clarifier).
4.6	LOX Plant Asbestos and Drum Disposal Area	NASA	VCEHD/ VCAPCD DTSC	RCRA Corrective Action	RFI	Asbestos cleanup conducted in 1990 under oversight of VCEHD and VCAPCD; NFA required by VCEHD.
4.20	Rocketdyne-Atomics International Rifle and Pistol Club [(a)]		NA	NA	NA	Included in RFA but property belongs to SMMC
Area I Leach Fields[(b)] (16):					Inactive	There are no active leach fields onsite; formerly under WDR issued by RWQCB.
Area I USTs[(b)] (2):						
AREA II						
5.1	Area II Landfill	NASA	VCEHD/ RWQCB DTSC	RCRA Corrective Action	RFI	DTSC lead for characterization; site action and lead agency determination based on results.

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
5.2	ELV Final Assembly, Building 206	NASA	DTSC	RCRA Corrective Action	RFI	Site expanded during RFI field program to include area near Building 203.
5.3	Building 231 PCB Storage Facility	NASA	DTSC	Former RCRA Part A Permit	Closed	Closed 1998 by DTSC.
5.4	RD-9 Area Ultraviolet Light/ Hydrogen Peroxide (UV/H_2O_2) Treatment System	NASA	DTSC	RCRA Part B Permit	Standby	Part of groundwater treatment system under jurisdiction of DTSC. Currently inactive on standby.
5.5	Building 204 Former Waste Oil UST (UT-50)	NASA	DTSC	RCRA Corrective Action	RFI	Former waste oil UST closed by VCEHD in 1991. DTSC requested additional assessment for RFI.
5.6	Former Area II Incinerator Ash Pile	NASA	DTSC	RCRA Corrective Action	RFI	Accelerated cleanup performed during 1993 (removal of ash pile).
5.8	HWSA Container Storage Area	Boeing NASA	DTSC	Former RCRA Part A Permit	Closed	Closed 1998 by DTSC.
5.9	Alfa Test Area	NASA	DTSC	RCRA Corrective Action	RFI	
5.10	Alfa Test Area Tanks	NASA	DTSC	RCRA Corrective Action	RFI	

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
5.11	Alfa Skim and Retention Ponds and Drainage	NASA	DTSC	RCRA Corrective Action	RFI	Previous sampling performed in channels for PC Permit.
5.12	Alfa/Bravo Skim Pond (ABSP)	NASA	DTSC	PC Permit	Closed	Soil vapor sampling near impoundment performed during RFI (included in Bravo site). Groundwater monitoring ongoing as specified in PC Permit (1995).
5.13	Bravo Test Area	NASA	DTSC	RCRA Corrective Action	RFI	
5.14	Bravo Test Stand Waste Tank	NASA	DTSC	RCRA Corrective Action	RFI	
5.15	Bravo Skim Pond and Drainage	NASA	DTSC	RCRA Corrective Action	RFI	Previous sampling performed in channels for PC Permit.
5.16	Storable Propellant Area Surface Impound-ment-1 (SPA-1) and Drainage	NASA	DTSC	PC Permit	Closed	Soil vapor sampling near impoundment performed during RFI (included in SPA site); groundwater monitoring ongoing as specified in PC Permit (1995).
5.17	SPA Surface Impound-ment-2 (SPA-2) and Drainage	NASA	DTSC	PC Permit	Closed	Soil vapor sampling near impoundment performed during RFI (included in SPA site); groundwater monitoring ongoing as specified in PC Permit (1995).

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
5.18	Coca Test Area	NASA	DTSC	RCRA Corrective Action	RFI	
5.19	Coca Skim Pond and Drainage	NASA	DTSC	RCRA Corrective Action	RFI	
5.20	Propellant Load Facility (PLF) Waste Tank	NASA	DTSC	RCRA Corrective Action	RFI	Tank never used.
5.21	PLF Ozonator Tank	NASA	DTSC	RCRA Corrective Action	RFI	Ozonator tank received RCRA variance from DTSC.
5.22	PLF Surface Impound-ment	NASA	DTSC	RCRA Corrective Action	Closed	Closed by DHS in 1989.
5.23	Delta Test Area	NASA	DTSC	RCRA Corrective Action	RFI	
5.24	Delta Skim Pond and Drainage	NASA	DTSC	PC Permit	Closed	Soil vapor sampling near impoundment performed during RFI (included with Delta site); groundwater monitoring ongoing as specified in PC Permit (1995).
5.25	Purge Water Tank near Delta Treatment System	NASA	DTSC	RCRA Corrective Action	NFA	Polypropylene AST intermittently used since 1992 as temporary holding tank for groundwater to transfer to treatment system; DTSC did not request further investigation during 1999/2000 site review.

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
5.26	R-2A and R-2B Ponds and Drainage	NASA	DTSC	RCRA Corrective Action	RFI	Surface water discharge from ponds monitored under RWQCB jurisdiction at NPDES outfall locations.
5.27	Area II Air Stripping Towers (Delta and Bravo)	NASA	DTSC VCAPCD	RCRA Part B Permit	Opera-tional	Part of groundwater treatment system under jurisdiction of DTSC; air discharges permitted by VCAPCD.
5.29	RD-51 Watershed [(c)]	(c)	(c)	(c)	(c)	
5.28	Area II AOCs (combined and listed as a SWMU in RFA)					
Area II – AOC	Building 515 Sewage Treatment Plant (STP) Area	NASA	RWQCB DTSC	NPDES Permit RCRA Corrective Action	Inactive RFI	When operational, discharges from sewage treatment plant under RWQCB jurisdiction (NPDES permit). Site includes Building 211 leach field (Area II AOC) and downslope area near RD-9 groundwater treatment system (SWMU 5.4).
Area II – AOC	Storable Propellant Area (SPA)	NASA	DTSC	RCRA Corrective Action	RFI	

