



The Boeing Company
Santa Susana Field Laboratory
5800 Woolsey Canyon Road
Canoga Park, CA 91304-1148

Via FedEx

April 29, 2011
In reply refer to SHEA- 111109

Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Attention: Mr. Sam Unger

Dear Mr. Unger:

Subject: Phase II Implementation Report – 2010 Activities performed in compliance with the Final Interim Source Removal Action (ISRA) Work Plan, California Water Code §13304 Order (NPDES NO. CA0001309, CI NO. 1111, Site ID No. 2040109)

Per the above referenced order dated December 3, 2008, The Boeing Company (Boeing), on behalf of Boeing and the National Aeronautics and Space Administration (NASA), hereby submits the attached Phase II Implementation Report – 2010 Activities. The attached report will be posted within the next 10 days on the Boeing External website at the following address: http://www.boeing.com/aboutus/environment/santa_susana/isra.html

If there are any questions, please contact Mr. Art Lenox at (818) 466-8795.

Sincerely,

Thomas D. Gallacher
Director
Santa Susana Field Laboratory
Environment, Health and Safety

Enclosure

Cc: Mazhar Ali, RWQCB
Ashley Boudreaux, NASA
Paul Carpenter, DTSC
Randy Dean, CH2M HILL
Allen Elliott, NASA
Jon Jones, Surface Water Expert Panel
Dr. Mike Josselyn, Surface Water Expert Panel
Buck King, DTSC
Mark Malinowski, DTSC
Cassandra Owens, RWQCB
Peter Raftery, RWQCB

**INTERIM SOURCE REMOVAL ACTION (ISRA)
PHASE II IMPLEMENTATION REPORT - 2010 ACTIVITIES
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA**

April 2011

Prepared For:

The Boeing Company

and

The National Aeronautics and Space Administration

Prepared By:

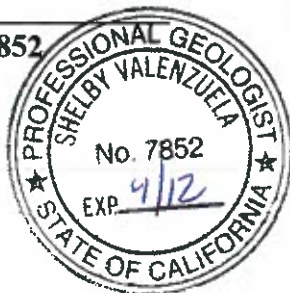
**MWH
618 Michillinda Avenue
Suite 200
Arcadia, California 91007**



**Alex Fischl, P.M.P.
Project Manager**



**Shelby Valenzuela, P.G. 7852
Project Geologist**



**Margaret S. Milman-Barris, P.G. 8682
Project Geologist**

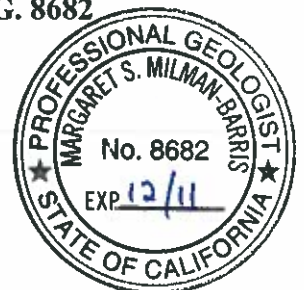


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ABBREVIATIONS AND ACRONYMS

AP/STP	Ash Pile and Building 515 Sewage Treatment Plant
Boeing	The Boeing Company
BMP	Best Management Practices
CAO	Cleanup and Abatement Order
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CM	culvert maintenance
COC	constituents of concern
CTL-I	Component Test Laboratory I
CWA	Clean Water Act
cy	cubic yards
DTSC	Department of Toxic Substances Control
ELV	Expendable Launch Vehicle
FS	Feasibility Study
HVS	Happy Valley South
IEL	Instrument and Equipment Laboratories
ISRA	Interim Source Removal Action
MRCA	Mountains Recreation Conservancy Authority
NASA	National Aeronautics and Space Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NWP	Nationwide Permit
PCB	polychlorinated biphenyl
PEA	Preliminary Evaluation Area
PID	photo ionization detector
RBSL	risk-based screening level
RCRA	Resource Conservation and Recovery Act

ABBREVIATIONS AND ACRONYMS (Continued)

RFI	RCRA Facility Investigation
RI	Remedial Investigation
RWQCB	Los Angeles Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SHPO	California State Historic Preservation Office
SMP	Soil Management Plan
SRG	soil remediation goal
SVOC	semi-volatile organic compound
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	California State Water Resources Control Board
TPH	total petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
USACE	United States Army Corp of Engineers
VOC	volatile organic compound
W and S	W and S Consultants
WDR	Waste Discharge Requirement

1.0 INTRODUCTION

This Interim Source Removal Action (ISRA) Phase II Implementation Report summarizes the ISRA activities performed during 2010 at the Santa Susana Field Laboratory (Santa Susana Site). ISRA implementation activities were conducted by MWH and CH2M HILL on behalf of The Boeing Company (Boeing) and the National Aeronautics and Space Administration (NASA) pursuant to a California Water Code Section 13304 Cleanup and Abatement Order (CAO) issued by the Los Angeles Regional Water Quality Control Board (RWQCB) dated December 3, 2008 (RWQCB, 2008). The CAO was issued by the RWQCB to achieve compliance with the Waste Discharge Requirements (WDRs) for Outfalls 008 and 009 established in its National Pollution Discharge Elimination System (NPDES) Permit, NPDES No. CA001309 (NPDES Permit). The CAO was issued to Boeing, and included provisions for Boeing to communicate and work cooperatively with NASA for ISRAs necessary on NASA property (Item 6 of the CAO). This communication and coordination is ongoing and represented in this report, as well as in previous ISRA work plans and reports.

As described in the Final ISRA Work Plan (MWH, 2009b) and the 2010 ISRA Work Plan Addendum (MWH, 2010c), the ISRA project is being conducted in annual phases to allow completion of ongoing work within the Outfall 009 watershed (Northern Drainage cleanup and stormwater maintenance activities), and to accommodate federal funding schedules for work to be performed on NASA property. ISRA Phase I implementation activities occurred during 2009, and ISRA Phase II implementation activities occurred during 2010, in accordance with the Final ISRA Work Plan (MWH, 2009b), the 2010 ISRA Work Plan Addendum (MWH, 2010c), supplemental plans, and applicable regulations. ISRA Phase I activities were described in the ISRA Phase I Implementation Report – 2009 Activities (MWH, 2010b), and ISRA Phase II activities performed in 2010 are described in this implementation report. Both implementation reports serve in partial fulfillment of Item 4 of the CAO. Item 4 of the CAO requires that a report be submitted documenting compliance with the CAO and describing the results of confirmation soil samples collected following the completion of soil removal. Additional ISRA activities described in the Final ISRA Work Plan (MWH, 2009b) and the 2010 ISRA Work Plan

Addendum (MWH, 2010c) are planned to be performed in 2011 and 2012, and will be documented in yearly implementation reports.

1.1 PROJECT BACKGROUND

The Santa Susana Site is located approximately 29 miles northwest of downtown Los Angeles, California, in the southeast corner of Ventura County. Figure 1-1 shows the geographic location and property boundaries of the site, as well as surrounding communities. Stormwater discharges at the Santa Susana Site are monitored according to the NPDES Permit. The 16 outfall locations are shown on Figure 1-2, and a detailed view of the Outfalls 008 and 009 watersheds, the subject outfalls of the CAO, is shown in Figure 1-3. The NPDES Permit established monitoring at Outfalls 008 and 009 in August 2004. NPDES permit limits were first established for Outfalls 008 and 009 in 2005-2006. Surface water discharges from the site are exclusively the result of stormwater runoff and are intermittent following rain events.

Pursuant to the NPDES Permit, a Best Management Practices (BMP) Plan (BMP Plan) describing the process for improving stormwater runoff quality and minimizing NPDES Permit exceedances in the Outfalls 008 and 009 watersheds at the Santa Susana Site was prepared in October 2010 (MWH *et al.*, 2010). The BMP Plan presents the refined strategy for the subject outfall drainages based on ongoing source removal actions and recently obtained data and information. The BMP Plan summarizes BMP activities that are planned, are underway, or have been completed in the Outfalls 008 and 009 watersheds, in addition to potential data gaps that need to be filled for future BMP planning and implementation. Activities pursuant to the BMP Plan are planned to be implemented in parallel with ISRA activities during 2011 and 2012.

The Santa Susana Site is also currently undergoing investigation and closure under Resource Conservation and Recovery Act (RCRA) Corrective Action and Remedial Investigation / Feasibility Study (RI/FS) Programs under oversight by the Department of Toxic Substances Control (DTSC). This action is currently in the RCRA Facility Investigation / Remedial Investigation (RFI/RI) Phase. In addition, removal of debris and contaminated soils from the Northern Drainage, within the Outfall 009 watershed, has been completed pursuant to an Imminent and Substantial Endangerment Determination and Order and Remedial Action Order

issued by DTSC (DTSC, 2007) and a Cleanup and Abatement Order issued by the RWQCB (RWQCB, 2007). A restoration plan for the Northern Drainage is being developed, with the support of the Surface Water Expert Panel, to stabilize the channel to reduce erosion. Additionally, the ongoing maintenance work related to the former Rocketdyne-Atomics International Rifle and Pistol Club shooting range on the Mountains Recreation Conservancy Authority (MRCA) property will continue under DTSC oversight.

1.1.1 ISRA Cleanup and Abatement Order (CAO)

In response to exceedances of NPDES permit limits and benchmarks at Outfalls 008 and 009, the RWQCB issued a CAO to Boeing on December 3, 2008 (RWQCB, 2008). The CAO (included in Appendix A) requires that the sources which are discharging constituents that exceeded NPDES permit limits and benchmarks within the Outfalls 008 and 009 watersheds be addressed. Constituents for which there have been NPDES permit limit and benchmark exceedances at Outfalls 008 and 009 between 2004 and March 2010 include lead at Outfall 008; and copper, lead, dioxins, pH, and oil and grease at Outfall 009 (Boeing, 2005a, 2006, 2007, 2008, and 2009a).

The objective of the CAO is to improve surface water quality within the Outfalls 008 and 009 watersheds by identifying and evaluating areas of contaminated soil containing the COCs that have resulted in exceedances of NPDES permit limits and benchmarks in stormwater, and implementing an appropriate source removal alternative (e.g., excavation and offsite disposal, capping with a clay cap, or constructing diversion and collection structures). The CAO also requires that methods be used that minimize impacts to the streambed adjacent to habitat during cleanup activities, protect the water quality during and after cleanup activities, and restore the streambed and surrounding upland habitat following cleanup activities.

The sources within the Outfall 008 watershed are being addressed by Boeing because the Outfall 008 watershed is entirely on property owned by Boeing. However, because the portion of the Outfall 009 watershed upgradient of the NPDES outfall includes property owned by Boeing as well as property owned by the federal government and administered by NASA, Boeing and NASA are addressing the sources on their respective properties and are individually responsible for funding and implementing these actions.

1.1.2 ISRA Project Approach

The ISRA project approach for developing remediation plans was presented in detail in the Final ISRA Work Plan (MWH, 2009b). The approach included:

- (1) Compiling the previously existing data set of soil and sediment samples for the Outfalls 008 and Outfall 009 watersheds;
- (2) Identifying potential source areas of ISRA COCs and designating them as Preliminary ISRA Evaluation Areas (ISRA PEAs). ISRA PEAs represent areas in which samples from the previously existing data set contain concentrations of the ISRA COCs exceeding DTSC-approved background comparison concentrations (MWH, 2005);
- (3) Performing additional soil sampling to fill data gaps and delineate the lateral and vertical extents of the source areas, producing refined ISRA PEAs;
- (4) Evaluating each refined ISRA PEA, based on criteria including sampling results, soil type, site geomorphology, and type of vegetation, to highlight which areas were likely to be contributing ISRA COCs to surface water and should be identified as an ISRA area requiring remediation; and
- (5) Performing a remedial alternatives analysis to select an appropriate source removal alternative (e.g., excavation and offsite disposal, capping with a clay cap, or constructing diversion and collection structures), and developing soil remediation goals (SRGs) for each proposed ISRA area.

ISRA COCs for surface water at Outfalls 008 and 009 were determined by surface water samples collected for monitoring or compliance under the NPDES Permit at those outfalls. Since the establishment of NPDES permit limits/benchmarks for Outfalls 008 and 009, constituents for which there have been NPDES permit limit and benchmark exceedances include lead at Outfall 008, and copper, lead, dioxins, pH, and oil/grease at Outfall 009 (Boeing, 2005a, 2006, 2007, 2008, and 2009a). However, based on an evaluation of all surface water samples collected at Outfalls 008 and 009 since August 2004, including sample data collected for monitoring before the NPDES permit limits/benchmarks were established, the ISRA COCs for surface water are copper, lead, and dioxins at Outfall 008, and cadmium, copper, lead, mercury, dioxins, pH, and oil/grease at Outfall 009. Since the exceedances of oil and grease and pH at Outfall 009 each occurred only once and are attributable to natural causes (Boeing, 2005b and 2006), they are not considered ISRA COCs, as described in the ISRA work plans (MWH, 2009a, 2009b, and 2010c).