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
Area II – AOC	Alfa/Bravo Fuel Farm (ABFF) and Stormwater Basin	NASA	RWQCB DTSC	SPCC RCRA Corrective Action	Operational RFI	Site added to RFI field program when soil impacts observed at fuel farm during underground pipeline removal.
Area II – AOC	Coca/Delta Fuel Farm (CDFF)	NASA	DTSC	RCRA Corrective Action	RFI	New AOC added to RFI after DTSC site review (Boeing 1997a).
Area II – AOC	Drainage Pipes Under ABSP	NASA	DTSC	PC Permit	Closed	Soil vapor sampling near impoundment drainage performed during RFI (included in Bravo site); groundwater monitoring ongoing as specified in PC Permit (1995).
Area II Leach Fields[(b)] (10):					Inactive	There are no active leach fields onsite; formerly under WDR Permit issued by RWQCB.
Area II – AOC	Area II Service Area, Building 211	NASA	DTSC	RCRA Corrective Action	RFI	Included with Building 515 STP site (Area II AOC).
Area II – AOC	Alfa Control Ctr, Building 208	NASA	DTSC	RCRA Corrective Action	RFI	At Alfa site (SWMUs 5.9/10/11).
Area II – AOC	Alfa Pretest, Building 212	NASA	DTSC	RCRA Corrective Action	RFI	North of Alfa site (SWMUs 5.9/10/11).
Area II – AOC	Bravo Pretest, Building 217	NASA	DTSC	RCRA Corrective Action	RFI	At Bravo site (SWMUs 5.13/14/15).

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
Area II – AOC	Bravo Recording Ctr, Building 213	NASA	DTSC	RCRA Corrective Action	RFI	At Bravo site (SWMUs 5.13/14/15).
Area II – AOC	Coca Pretest, Building 222	NASA	DTSC	RCRA Corrective Action	RFI	At Coca site (SWMUs 5.18/19).
Area II – AOC	Coca Upper Pretest, Building 234	NASA	DTSC	RCRA Corrective Action	RFI	At Coca site (SWMUs 5.18/19). Not listed in RFA but included in CCR.
Area II – AOC	Coca Control Ctr, Building 218	NASA	DTSC	RCRA Corrective Action	RFI	At Coca site (SWMUs 5.18/19). Listed incorrectly as Building 216 in RFA.
Area II – AOC	Delta Control Ctr, Building 224	NASA	DTSC	RCRA Corrective Action	RFI	At PLF site (SWMU 5.20/21/22).
Area II – AOC	Delta Pretest, Building 223	NASA	DTSC	RCRA Corrective Action	RFI	At Delta site (SWMU 5.23).
Area II USTs[(b)] (4 Sites)						
Area II – AOC	Building 207 Diesel UST (UT-53)	NASA	VCEHD	LUFT	Closed	Closed 1996. Former diesel UST on north side of Building 207.
Area II – AOC	UST across from Alfa/Bravo Fuel Farm (ABFF) (UT-52)	NASA	VCEHD	LUFT	Closed	Closed 1994. Former gasoline UST north of ABFF site (Area II AOC) along road.
Area II – AOC	Building 206 Diesel UST (UT-51)	NASA	VCEHD	LUFT	Closed	Closed 1996. Former diesel UST east of Building 206 (ELV site, SWMU 5.2).

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
Area II – AOC	Two Underground Tanks at Plant Services (UT-48 and UT-49)	NASA	VCEHD	LUFT	RFI (Tanks closed)	UT-48 closed 1996; former fuel oil UST located on east side of Building 204. UT-49 closed by VCEHD 1991; former gasoline UST located on south side of Building 204. Additional soil sampling requested by DTSC in area for Building 204 site.
AREA IV						
7.1	Building 056 Landfill	DOE	DTSC	RCRA Corrective Action	RFI	
7.2	Building 133 Hazardous Waste Management Facility	DOE	DTSC	RCRA Part B Permit	Inactive	Closure plan approved. Work suspended until completion of EIS
7.3	Building 886 Former Sodium Disposal Facility (FSDF)	DOE	DTSC	RCRA Corrective Action	RFI	Interim measures completed in 2000 (IT 2002).
7.4	Old Conserva-tion Yard (OCY) Container Storage Area and Fuel Tanks	DOE	DTSC	RCRA Corrective Action	RFI	

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
7.5	Building 100 Trench	DOE	DTSC	RCRA Corrective Action	RFI	
7.6	Radioactive Materials Handling Facility (RMHF)	DOE	DOE/DHS DTSC	Part A Permit Interim Status	Operational	Site under DTSC/DOE jurisdiction; Part A permit administered by DTSC. Closure plan in preparation.
7.7	Building 020	DOE	DTSC	RCRA Corrective Action	RFI	Site investigation pending.
7.11	Building 029 Reactive Metal Storage Yard	DOE	DTSC	RCRA Part B Permit	Opera-tional	Closure plan submitted to DTSC.
7.12	Area IV AOCs (combined and listed as a SWMU in RFA)					
Area IV - AOC	Building 059 Former SNAP Reactor Facility	DOE	DOE/DHS DTSC	DOE Closure RCRA Corrective Action	RFI	Under DHS/DOE jurisdiction; demolition, final status surveys and DHS verification surveys completed; pending unrestricted release. Groundwater monitoring ongoing.
Area IV-AOC	Building 065 Metals Laboratory Clarifier	DOE	DTSC	RCRA Corrective Action	RFI	New AOC added after DTSC site review in 1999/2000.

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
Area IV-AOC	Building 457 Hazardous Materials Storage Area (HMSA)	DOE	DTSC	RCRA Corrective Action	RFI	New AOC added after DTSC site review in 1999/2000.
Area IV Leach Fields (15):					Inactive	There are no active leach fields onsite; formerly under WDR issued by RWQCB.
Area IV – AOC	AI-Z2, Building 064	DOE	DTSC	RCRA Corrective Action	RFI (re-moved)	Included in DOE leach fields RFI site (Area IV COC). Incorrectly listed as Building 014 in RFA.
Area IV – AOC	AI-Z3, Building 030	DOE	DTSC	RCRA Corrective Action	RFI (re-moved)	Included in DOE leach fields RFI site (Area IV AOC). Status of leach field will be addressed in RFI report.
Area IV – AOC	AI-Z4, Building 093	DOE	DTSC	RCRA Corrective Action	RFI (re-moved)	Incorrectly listed as Building 003 in RFA. Part of DOE leach fields RFI site.
Area IV – AOC	AI-Z5, Building 021	DOE	DTSC	Pending	Pending	Regulatory assignment pending review and approval of RMHF (SWMU 7.6) closure plan (Part A Permit).
Area IV – AOC	AI-Z6, Building 028	DOE	DTSC	RCRA Corrective Action	NFA (not present)	Not located during CCR investigation- facility records confirm the building never had a leach field. DTSC did not require further investigation during 1999/2000 site review.

SWMU or AOC	Description	Lead Respondent	Regulatory Jurisdiction	Current Regulatory Program	Current Status	Comments
Area IV – AOC	AI-Z7, Building 010/ 012	DOE	DTSC	RCRA Corrective Action	RFI (removed)	Not located during CCR or RFI. Included in DOE leach fields RFI site (Area IV AOC). Incorrectly listed as Building 012 in RFA and CCR.
Area IV – AOC	AI-Z10, Building 383	DOE	DTSC	RCRA Corrective Action	RFI (removed)	Incorrectly listed as Building 483 in RFA. Included in DOE leach fields RFI site (Area IV AOC).
Area IV – AOC	AI-Z11, Building 009	DOE	DTSC	RCRA Corrective Action	RFI (re-moved)	Included in DOE leach fields RFI site (Area IV AOC).
Area IV – AOC	AI-Z12, Building 020	DOE	DTSC	RCRA Corrective Action	RFI (re-moved)	At RIHL RFI site (SWMU 7.7).
Area IV – AOC	AI-Z13, Building 373	DOE	DTSC	RCRA Corrective Action	RFI (re-moved)	Included in DOE leach fields RFI site (Area IV AOC).
Area IV – AOC	AI-Z14, Building 363	DOE	DTSC	RCRA Corrective Action	RFI (re-moved)	Included in DOE leach fields RFI site (Area IV AOC).
Area IV – AOC	AI-Z15, Building 353	DOE	DTSC	RCRA Corrective Action	RFI (re-moved)	Included in DOE leach fields RFI site (Area IV AOC).
7.13	SRE Watershed[(c)]	(c)	(c)	(c)	(c)	

Notes: All SWMUs and AOCs (except those added by DTSC during the field program) are described in the RFA Report (SAIC 1994) and CCR (ICF 1993). Site descriptions for all SWMUs/AOCs added during RFI are further described in the RFI WPAA (Ogden 2000b) and this document.

See Acronym List for acronym definitions

(a) The former Rocketdyne-Atomics International Rifle and Pistol Club shooting range on Sage Ranch is an offsite location and is owned by SMMC. It is included in this table because it was listed in the RFA.
(b) Individual leach fields and USTs located in Areas I, II, and III are all associated with existing SWMUs or AOCs, and are being evaluated as part of those sites. Individual Area IV leach fields located outside of other RFI sites have been grouped as RFI sites by owner. Nine of these are being evaluated as a single AOC (DOE Leach Fields RFI site), and two are being evaluated as a separate AOC (Boeing Leach Field RFI site). Of the remaining five leach field sites in Area IV, four are being evaluated with associated RFI sites, and one is pending approval of a RCRA closure plan. Please note that this table reflects corrections to site identification errors in the RFA (e.g., Building 008 listed as an Area I leach field in the RFA, but it is an Area IV warehouse).
(c) The RD-51 and SRE watersheds were identified as SWMUs in the RFA (SAIC 1994) based on radiological sample data collected during initial sampling in 1993 (McLaren Hart 1993). Subsequent resampling of these areas did not detect or confirm initial data (McLaren Hart 1995).

ATTACHMENT 5
RFI SITES

RFI Site SWMU Number or AOC and Name	**Sampling Plan Reference**
AREA I	
B-1 Area 4.1 B-1 Area AOC Building 312 Leach Field	DTSC site review 1999/2000
Area I Landfill 4.2 Area I Landfill	Area I & II Landfills Work Plan (MWH 2003e)
Instrument and Equipment Laboratories (IEL) 4.3 Building 324 Instrument Lab, Hazardous Waste Tank 4.4 Building 301 Equipment Lab, TCA Unit and Used Product Tank AOC Buildings 301/324 Gasoline USTs (UT-37/UT-38) AOC Building 301 Diesel UST (UT-44) AOC Building 300 Leach Field AOC Building 324 Leach Field	WPA (Ogden 1996) DTSC site review 1999/2000
Liquid Oxygen (LOX) Plant 4.5 LOX Plant Waste Oil Sump and Clarifier 4.6 LOX Plant Asbestos and Drum Disposal Area	WPA (Ogden 1996) DTSC site review 1999/2000
Component Test Laboratory III (CTL-III) 4.7 CTL-III AOC Building 413 Leach Field AOC Building 412 Leach Field	WPA (Ogden 1996) DTSC site review 1999/2000
Advanced Propulsion Test Facility (APTF) 4.9 Advanced Propulsion Test Facility AOC APTF Aboveground Tanks	WPA (Ogden 1996)
LETF/CTL-I 4.12 Laser Engineering Test Facility (LETF)/ Component Test Laboratory I (CTL-I) AOC Building 309 Leach Field AOC Building 317 Leach Field AOC Building 423 Leach Field	WPA (Ogden 1996) DTSC site review 1999/2000
Canyon Area 4.14 Canyon Area AOC Building 375 Leach Field AOC Building 382 Leach Field	WPA (Ogden 1996) DTSC site review 1999/2000
Bowl Area 4.15 Bowl Area	WPA (Ogden 1996) DTSC site review