The ISRA approach presented in the Final ISRA Work Plan also specifies that where RCRA risk drivers are co-located with ISRA areas, the RCRA risk drivers will be considered in ISRA activities (MWH, 2009b). RCRA risk drivers are those chemicals that significantly contribute to unacceptable human risks and ecological risks within the Outfalls 008 and 009 watersheds, as presented in the RFI Group reports.

The SRGs established for the ISRA project are consistent with or near DTSC-approved soil background concentrations (MWH, 2005), as described in the ISRA Final Work Plan (MWH, 2009b). The SRG for dioxins is slightly higher than current background levels (approximately 3 times the background concentration) because the Outfalls 008 and 009 watersheds were extensively burned during the 2005 Topanga Fire, resulting in dioxin-containing ash and burned debris being deposited throughout the area.

1.1.3 Phase I Scope

ISRA remedial activities performed in 2009 are considered to be Phase I implementation activities. Phase I activities consisted of soil sampling to refine ISRA PEAs, ISRA area identification, remedial alternatives evaluation, surveying, permitting, supplemental work plan preparation, sampling to characterize soil for waste disposal purposes, sampling to characterize soil for use as backfill during restoration (soil borrow area sampling), and remedial activities (excavation and site restoration activities). ISRA remedial activities during 2009 consisted of excavation and site restoration at ten ISRA areas in the Outfall 008 watershed (CYN-1, DRG-1, HVS-1, HVS-2A, HVS-2B-1, HVS-2B-2, HVS-2C, HVS-2D, HVS-3, and HVS-4), within the Happy Valley South (HVS) RFI Site, the Canyon RFI Site, and in the drainage downgradient from the Canyon RFI Site; and at two ISRA areas in the Outfall 009 watershed (A2LF-1 and A2LF-3), on the northeast bank of the Northern Drainage near Outfall 009, and within culvert CM-1 southeast of the Expendable Launch Vehicle (ELV) RFI Site. The locations of these ISRA areas are shown on Figures 1-4 and 1-6.

In addition, an abandoned natural gas pipeline segment adjacent to ISRA area HVS-2A and a septic tank within ISRA area HVS-3 were removed under DTSC, RWQCB, and Ventura County oversight. A total of approximately 5,200 cubic yards (cy) (*ex situ*) of soil was removed from Outfall 008 ISRA area excavations, and approximately 180 cy (*ex situ*) of soil was removed from

Outfall 009 ISRA area excavations. Areas of removal were then re-graded to previously existing contours, hydroseeded, and, in appropriate areas, revegetated with plants specifically grown for use along drainage swales and to stabilize soils. Pursuant to Item 4 of the RWQCB CAO, a Phase I Implementation Report was prepared and submitted to the RWQCB on April 1, 2010 (MWH, 2010b). The Phase I Implementation Report summarizes the ISRA activities completed in 2009 and includes all pertinent ISRA project-related documentation associated with the work.

Performance monitoring of stormwater runoff upgradient and downgradient of the Phase I ISRA areas is being performed to assess the contribution of ISRA COCs to surface water runoff following completion of remedial activities. Performance monitoring was conducted at Phase I ISRA areas and selected Outfall 009 culverts during the 2009-2010 and 2010-2011 rainy seasons per the monitoring plans (MWH, 2010a and 2010m). Sampling results from the 2009-2010 rainy season have been presented in a memorandum submitted to the RWQCB on June 30, 2010 (MWH, 2010k); sampling results from the 2010-2011 rainy season will be published in a report scheduled to be submitted to the RWQCB in July 2011. This report will also include an overall summary of performance monitoring sampling results collected to date, and recommendations for future sampling and ISRA activities. Although the overall effectiveness of the ISRA remedial actions in meeting the requirements of the CAO will be evaluated by the results of NPDES surface water samples collected at Outfalls 008 and 009 compared to NPDES permit limits, performance monitoring sampling results will be considered when assessing the need for additional ISRA actions, if any.

1.1.4 Phase II Scope

ISRA remedial activities performed in 2010 are considered to be Phase II implementation activities. Phase II activities consisted of soil sampling to refine ISRA PEAs, ISRA area identification, remedial alternatives evaluation, surveying, permitting, supplemental work plan preparation, sampling to characterize soil for waste disposal purposes, sampling to characterize soil for use as backfill during restoration (soil borrow area sampling), and remedial activities. ISRA remedial activities during 2010 consisted of excavation and site restoration at 11 ISRA areas in the Outfall 009 watershed (AP/STP-1A, AP/STP-1D, AP/STP-1F, B1-1A, B1-1B, B1-1C, B1-1D, B1-2, CTLI-1A, CTLI-1B, and IEL-1). These ISRA areas are located within and east of the B-1 RFI Site, on the ridge north of the Component Test Laboratory I (CTL-I) RFI

Site, within the Instrument and Equipment Laboratories (IEL) RFI Site, and in the vicinity of the Ash Pile and the Building 515 Sewage Treatment Plant (AP/STP) RFI Sites. The locations of these ISRA areas are shown on Figures 1-5 and 1-6, and tables and figures showing conditions at these ISRA areas prior to excavation are included in Appendix E.

ISRA Phase II activities performed in 2010 are described in this implementation report to serve in partial fulfillment of Item 4 of the CAO. Section 2 of this report provides details of the preparatory activities, and Section 3 provides the details of the remedial activities, in addition to the planned performance monitoring activities following completion of the ISRAs.

ISRA activities are performed to meet the requirements of the CAO, and therefore, similar to the Phase I activities, the Phase II ISRA activities focused on remediation of soil areas considered to be potentially contributing to exceedances of the limits at Outfalls 008 and 009. ISRA activities did not include investigation or remediation of other types of soil contamination within the Outfalls 008 or 009 watersheds, or include activities within other watersheds, since such activity was not directed by the CAO, and overall investigation and cleanup is being addressed under DTSC oversight as part of the currently-ongoing RCRA Corrective Action Program. However, additional activities were performed during ISRA Phase II implementation at ISRA areas AP/STP-1A, B1-2, and CTLI-1A where buried pipelines were removed during excavation activities. The portions of the pipelines within the excavation footprint were removed under DTSC and RWQCB oversight. Pipeline removal activities are described in Section 3.

1.1.5 Agency and Public Involvement

The RWQCB provides primary regulatory oversight of the ISRA project. In addition to the RWQCB, all Phase II ISRA activities were closely overseen by DTSC and the Santa Susana Site Surface Water Expert Panel, and grading activities on Boeing property were permitted and overseen by Ventura County¹. Below are additional details of how each agency was involved with the Phase II activities:

¹ Grading activities on federal property are not subject to Ventura County requirements.