AOC Building 900 Leach Field AOC Building 901 Leach Field		1999/2000
R-1 Pond 4.16 Area I Reservoir (R-1 Pond)		WPA (Ogden 1996)
Perimeter Pond 4.17 Perimeter Pond		Identified in WPA DTSC site review 1999/2000
Building 359 Area AOC Building 359 Leach Field/Sump AOC Building 376 Leach Field AOC Building 741 Leach Field		WPA (Ogden 1996) DTSC site review 1999/2000
Happy Valley AOC Happy Valley		WPA (Ogden 1996)
Component Test Laboratory V (CTL-V) AOC CTL-V AOC Building 439 Leach Field		Letter Work Plan (Boeing 1997); Building 439 Leach Field identified in RFA
AREA II		
Area II Landfill 5.1 Area II Landfill		Area I & II Landfills Work Plan (MWH 2003e)
Expendable Launch Vehicle (ELV) 5.2 ELV Final Assembly, Building 206		WPA (Ogden 1996)
Building 204 USTs 5.5 Building 204 Former Waste Oil UST (UT-50) AOC Underground Tanks at Plant Services (UT-48 and UT-49)		WPA (Ogden 1996)
Former Area II Incinerator Ash Pile 5.6 Former Area II Incinerator Ash Pile		WPA (Ogden 1996)
Hazardous Waste Storage Area (HWSA) Waste Coolant Tank (WCT) 5.7 Hazardous Waste Storage Area Waste Coolant Tank		WPAA (Ogden 2000b)

AREA II (Cont'd)	
Alfa Area	WPA (Ogden 1996)

5.9 Alfa Test Area 5.10 Alfa Test Area Tanks 5.11 Alfa Skim and Retention Ponds and Drainage AOC Building 208 Leach Field AOC Building 212 Leach Field	DTSC site review 1999/2000
Bravo Area 5.13 Bravo Test Area 5.14 Bravo Test Stand Waste Tank 5.15 Bravo Skim Pond and Drainage AOC Building 213 Leach Field AOC Building 217 Leach Field	WPA (Ogden 1996) DTSC site review 1999/2000
Coca Area 5.18 Coca Test Area 5.19 Coca Skim Pond and Drainage AOC Building 222 Leach Field AOC Building 234 Leach Field AOC Building 218 Leach Field	WPA (Ogden 1996) DTSC site review 1999/2000
Propellant Load Facility (PLF) 5.20 PLF Waste Tank 5.21 PLF Ozonator Tank 5.22 PLF Surface Impoundment (Closed) AOC Building 224 Leach Field	Identified in WPA DTSC site review 1999/2000
Delta Area 5.23 Delta Test Area AOC Building 223 Leach Field	WPA (Ogden 1996) DTSC site review 1999/2000
R-2 Ponds 5.26 R-2A and R-2B Ponds and Drainage	Identified in WPA DTSC site review 1999/2000
Building 515 Sewage Treatment Plant (STP) AOC Building 515 STP Area AOC Building 211 Leach Field	WPA (Ogden 1996) DTSC site review 1999/2000
Alfa/Bravo Fuel Farm (ABFF) AOC ABFF and Stormwater Basin	DTSC site review 1997
Coca/Delta Fuel Farm (CDFF) AOC CDFF	Letter Work Plan (Boeing 1997)
Storable Propellant Area (SPA) AOC SPA	WPA (Ogden 1996)
AREA III	

Engineering Chemistry Laboratory (ECL) Area 6.1 ECL Building 270, Waste Tank, and Container Storage Area 6.2 ECL Suspect Water Pond 6.3 ECL Collection Tank AOC Building 260 ECL Runoff Tanks AOC Building 270 Leach Field		WPA (Ogden 1996) DTSC site review 1999/2000
Compound A Facility 6.4 Building 418 Compound A Facility		WPA (Ogden 1996)
Systems Test Laboratory IV (STL-IV) 6.5 STL-IV Test Area and Ozonator Tank AOC Buildings 253/254 Leach Field		WPA (Ogden 1996) DTSC site review 1999/2000
Silvernale Reservoir 6.8 Silvernale Reservoir and Drainage		WPA (Ogden 1996)
Environmental Effects Laboratory (EEL) 6.9 EEL		WPA (Ogden 1996)
Sewage Treatment Plant (STP) Pond AOC Sewage Treatment Plant (STP) Pond		DTSC site review 1999/2000
AREA IV		
Building 56 Landfill 7.1 Building 56 Landfill		WPA (Ogden 1996) B56 Landfill WP
Former Sodium Disposal Facility (FSDF) 7.3 Building 886 FSDF		Identified in WPA DTSC site review 1999/2000
Old Conservation Yard (OCY) 7.4 OCY Container Storage Area and Fuel Tanks		WPA (Ogden 1996)
RFI Site SWMU Number or AOC and Name		**Sampling Plan Reference**
AREA IV (Cont'd)		
Building 100 Trench 7.5 Building 100 Trench		DTSC site review 1999/2000
Hot Laboratory (HL) 7.7 HL, Building 20 AOC Building 20 Leach Field		WPA (Ogden 1996) (revised in WPAA)