- Weekly teleconferences to provide updates on project activities, schedule, and any ongoing issues were held, and were attended by Boeing, NASA, RWQCB, DTSC, Ventura County, and the Surface Water Expert Panel.
- Monthly and quarterly ISRA progress reports were submitted to the RWQCB describing Phase II ISRA activities (Boeing, 2009c, 2010a-f, 2010i-j, 2010l, 2010n-t).
- The 2010 ISRA Work Plan Addendum (MWH, 2010c) and supplemental plan addenda were submitted to the RWQCB and DTSC for review and comments, and comments were addressed in a work plan addendum (MWH, 2010).
- Draft versions of 2010 ISRA Work Plan Addendum (MWH, 2010c) and the 2010-2011 BMP and ISRA Performance Monitoring Sampling and Analysis Plan for the 008/009 Watersheds (MWH, 2010m) were submitted to the Surface Water Expert Panel for review and comments, and comments were addressed prior to finalization.
- The Surface Water Expert Panel developed containerized planting plans for Phase II ISRA areas, recommendations for erosion control hydroseeding (Surface Water Expert Panel, 2010a), recommendations for dirt road erosion control BMPs and procedures for road closures (Surface Water Expert Panel, 2010b), and a protocol for agency split sample collection for performance monitoring samples (E. R. Weiner, 2010).
- During Phase II ISRA field preparation and implementation (April 2010 – February 2011), the RWQCB conducted 20 site visits; DTSC conducted 2 site visits; and Ventura County conducted 13 site visits.
- The RWQCB collected and analyzed 57 split samples of excavation confirmation soil samples at Phase II ISRA areas.
- Excavation confirmation soil sampling results for each ISRA area were provided to the RWQCB and DTSC for review, results were discussed on teleconferences, and approval that SRGs had been achieved was received from the RWQCB prior to excavation backfill and restoration of each ISRA area.
- Boeing, NASA, and the Surface Water Expert Panel gave a presentation on ISRA Phase II activities at the public Santa Susana Site public site tour on January 22, 2011.

Public participation during Phase II ISRA activities included three site visits by members of the public between August and October 2010, and participation in the Santa Susana Site public site tour on January 22, 2011. ISRA documents, including work plans, supplemental plans, soil waste characterization certifications, quarterly progress reports, and letter communications with regulatory agencies, were made available to the public on the Boeing external web site, on a page dedicated to ISRA, within 10 working days of submittal to the RWQCB, at the following web address: http://www.boeing.com/aboutus/environment/santa_susana/isra.html.

1.2 REPORT CONTENT

This data report includes the following four sections and 10 appendices:

- Section 1 presents project background information, describes the scope and objectives of the Phase II ISRA implementation activities, and describes the involvement of regulatory agencies and the public.
- Section 2 describes the preparation activities that were undertaken prior to Phase II ISRA implementation, including work plan addendum preparation, supplemental plan preparation, permitting, waste characterization sampling, Outfall 009 soil borrow area sampling, and site surveys and site preparation activities.
- Section 3 presents the results of the Phase II ISRA implementation activities, including excavations, Storm Water Pollution Prevention Plan (SWPPP) implementation, and site restoration. It also describes the plan that has been approved and implemented for stormwater performance monitoring during the 2010-2011 rainy season.
- Section 4 presents a summary of the work performed and ongoing.
- Appendix A provides copies of correspondence regarding Phase II ISRA implementation activities.
- Appendix B provides waste certification documents for excavated soils.
- Appendix C presents topographic surveys of Phase II ISRA implementation areas.
- Appendix D provides boring logs for soil samples and trench logs for excavations conducted during Phase II ISRA implementation activities.
- Appendix E presents maps and tables showing pre-excavation and confirmation soil sampling results, and excavation boundaries for Phase II ISRA areas.
- Appendix F provides offsite disposal records for soils excavated during Phase II implementation.
- Appendix G provides laboratory and data validation reports for soil samples associated with Phase II ISRA areas.
- Appendix H provides documents related to the removal of pipelines/conduits within ISRA areas AP/STP-1A, B1-2, and CTLI-1A during Phase II implementation activities.
- Appendix I provides photographs of ISRA Phase II implementation activities.
- Appendix J provides a Biological Survey and Construction Monitoring Report prepared by Padre Associates, Inc., presenting the results of biological surveys and monitoring conducted during and after the completion of Phase II ISRA implementation activities.

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2.0 PREPARATION ACTIVITIES

This section describes the preparation activities undertaken prior to Phase II ISRA implementation. Preparation activities included work plan preparation, supplemental plan preparation, obtaining necessary permits, soil waste characterization sampling, development of soil waste profiles, sampling in the Outfall 009 soil borrow area, and conducting site surveys and other site preparation activities.

2.1 2010 WORK PLAN ADDENDUM

The 2010 ISRA Work Plan Addendum (MWH, 2010c) was submitted to the RWQCB on April 30, 2010. The addendum supplements the previously submitted ISRA Work Plans and addenda (MWH 2009a-c, and NASA, 2009), by performing the ISRA area identification and remedial planning process for the eight remaining ISRA PEAs following the ISRA approach presented in the Final ISRA Work Plan. Within the eight remaining PEAs, 19 ISRA areas were identified via data gap and delineation soil sampling, PEA refinement, and evaluating according to the criteria described in the Final ISRA Work Plan (MWH, 2009b). The remedial alternatives analysis in the 2010 ISRA Work Plan Addendum (MWH, 2010c) identified excavation and offsite disposal as the optimal remediation strategy for 17 of these ISRA areas. The other two ISRA areas are associated with the Area I Landfill (A1LF-1 and A1LF-2), for which development of a remediation strategy is underway. Potential source removal alternatives for these two areas include excavation and offsite disposal, capping with a clay cap, constructing diversion and collection structures, and phytoremediation. Additional data collection to support the evaluation of these alternatives has included performance monitoring downgradient of these areas since 2009 and phytoremediation pilot testing. A separate work plan will be submitted once the evaluation is complete.

RWQCB and DTSC provided comments on the 2010 ISRA Work Plan Addendum verbally to Boeing during a teleconference held on May 19, 2010. Boeing summarized the comments and provided planned responses in an email to RWQCB and DTSC dated May 25, 2010 (MWH, 2010g). RWQCB provided email confirmation that the responses were acceptable on May 26, 2010 (RWQCB, 2010a), and DTSC provided three additional comments and email

confirmation that the responses were acceptable on May 26, 2010 (DTSC, 2010). Boeing subsequently submitted a memorandum response to comments that included an errata package for the 2010 ISRA Work Plan Addendum (MWH, 2010c). RWQCB indicated approval of the 2010 Work Plan Addendum in a letter to Boeing dated June 30, 2010 (RWQCB, 2010b). These communications are included in Appendix A.

Subsequent to submittal of the 2010 Work Plan Addendum (MWH, 2010c), additional delineation soil sampling was performed, resulting in the refinement and subdivision of several ISRA areas. ISRA areas A2LF-2, AP/STP-1C, AP/STP-1E, B1-1, CTLI-1, and LOX-1B were subdivided as follows: A2LF-2 was subdivided into A2LF-2A and A2LF-2B; AP/STP-1C was subdivided into AP/STP-1C-1 and AP/STP-1C-2; AP/STP-1E was subdivided into AP/STP-1E-1 through AP/STP-1E-3; B1-1 was subdivided into B1-1A through B1-1D; CTLI-1 was subdivided into CLTI-1A and CTLI-1B; and LOX-1B was subdivided into LOX-1B-1 through LOX-1B-4. Laboratory and data validation reports for data gap and source delineation soil samples associated with Phase II ISRA areas are included in Appendix G.

In total, there were 32 ISRA areas remaining prior to Phase II implementation, including the two Area I Landfill ISRA areas for which a remedial approach has not been finalized and the ELV ISRA areas identified in the Final ISRA Work Plan (MWH, 2009b). All ISRA areas, including those completed during Phase I implementation, are shown on Figures 1-4, 1-5, and 1-6. These figures also present concentrations of ISRA COCs in surface soils (0 to 2 feet) within the Outfall 009 watershed prior to Phase II ISRA implementation. The samples with results above SRGs for ISRA COCs shown on the figures meet one of the following criteria:

- 1) Are located within ISRA areas planned for remediation;
- 2) Are located within an ISRA PEA that, following evaluation in the 2010 ISRA Work Plan Addendum (MWH, 2010), was not recommended for remedial action;
- 3) Are located upgradient of a culvert where stormwater maintenance activities are ongoing, and remedial action will be evaluated as part of the performance monitoring program;
- 4) Are located under an impermeable layer (e.g., asphalt or building); or
- 5) Are slightly above the SRG, not located near a drainage, and/or surrounded by small amount of soil.

As described in Final ISRA Work Plan, effectiveness of ISRA activities in meeting the requirements of the CAO will be evaluated by the results of surface water samples collected at Outfalls 008 and 009 under the NPDES program. In addition, performance monitoring sample results will be considered when assessing the need for additional source control actions, if any, and at that time additional work plan addenda will be prepared.

2.2 SUPPLEMENTAL PLAN ADDENDA

Following work plan development, addenda to the Phase I supplemental plans were prepared to support Phase II ISRA implementation. These supplemental plan addenda were submitted to the RWQCB and DTSC prior to the commencement of applicable Phase II activities. Regulatory approvals are provided in Appendix A.

- 2010 Addendum to the Soil Management Plan (SMP), which provides updated procedures for waste soils characterization, soil handling, and stockpile and container management for Phase II ISRA areas (MWH, 2010e); RWQCB indicated approval of the 2010 Addendum to the SMP in a letter dated September 23, 2010 (RWQCB, 2010c).
- SWPPP Rev. 2 for ISRA was submitted to the State Water Quality Control Board (SWQCB) online SMARTS website on June 25, 2010 (MWH, 2010j).
- 2010 Addendum to the Final ISRA Transportation Plan, which provides updated procedures for loading, Santa Susana Site entry and egress, transportation of soil waste on public roads, and an updated plan for minimizing potential health, safety, and environmental risks that may result during these activities (MWH, 2010d); an addendum letter was submitted to the RWQCB adding the McKittrick Waste Treatment Site as an option for disposal of non-hazardous soils (Boeing, 2010m).
- Health and Safety Plan Addendum 29 to the RCRA Facility Investigation Health and Safety Plan (MWH, 2010h), which describes overall health and safety requirements for the ISRA project tasks.
- Recommendations for Erosion Control Hydroseeding Methods and Culvert Modification Areas, which provides recommendations for improvements to hydromulching techniques, seed mixes, weed control, and use of culvert modifications (Surface Water Expert Panel, 2010a); and Technical Memorandum, Recommended Procedures for Road Closures in the Outfalls 008 and 009 watersheds, which provides procedures for abandoning and restoring unpaved roads where use is no longer required (Surface Water Expert Panel, 2010b).
- Environmental Sampling of Dioxins and Other Low Solubility Pollutants at Parts-per-Billion and Lower Concentrations, which recommends protocols for field collection of ISRA performance monitoring samples and obtaining replicate split samples using a Dekaport cone splitter (Weiner, 2010); the RWQCB indicated its approval of the protocols in a letter dated October 6, 2010 (RWQCB, 2010d); an addendum letter was

submitted to the RWQCB documenting the use of a subcontract laboratory to conduct the split procedures (Boeing, 2011a).

- 2010-2011 BMP and ISRA Performance Monitoring Sampling and Analysis Plan for the 008/009 Watersheds, which describes the sampling and analysis plan for performance monitoring at ISRA areas and BMP sub-watershed sampling recommended in the BMP Plan described in Section 1.1 (MWH, 2010m).

2.3 PERMITTING

Permitting activities were conducted prior to commencing Phase II implementation activities, as required by Item 7 of the CAO. All necessary permits were obtained prior to beginning remediation activities and included the following:

- Clean Water Act (CWA) Section 404, Nationwide Permit (NWP) 38 (Cleanup of Hazardous and Toxic Waste), from the U.S. Army Corps of Engineers (USACE), for activities performed at ISRA areas AP/STP-1E and LOX-1A (other remaining ISRA areas were evaluated and determined to be outside USACE geographic jurisdiction) (Boeing, 2010h; USACE, 2010);
- CWA Section 401 Notification to RWQCB for Phase II ISRA areas was submitted prior to commencing field work. CWA Section 404 NWP 38 is a CWA Section 401 Certified permit (Boeing, 2010g);
- Determination that Phase II activities were covered under an existing Amendment to Streambed Alteration Agreement (SAA) No. 1600-2003-5052-R5 with the California Department of Fish and Game (CDFG) (Boeing, 2009b; CDFG, 2009);
- Grading Permit from Ventura County for Phase II ISRA areas located on non-Federal property (MWH, 2010f; Ventura County, 2010b; Boeing, 2010k), approved by Ventura County on July 13, 2010 (Ventura County, 2010c); and
- Letter of Exemption from Ventura County, to remove contaminated soil from the protected zones of 25 *Quercus agrifolia* (Coast Live Oak) at Phase II ISRA areas (Padre, 2010a; Ventura County, 2010a).