New Conservation Yard (NCY) 7.8 NCY		WPA (Ogden 1996)
Empire State Atomic Development Authority (ESADA) 7.9 ESADA Chemical Storage Yard		Identified in WPA DTSC site review 1999/2000
Coal Gasification Process Development Unit (PDU) 7.10 Building 005 Coal Gasification PDU AOC Buildings 005/006 Leach Field		Identified in WPA DTSC site review 1999/2000
Sodium Reactor Experiment (SRE) Area AOC SRE AOC Building 003 Leach Field		Letter Work Plan (Boeing 1997)
Southeast Drum (SE Drum) Storage Yard AOC SE Drum Storage Yard		DTSC site review 1999/2000
Pond Dredge Area AOC Pond Dredge Area		WPAA (Ogden 2000b)
Boeing Area IV Leach Fields AOC Building 011 Leach Field AOC Building 008 Warehouse		DTSC site review 1999/2000
Systems for Nuclear Auxiliary Power (SNAP) Facility AOC Building 59, SNAP Facility		WPAA (Ogden 2000b)
Building 65 Metals Laboratory Clarifier AOC Building 65, Metals Laboratory Clarifier		WPAA (Ogden 2000b)
Hazardous Materials Storage Area (HMSA) AOC Building 457, Former HMSA		WPAA (Ogden 2000b)
DOE Leach Fields AOC Building 009 Leach Field AOC Building 010 Leach Field AOC Building 030 Leach Field AOC Building 064 Leach Field AOC Building 093 Leach Field AOC Building 353 Leach Field AOC Building 363 Leach Field AOC Building 373 Leach Field		DTSC site review 1999/2000

AOC Building 383 Leach Field		

Summary by Document

Document	Total		Proposed for Sampling	
	SWMUs/AOCs	RFI Sites	SWMUs/AOCs	RFI Sites
WPA (1996)	64	34	40	27
WPAA (2000)	6	5	7	6
DTSC Site Reviews (1997/1998)	29	7	52	13
Area I/II Landfill WP (2003)	2	2	2	2
Letter WPs (1997/1998)	5	3	5	3
Totals	**106**	**51**	**106**	**51**

Notes:

1. Sampling plans included in referenced document or as directed during field investigation by DTSC.

2. Because of proximity, Buildings 011 and 008 will be reported together as one RFI site.

3. Only SWMUs and AOCs considered part of each RFI site are listed. No RCRA permitted units or closed USTs are shown, with the exception of tanks for which DTSC has requested additional characterization. All SWMUs and AOCs included in the RFI are listed here and designated in Table 1-3 by "RFI" under "Current Status."

4. Leach Field AOCs originally introduced in the RFA (SAIC 1994).

See Acronym List for acronym definitions

ATTACHMENT 6

[EPA PRGs to be inserted]

ATTACHMENT 7
LIST OF SURFICIAL OU AND CHATSWORTH FORMATION OU HUMAN HEALTH EXPOSURE PATHWAYS

	Rural Residential (Agricultural)		Suburban Residential		Recreational	
Exposure Pathway	**Radionuclides[a]**	**Chemicals**	**Radionuclides[a]**	**Chemicals**	**Radionuclides**	**Chemicals**
Direct radiation exposure	X	N/A	X	N/A	X	N/A
Soil/sediment pathways:						
- Ingestion of soil	X	X	X	X	X	X
- Dermal contact with soil	N/A	X	N/A	X	N/A	X
- Inhalation of particulates in air derived from soil	X	X	X	X	X	X
- Inhalation of VOCs in ambient air derived from soil	N/A	X	N/A	X	N/A	X
- Inhalation of VOCs in indoor air derived from soil	N/A	X	N/A	X	N/A	N/A
Surface water pathways						
- Ingestion of surface water	N/A	X	N/A	X	N/A	X
- Dermal contact with surface water	N/A	X	N/A	X	N/A	X
Groundwater pathways						
- Ingestion of potable water	X	X	X	X	N/A	N/A
- Dermal contact while bathing	N/A	X	N/A	X	N/A	N/A
- Inhalation of VOCs/volatiles while showering	X	X	X	X	N/A	N/A
- Inhalation of VOCs in indoor air derived from groundwater	N/A	X	N/A	X	N/A	N/A
- Inhalation of VOCs in ambient air derived from groundwater	N/A	X	N/A	X	N/A	X
Consumption of Biota:						
- Fruits & vegetables	X	X	X	X	N/A	N/A
- Beef	X	X	N/A	N/A	N/A	N/A
- Poultry	X	X	N/A	N/A	N/A	N/A
- Swine	X	X	N/A	N/A	N/A	N/A
- Eggs	X	X	N/A	N/A	N/A	N/A
- Milk	X	X	N/A	N/A	N/A	N/A
- Fish	X	X	N/A	N/A	N/A	N/A

Notes:
[a] Based on default EPA agricultural and residential soil PRGs and tap water PRGs.
N/A – Not applicable.

Human Health Exposure Pathways for Radionuclides and Chemicals by Land Use

	Rural Residential (Agricultural)		Suburban Residential		Recreational	
Exposure Pathway	**Radionuclides[a]**	**Chemicals**	**Radionuclides[a]**	**Chemicals**	**Radionuclides**	**Chemicals**
Direct radiation exposure	X	N/A	X	N/A	X	N/A
Soil/sediment pathways:						
- Ingestion of soil	X	X	X	X	X	X
- Dermal contact with soil	N/A	X	N/A	X	N/A	X
- Inhalation of particulates in air derived from soil	X	X	X	X	X	X
- Inhalation of VOCs in ambient air derived from soil	N/A	X	N/A	X	N/A	X
- Inhalation of VOCs in indoor air derived from soil	N/A	X	N/A	X	N/A	N/A
Surface water pathways						
- Ingestion of surface water	N/A	X	N/A	X	N/A	X
- Dermal contact with surface water	N/A	X	N/A	X	N/A	X
Groundwater pathways						
- Ingestion of potable water	X	X	X	X	N/A	N/A
- Dermal contact while bathing	N/A	X	N/A	X	N/A	N/A
- Inhalation of VOCs/volatiles while showering	X	X	X	X	N/A	N/A
- Inhalation of VOCs in indoor air derived from groundwater	N/A	X	N/A	X	N/A	N/A
- Inhalation of VOCs in ambient air	N/A	X	N/A	X	N/A	X

derived from groundwater						
Consumption of Biota:						
- Fruits & vegetables	X	X	X	N/A	N/A	N/A
- Beef	X	X	N/A	N/A	N/A	N/A
- Poultry	X	X	N/A	N/A	N/A	N/A
- Swine	X	X	N/A	N/A	N/A	N/A
- Eggs	X	X	N/A	N/A	N/A	N/A
- Milk	X	X	N/A	N/A	N/A	N/A
- Fish	X	X	N/A	N/A	N/A	N/A

Notes:
[a] Based on default EPA agricultural and residential soil PRGs and tap water PRGs.
N/A – Not applicable.