Correspondence relevant to these permits is included in Appendix A.

2.4 WASTE CHARACTERIZATION SAMPLING

The guidelines presented in “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods”, U.S. Environmental Protection Agency (USEPA) publication SW-846, were followed to characterize soil removed from the ISRA excavations as either nonhazardous or hazardous waste for disposal purposes, as described in the 2010 Addendum to the ISRA SMP (MWH, 2010e). To facilitate this, *in situ* waste characterization soil samples were collected

from Phase II ISRA areas prior to beginning remedial activities. The number of waste characterization samples required for each ISRA area was determined based on estimated contaminant presence, excavation area, excavation footprint shape, and projected volume of material to be removed. *In situ* waste characterization samples were collected from random locations within each ISRA area, with sample locations determined by randomly-generated coordinates within the ISRA area boundary. In one case, four additional randomly identified *ex situ* waste characterization samples were collected from a stockpile after excavation was conducted, as described in Section 3.1. This was performed because the soil in the stockpile originated outside the *in situ* characterized excavation footprint. Sample locations and results for waste characterization samples are included in tables and figures showing conditions at ISRA areas prior to excavation in Appendix E.

The analytical suite for waste characterization samples was determined based on documented historical information and analytical data, including data from ongoing RFI and ISRA data gap sampling. In addition, all waste characterization samples were analyzed for radiological constituents. The radionuclide sampling and analysis protocol for waste characterization sampling was the same as that used for the Northern Drainage cleanup action approved by DTSC. Laboratory requirements for radionuclide analysis were presented in the 2010 Addendum to the ISRA SMP (MWH, 2010e), as indicated below:

- Gamma-emitting radionuclides by HASL Method 300;
- Strontium-90 by USEPA Method 905.0; and
- Tritium by USEPA Method 906.0.

The results of waste characterization samples were used to develop chemical and radiological waste certifications prepared by Boeing. Chemical waste certifications classified waste soils from each ISRA area as nonhazardous or hazardous, pursuant to Title 22 of the California Code of Regulations (CCR). Radiological waste certifications addressed any detected activity in waste soils compared to local soil background and human health standards. Waste certifications for Phase II ISRA areas are included in Appendix B, and laboratory reports for waste characterization samples are included in Appendix G. The nonhazardous or hazardous classification of soils excavated from each ISRA area is listed in Table 3-1. Waste soils from

Phase II ISRA areas met the requirements of disposal facility permits and complied with the California Health and Safety Code, as described in the radiological waste certifications included in Appendix G.

2.5 OUTFALL 009 SOIL BORROW AREA SAMPLING

A local soil borrow source was used for fill during re-contouring of excavations in Outfall 009 on Boeing property. The soil borrow area was located within the Outfall 009 watershed on Boeing property, in a small valley east of Well RD-47 near the Outfall 009 watershed divide, approximately 1,400 feet south of the former LOX Plant and approximately 1,250 feet northeast of the Alfa RFI Site. The area is not believed to have been impacted by operational activities. The location of the soil borrow area is shown on Figure 1-6.

Prior to use, 17 soil samples were collected from 10 locations within the soil borrow area and analyzed for the following ISRA COCs and other site-related chemicals of potential concern:

- Metals by USEPA Methods SW6010B, SW6020, SW6020A, and SW7471A;
- Dioxins by USEPA Method 1613B;
- Fluoride by USEPA Method 300.0;
- pH by USEPA Method 9045C;
- Polychlorinated biphenyls (PCBs) by USEPA Method 8082;
- Total petroleum hydrocarbons (TPH) by USEPA Method SW8015B, modified;
- Volatile organic compounds (VOCs) by USEPA Method SW8260B; and
- Semi-volatile organic compounds (SVOCs) by USEPA Method 8270C SIM.

Soil borrow area sample results did not exceed the SRGs, background concentrations, or risk-based screening levels (RBSLs). Soil borrow area sampling results were provided to the RWQCB and DTSC for review in a memorandum dated July 23, 2010 (MWH, 2010l), and RWQCB indicated their approval of the soil borrow area in a letter dated September 23, 2010 (RWQCB, 2010c), attached to which is an email from DTSC recommending RWQCB approve the soil borrow area. Boring logs for soil borrow area samples are included in Appendix D. Laboratory and data validation reports are included in Appendix G.

Soil from the soil borrow area may be used as backfill during restoration of one ISRA area in the Outfall 009 watershed on Boeing property during Phase III ISRA activities (ISRA area IEL-2), and therefore final re-contouring and restoration of the RD-47 soil borrow area is anticipated to be completed during 2011.

2.6 SITE SURVEYS AND SITE PREPARATION ACTIVITIES

The following site surveys and site preparation activities were conducted prior to the Phase II ISRA implementation:

- Biological surveys of planned Phase II ISRA areas and the soil borrow area, conducted by Padre, Inc., (Padre, 2010b and 2010c). The biological surveys were performed to identify the presence of sensitive species and to help prepare potential relocation and/or mitigation options, and to ensure compliance with the CDFG SAA.
- Archaeological assessment of planned Phase II ISRA areas within the Outfall 009 watershed on Boeing property, conducted by W and S Consultants (W and S, 2009). The archeological assessment was performed to identify the potential for adverse impacts to cultural resources.
- Archaeological assessment of planned Phase II ISRA areas within the Outfall 009 watershed (NASA property) was conducted by CH2M HILL to identify the potential for adverse impacts to cultural resources. The archaeological survey report for NASA property within Outfall 009 was provided to the California State Historic Preservation Office (SHPO); NASA received concurrence from California SHPO on August 3, 2009 and submitted the report to the South Central Coastal Information Center, California State University, Fullerton.
- Pre-excavation aerial topographic survey of the entire Outfall 009 watershed, including planned Phase II ISRA areas, conducted by Sage Consultants, Inc... Pre-excavation topographic survey drawings are included in Appendix C.
- Stormwater BMP installation, per the SWPPP, was performed on July 15-19, 2010 for planned Phase II ISRA areas within the Outfall 009 watershed on Boeing property, and on October 4, 2010 for planned Phase II ISRA areas within the Outfall 009 watershed on NASA property.
- Underground utility survey prior to advancement of all planned soil sampling and prior to Phase II implementation excavation.
- Vegetation clearance of all planned Phase II ISRA areas.