ATTACHMENT 8
LIST OF SURFICIAL OU AND CHATSWORTH FORMATION OU ECOLOGICAL EXPOSURE PATHWAYS

Representative Ecological Receptor	Evaluated Exposure Pathways[a]
Plant (terrestrial)	• Soil (direct exposure)
Soil Invertebrate (terrestrial)	• Soil (direct exposure)
Red Tailed Hawk	• Food ingestion (small mammals) • External dose (radionuclides only)
Hermit Thrush	• Soil ingestion • Food Ingestion (plants and invertebrates) • Surface water ingestion • Near-surface groundwater (seeps and springs) • Chatsworth formation groundwater (seeps and springs) • External dose (radionuclides only)
Deer Mouse	• Soil Ingestion • Food ingestion (plants and invertebrates) • Surface water ingestion • Near-surface groundwater (seeps and springs) • Chatsworth formation groundwater (seeps and springs) • Vapor inhalation (chemicals only) • External dose (radionuclides only)

Mule Deer Bobcat Plant (aquatic) Invertebrate (aquatic)	• Soil Ingestion • Food ingestion (plants) • Surface water ingestion • Near-surface groundwater (seeps and springs) • Chatsworth formation groundwater (seeps and springs) • External dose (radionuclides only) • Food ingestion (small mammals) • Surface water ingestion • Near-surface groundwater (seeps and springs) • Chatsworth formation groundwater (seeps and springs) • External dose (radionuclides only) • Direct exposure to surface water concentrations • Direct exposure to surface water concentrations
Great Blue Heron	• Food ingestion (small mammals, aquatic invertebrates and fish) • Surface water ingestion • Chatsworth formation groundwater (seeps and springs) • Sediment ingestion • External dose (radionuclides only)

[a]: Exposure pathways applicable to both radionuclides and chemicals unless otherwise specified

ATTACHMENT 9

SSFL
HAZARDOUS SUBSTANCES OF CONCERN ASSOCIATED WITH
ROCKET ENGINE TESTING and OTHER RESEARCH AND DEVELOPMENT ACTIVITIES

● Hazardous substance constituents of concern at the SSFL associated with rocket engine testing include, but are not limited to, the following:

Liquid rocket test fuels - RP-1 (high-grade kerosene), JP-4 (a type of jet fuel) monomethyl hydrazine, hydrazine, derivatives, and liquid hydrogen, as well as various by-product of the combustion of these materials;

Oxidizers - liquid oxygen and nitrogen tetroxide, and various fluorine compounds and inhibited red fuming nitric acid; and

Solvents - trichloroethylene, the primary solvent used at SSFL, used to clean engine components before and after testing.

● Hazardous substances of concern associated with other research and development activities carried out at the SSFL include, but are not limited to, the following:

Halogenated solvents - 1,1,1-trichloroethane, tetrachloroethylene, 1,1-dichloroethane, and chlorofluorocarbons;

Caustic solutions - potassium hydroxide and sodium hydroxide;

Radionuclides;

Reactive metals - sodium and other reactive metals;

"Green Liquor" wastewater - generated from coal gasification operations, containing organics, sulfur compounds, and ash;

Energetic materials - perchlorate, glycidyl azide polymer, hexahydro-1,3,4-trinitro-1,3,5-triazine (RDX), oxtahydro-1,3,5,7-tetranitro-1,2,5,7-tetrazocine (HMX), and other ordnance compounds;

Polychlorinated biphenyls (PCBs) – transformers;

Various chemicals - used in laboratory operations, such as solvents, acids, and bases;

Laboratory wastes - from cleaning laboratory instruments, such as waste solvents, acids and bases;

Waste oil - sumps and clarifiers;,

Construction debris - including concrete, wood, metal and asbestos;

Incinerator ash - dioxin and metals; and

Biocides - cooling tower, water treatment chemicals which include copper and chromium compounds.

ATTACHMENT 10
CHEMICALS OF CONCERN
FROM POST CLOSURE PERMITS
SSFL

Acetone
Carbon Tetrachloride
Methylene Chloride
Chloroform
Fluoride
Freon 11
Freon 113
Formaldehyde
Ammonia
Nitrate
Methyl Ethyl Ketone
Benzene
Toluene
Xylenes
Ethylbenzene
PCE
TCE
Cis-1,2-DCE
Trans-1,2-DCE
1,1-DCE
Vinyl Chloride
1,1,1-TCA
1,1,2-TCA
1,2-DCA
1,1-DCA
1,4-dioxane
N-nitrosodimethylamine
Nitrobenzene

ATTACHMENT 11
LIST OF CHEMICALS AND RADIONUCLIDES IDENTIFIED IN GROUNDWATER AT SSFL

The following list is inclusive of all chemicals detected in at least a single groundwater sample collected from wells at or near the SSFL (regardless of concentration). These chemicals are not necessarily related to releases from the SSFL and include those that occur naturally and are artifacts of work performed in analytical laboratories.

1,1,1-trichloroethane
1,1,2--trichloroethane
1,2-dichloroethane
1,1-dichloroethane
chloroethane
1,4-dioxane

tetrachloroethylene
trichloroethylene
cis-1,2-dichloroethylene
trans-1,2-dichloroethylene
1,1-dichloroethylene
vinyl chloride

n-nitrosodimethylamine
1,2,3-trichloropropane
1,3-dinitrobenzene
nitrobenzene
nitrate
perchlorate
petroleum hydrocarbons (various ranges)
benzene
ethylbenzene
m-, p-, and o-xylenes
toluene
acetone
ammonia as nitrogen
fluoride

carbon tetrachloride
methylene chloride
chloroform
chloromethane

trichlorotrifluoroethane (Freon 113)
trichlorofluoromethane (Freon 11)
dichlorodifluoromethane (Freon 12)

poly-chlorinated di-benzo dioxins/furans
formaldehyde

cadmium
chromium
copper
lead
manganese
nickel
silver
thallium
zinc

The following is a list of all radionuclides detected in at least a single groundwater sample collected from wells at or near SSFL (regardless of concentration). These radionuclides are not all necessarily related to releases from the SSFL and include radionuclides that occur naturally.

Actinium	228
Bismuth	214
Cesium	134
Cobalt	60
Hydrogen	3
Lead	210
Lead	212
Lead	214
Polonium	210
Potassium	40
Radium	226
Radium	228
Radon	222
Strontium	90
Thallium	208
Thorium	228
Thorium	230
Thorium	232
Uranium	233/234
Uranium	234
Uranium	235
Uranium	236
Uranium	238

ATTACHMENT 12

LIST OF APPLICABLE GUIDANCE DOCUMENTS

- Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final (EPA 540/G-89/004, OSWER 9355.3-01,October 1988),
- Proven Technologies and Remedies Guidance – Remediation of Metals in Soil (DTSC, August 2008)
- Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (EPA 402-R-97-016, Revision 1, August 2000)
- U.S. EPA's Pro UCL Version 4.00.02 User Guide
- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW 846)
- Environmental Measurements Laboratory (EML) Procedures Manual, HASL-300
- EPA Publication 9285.7-08, "Supplemental Guidance to RAGS: Calculating the Concentration Term"
- EPA 93555.0-01, "Guidance on Surface Soil Cleanup at Hazardous Waste Sites", EPA/600/R-07/038
- California Environmental Protection Agency (Cal-EPA). 1997. Selecting Inorganic Constituents as Chemicals of Potential Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities. Prepared by Human and Ecological Risk Division, Department of Toxic Substances Control. California Environmental Protection Agency. February.
- Department of Toxic Substances Control (DTSC). 1998-2009. *HERD Ecological Risk Assessment Notes: Numbers 1-5.* California Department of Toxic Substances Control. Human and Ecological Risk Division (HERD).

- DTSC. 1992. Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities. October. Document not provided. Publicly available document.
- DTSC. 1994. Preliminary Endangerment Assessment Guidance Manual. January. Document not provided. Publicly available document.
- DTSC. 1996. Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities, Part A: Overview. State of California, California Environmental Protection Agency. July. Document not provided. Publicly available document.
- United States Environmental Protection Agency (USEPA). 1989a. Risk Assessment Guidance for Superfund (RAGS). Volume I: Human Health Evaluation Manual (Part A), Interim Final, EPA/540/1-89/002. December.
- USEPA. 1989b. Risk Assessment Guidance for Superfund. Volume II: Environmental Evaluation Manual. Interim Final. EPA/540/1-89/001A.
- USEPA. 1991a. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors.
- USEPA. 1991b. Role of the Baseline Risk Assessment in Superfund Remedy Selection Decision, OWSER Directive 9355.0-30.
- USEPA. 1992a. Final Exposure Assessment Guidelines.
- USEPA. 1992b. National Toxics Rule Criteria to Protect Freshwater Aquatic Life in California Waters. Criterion for Continuous Concentration (CCC). 40 CFR 131.36.
- USEPA. 1993a. Wildlife Exposure Factors Handbook, Volume I of II. Office of Research and Development. EPA 600/R-93/187a. December.
- USEPA. 1993b. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. EPA/600/R-93/089.
- USEPA. 1996. Ecotox Thresholds. US Environmental Protection Agency. Office of Solid Waste and Emergency Response. EPA 540/F-95/038. January.
- USEPA. 1997a. Exposure Factors Handbook, Volume I: General Factors. Office of Emergency and Remedial Response. EPA/600/P-95/002 Fa. August.
- USEPA. 1997b. Exposure Factors Handbook, Volume II: Food Ingestion Factors. Office of Emergency and Remedial Response. EPA/600/P-95/002 Fa. August.

- USEPA. 1997c. Exposure Factors Handbook, Volume III: Activity Factors. Office of Emergency and Remedial Response. EPA/600/P-95/002 Fa. August.
- USEPA. 1997d. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. June.
- USEPA. 1998. Guidelines for Ecological Risk Assessment. EPA/630/R-95/002F. April 14.
- USEPA. 1999a. Contact Laboratory Programs National Functional Guidelines for Organic Data Review. February.
- USEPA. 1999b. Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Volume Three. Peer Review Draft. Appendix C Media-to-Receptor Bioconcentration Factors (BCFs). EPA530-D-99-001A. August.
- USEPA 1999c. Data Collected for the Hazardous Waste Identification Rule. Section 10.0 Farm Food Chain and Terrestrial Foodweb Data. US Environmental Protection Agency, Washington DC, Contract No. 68-W-98-085, October.
- USEPA. 2000. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule Part III. 40 CFR Part 131. May 18.
- USEPA. 2001. Risk Assessment Guidance for Superfund (RAGS), Supplemental Guidance for Dermal Risk Assessment, Interim.
- USEPA. 2002a. Guidance for Comparing Background and Chemical Concentrations at Superfund Sites. Office of Solid Waste and Emergency Response.
- USEPA. 2002b. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites, OSWER 9285.6-10. December.
- USEPA. 2002c. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites, OSWER 9285.6-10. December.
- USEPA, 2003. Guidance for Developing Ecological Soil Screening Levels. OSWER 9285.7-55. November.
- USEPA, 2004. Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). EPA/540/R/99/005.

- USEPA. 2005. Update of Ecological Soil Screening Level (Eco-SSL) Guidance and Contaminant Specific Documents. February-March 2005.

- USEPA. 2007. Guidance for Developing Ecological Soil Screening Levels (Eco-SSL). Attachment 4-1. Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs. OSWER Directive 9285.7-55. Issued November 2003. Revised February 2005. Revised April 2007.

ATTACHMENT 13
INTERIM MEASURES COMPLETED

DATE	NAME	ACTION
1999-2000	Happy Valley Interim Measure	Over 1,600 cubic yards of soil and debris were removed from drainage containing metals/perchorate and geophysical surveys in support of ordnance investigation
2000	Former Sodium Disposal Facility (FSDF)	Over 20,000 cubic yards of material were excavated to remove elevated concentrations of dioxins, PCBs, and mercury.
2003 - 2004	Happy Valley Interim Measures	Approximately 8,500 cubic yards of perchlorate impacted soils and surficial weathered bedrock excavated during removal action primarily from the southern Happy Valley Drainage area. Approximately 8,000 cubic yards are undergoing biotreatment of perchlorate.
2004	Building 203 Interim Cleanup Measure	Interim measures were performed north of Building 203 to remove mercury-impacted soils to prevent migration of mercury in soil downslope. Approximately 3,000 cubic yards of soil and bedrock that contained mercury were excavated.

ATTACHMENT 14
RFI GROUP AREA REPORTS FOR SSFL

RFI Group Report Area

Group 1A - Boeing

Group 1B - Boeing

Group 2 - NASA

Group 3 - NASA & Boeing

Group 4 - NASA

Group 5 - Boeing & DOE

Group 6 - Boeing & DOE

Group 7 - DOE

Group 8 - Boeing & DOE

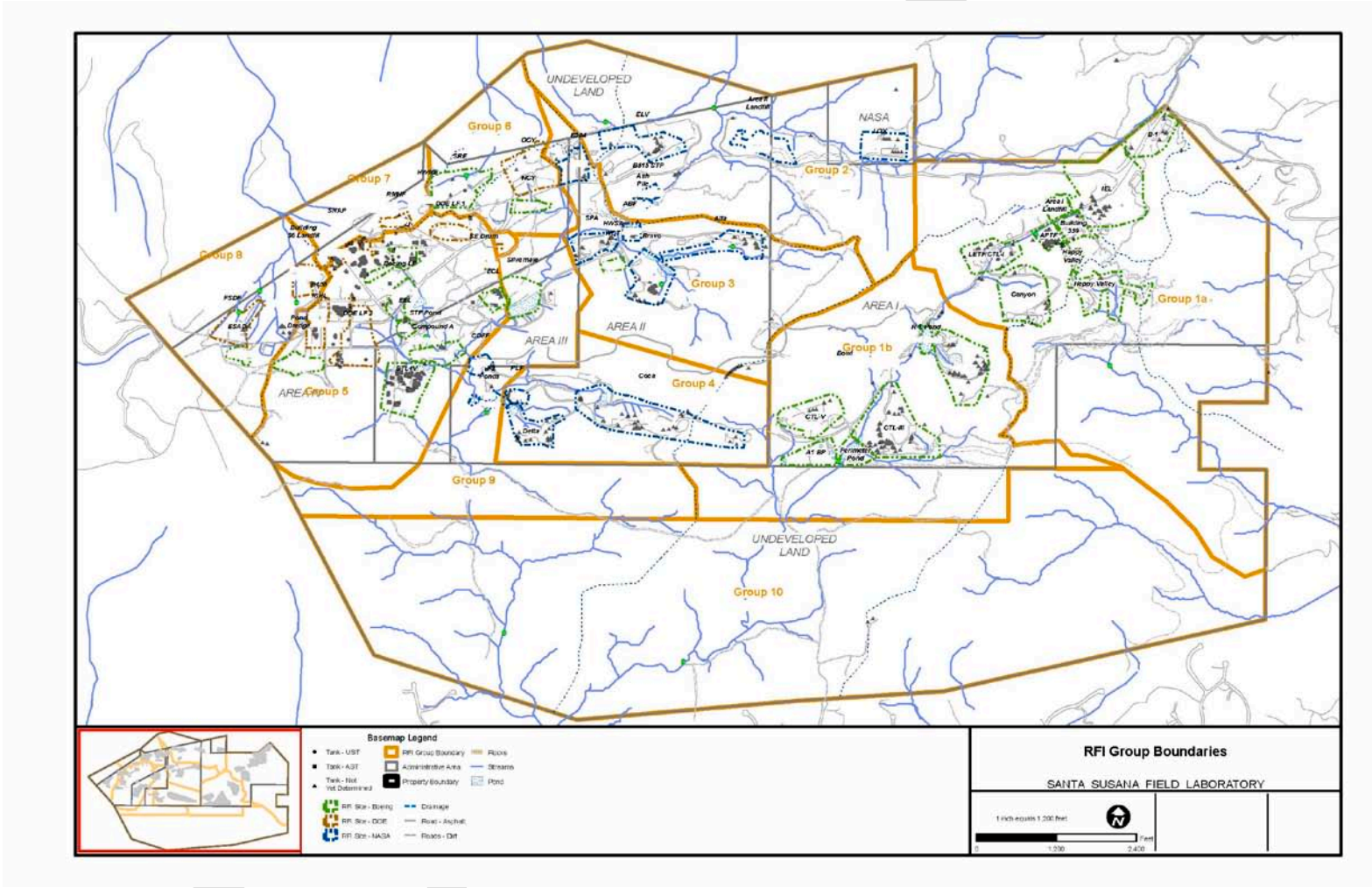
Group 9 - Boeing & NASA (DOE contribution)

Group 10 – Boeing

Eco/Large Home Range

Note: Group 1A, 2, 4, 5, 6, 8, and 10 Reports were received as of April 1, 2009

ATTACHMENT 15
SSFL RFI Group Report Areas



Source: Modified from CH2MHill figure dated January 2008 showing RFI Group boundaries