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3.0 PHASE II REMEDIAL ACTION IMPLEMENTATION SUMMARY

During Phase II implementation, remedial actions were conducted at 11 ISRA areas within the Outfall 009 watershed, including AP/STP-1A, AP/STP-1D, AP/STP-1F, B1-1A, B1-1B, B1-1C, B1-1D, B1-2, CTLI-1A, CTLI-1B, and IEL-1. The locations and planned boundaries of these ISRA areas are shown on Figures 1-5 and 1-6. The recommended remedial alternative identified for each of these ISRA areas was excavation and offsite disposal, as described above in Section 1.1.4. Remedial actions consisted of installing and inspecting erosion control BMPs per the ISRA SWPPP, excavating soil, transporting soil to an offsite disposal facility, collecting confirmation soil samples, backfilling excavations, completing site restoration, performing post-excavation and post-restoration topographic surveys, and conducting performance monitoring stormwater inspections and sampling. These activities are described in more detail below.

3.1 EXCAVATION SUMMARY

Excavations were conducted at Outfall 009 Phase II ISRA areas, with work practices in accordance with the ISRA supporting plans (MWH, 2010d, 2010e, 2010h, and 2010j). The total volume of soil excavated from Phase II ISRA areas was approximately 7,500 cy (*ex situ* estimate). Excavation activities began on July 20, 2010 and were completed on December 4, 2010. Contractors conducting the remedial activities were MPe (heavy equipment operation), EnviroSolve (geologic logging and sample collection), and MWH (field oversight). Equipment used during excavations included an excavator, a water truck, haul trucks, and a vacuum truck. A summary of the excavation details for each ISRA area, including the ISRA COCs and co-located RCRA risk drivers, planned and actual excavation surface areas and volumes, backfill volumes, excavation depths, numbers of waste characterization and confirmation samples collected, numbers of RWQCB split samples collected, and soil waste classifications, is provided in Table 3-1. Trench logs for the excavations are included in Appendix D. Photographs of ISRA Phase II excavation activities are included in Appendix I.

Pipelines/conduits and concrete containing conduits were encountered during excavation activities at ISRA areas AP/STP-1A, B1-2, and CTLI-1A. These features were documented, and the portions of the features within the excavation boundary were subsequently removed under

RWQCB and DTSC oversight, except where located under *Deinandra minthornii* (Santa Susana tar plants), a California-listed rare plant species. If pipelines contained black mastic wrapping on the exteriors, a sample of the wrapping was collected and analyzed for PCBs and/or asbestos for waste disposal purposes. Appendix H includes tables of pipeline segment characteristics and the results of pipeline sampling, building feature documentation logs, and building feature removal logs. Laboratory reports of pipe wrapping samples are included in Appendix G. Management and disposal of the pipelines/conduits, including materials contained within and adjacent to these features, and concrete were performed under the Santa Susana Site site-wide demolition program; therefore the offsite disposal records for these materials are not included in this report. A summary of the features encountered in each ISRA area is provided below.

- Within ISRA area AP/STP-1A, a buried 2-inch steel pipeline used for natural gas conveyance was encountered. The pipeline did not contain wrapping.
- Within ISRA area B1-2, 27 buried metal pipelines and conduits ranging in size from 1/2 to 12 inches in diameter, and concrete used to encase 11 of the conduits, were encountered. The pipelines are believed to have been used to transfer water, convey storm water, and supply fuel to the B-1 area. The conduits are believed to have been used to supply gas and electricity to the B-1 area. Pipe wrapping around one conduit contained asbestos and PCBs above RBSLs, and pipe wrapping around three pipelines/conduits contained PCBs above RBSLs. Asbestos and PCBs were added to the analytical suite of ISRA confirmation soil samples planned near these pipelines/conduits to assess post-removal conditions. Asbestos was not detected in the confirmation soil samples and PCBs were not detected above RBSLs. Sample results and laboratory reports for the confirmation soil samples are included in Appendices E and G, respectively.

A small volume of water with hydrocarbons was removed from one of the pipelines, and a small volume of soil with visible hydrocarbon staining was removed adjacent to the pipeline. The water with hydrocarbons was placed in a 30-gallon polyethylene container and classified as non-RCRA California hazardous waste. The soil was placed into a 55-gallon drum and classified as non-RCRA California hazardous waste. Although B-1 is not a former radiological facility, a radiation survey was performed on the pipeline prior to removal, including beta/gamma total surface contamination and gamma exposure rate. Results of the survey were non-detect. The radiological waste certification for this pipeline is included in Appendix B.

- Within ISRA area CTLI-1A, an aboveground pipeline was present. The pipeline is believed to have been used to supply water to CTL-1, possibly from a former tank located at the top of the slope. The pipeline was wrapped, but the pipe wrapping did not contain asbestos or PCBs.
- Within ISRA area CTLI-1A, two segments of a 4-inch buried metal pipeline were encountered. The pipeline did not contain wrapping.

Additional details of excavation activities are as follows:

- During excavation at ISRA area AP/STP-1D, leachfield gravels were encountered in the southern excavation sidewall. Excavation activities did not continue to the south, and no leachfield gravels were removed.
- Within the excavation footprints of ISRA areas B1-1A, B1-1B, B1-1D, and B1-2 are Santa Susana tar plants, a California-listed rare plant species, and/or Coast Live Oak, a Ventura County protected tree species. With the agreement of the RWQCB, a buffer of unexcavated soil was left in place around these plants to protect them. The project biologist and/or arborist provided recommendations during excavation activities near these species. The estimated locations of the buffer areas at ISRA areas B1-1A, B1-1B, B1-1D, and B1-2 are shown in figures in Appendix E.
- Within the excavation footprint of ISRA area B1-2 are five monitoring wells. With the concurrence of the RWQCB, a buffer of unexcavated soil was left in place around these features to protect them. The locations of the monitoring wells and the extent of the buffer are shown on figures in Appendix E.
- During excavation at ISRA area B1-2, burnt ash material was encountered in the northern portion of the drainage and under the adjacent oak trees where stormwater runoff collects. The burnt ash material is believed to be fire related. Approximately 10 cy of burnt ash material were removed; however, ash material was left in place at depth under the Coast Live Oak trees due to excavation limitations associated with the protected species.
- During excavation at ISRA area CTLI-1A, debris comprised of black melted material, metal shavings, and gravels was encountered. The debris, which is estimated to be less than 5 cy, was present in two locations in the central portion of ISRA area CTLI-1A. The source of the debris is unknown, but surficial debris (metal drum, metal debris, power pole, and a metal stand) in the area had been documented during the 2008 debris survey and subsequently removed prior to the ISRA excavation activities. The melting of the black debris is believed to have been a result of the Topanga Fire in 2005. The debris was documented and subsequently removed under RWQCB and DTSC oversight.
- During excavation at ISRA area IEL-1, sandstone bedrock was encountered at a shallower depth than expected based on pre-excavation boring logs within the excavation boundary. Trenches containing active utilities that were backfilled with hard, compacted material were present in the bedrock. With the agreement of the RWQCB, excavation of the hard, compacted material within the utility trenches was not performed.
- During excavation at ISRA area IEL-1, debris comprised of metal shavings, asphalt, and concrete were encountered. Debris within the planned excavation boundary was removed, totaling less than 1 cy. At the completion of excavation, debris remained in the western sidewall. Any remaining debris will be addressed during the RFI program under the oversight of DTSC.

After the excavations were completed, confirmation soil samples were collected from the sidewalls and floors of the excavations, at the frequencies specified in the Final ISRA Work Plan (MWH, 2009b), to confirm that SRGs were met. Data gap samples that remained in place along the sidewalls of excavations were also used for confirmation sample purposes, with the approval of the RWQCB. The number of confirmation samples collected at each ISRA area is provided in Table 3-1. Confirmation sample locations are shown in Appendix E figures, and confirmation sample results are listed in Appendix E tables. Laboratory and data validation reports are included in Appendix G. In general, soil associated with confirmation samples with results exceeding SRGs was subsequently removed, and, if the additional excavation did not contact bedrock, additional confirmation samples were collected. The remediation status of these confirmation samples are, therefore, listed as “Excavated” in Appendix E tables. There are ten confirmation samples with results slightly exceeding SRGs that were left in place with RWQCB agreement, including:

- Four floor confirmation samples at ISRA area B1-2 (B1ET0671, B1ET0680, B1ET0682, and B1ET0683) located among Coast Live Oak trees, a Ventura County protected tree species, where additional excavation would expose roots and potentially cause instability of the tree. The recommendation of the project biologist and/or arborist to not excavate additional soil at these locations is documented in communications, which are included in Appendix A (Pacific Horticulture 2010, Padre, 2010d);
- One sidewall confirmation sample at ISRA area B1-2 (B1ET0590) located along the entrance road, where additional excavation would compromise the road;
- Three confirmation samples (1 floor and 2 sidewall) at ISRA area B1-2 (B1ET0640, B1ET0654, and B1ET0687) with mercury results slightly above, but essentially equivalent to the SRG when the precision of the analyses is considered;
- One floor confirmation sample at ISRA area CTLI-1B (LFET0202) with a lead result slightly above the SRG, but the lead result in the RWQCB split sample is below the SRG; and
- One floor confirmation sample at ISRA area IEL-1 (ILET0001) located within the hard, compacted material of the utility trench, where additional excavation would be difficult and could compromise the safety of field staff due to the presence of active utilities.

To minimize mobilization of the constituents above SRGs, at least two feet of soil was placed over each of the floor confirmation samples mentioned above, except backfill at IEL-1 was limited to one foot of soil due to the shallow depth of excavation.

Soil management was conducted as specified in the 2010 Addendum to the ISRA Transportation Plan (MWH, 2010d) and the 2010 Addendum to the ISRA SMP (MWH, 2010e). Excavated soil classified as non-hazardous was loaded directly into haul trucks and transported to a temporary stockpile location at the Lower Parking Lot near the Santa Susana Site facilities entrance. Excavated soil from an area in the southwestern portion of ISRA area B1-2 was segregated from other soils excavated from ISRA area B1-2 because it was from an area outside of the boundary used for *in situ* waste characterization sampling, and *ex situ* stockpile samples were collected for waste characterization purposes. Results of chemical evaluations for this soil are addressed in the ISRA area B1-2 waste certification, and a separate radiological waste certification for this soil was prepared. Both waste certifications are included in Appendix B, and laboratory reports are included in Appendix G. Portions of waste soils from ISRA areas B1-1D, B1-2, and CTLI-1A were classified as hazardous. These soils were loaded directly into lined and covered roll-off bins and transported to the Lower Parking Lot for subsequent shipment to appropriately permitted disposal facilities. Within ISRA area B1-2, soils impacted by hydrocarbons were identified using a photo ionization detector (PID). The majority of these soils did not have hydrocarbon staining, and were loaded directly into roll-off bins and classified as non-hazardous based on existing data. Management of the small amount of soil with visible hydrocarbon staining is described earlier in this Section.

Soils classified as non-hazardous were transported to either Lancaster Recycle and Disposal Facility in Lancaster, California or McKittrick Waste Treatment Site in McKittrick, California for disposal. Soils classified as hazardous were transported to U.S. Ecology in Beatty, Nevada for disposal. Offsite disposal of waste soils was completed on February 28, 2011. Offsite disposal records, including a summary table and waste manifests, are provided in Appendix F.

Confirmation sample location maps and results tables for each ISRA area were provided to RWQCB for review and approval prior to backfill and site restoration. Following review of the confirmation sampling data, RWQCB concurred that excavation was complete at each ISRA area and restoration activities could proceed. Correspondences from RWQCB related to confirmation sample results and completion of excavations is included in Appendix A. Confirmation sample result tables and figures are included in Appendix E. All ISRA areas, including those completed

and planned for future implementation, are shown on Figures 3-1 and 3-2. These figures also present concentrations of ISRA COCs in surface soils (0 to 2 feet) within the Outfall 009 watershed after Phase II ISRA implementation.

Ground-based post-excavation topographic surveys were conducted by Sage Consultants, Inc., between October 25, 2010 and January 11, 2011, after excavations were completed and confirmation samples were approved by the RWQCB, prior to the beginning of re-contouring activities. Post-excavation topographic survey drawings are included in Appendix C.

Biological monitoring was conducted throughout Phase II excavation activities by Padre Inc. A summary of the monitoring is presented in the Santa Susana Site Outfall 009 ISRA Biological Survey and Construction Monitoring Report – June 2010 to February 2011 (Padre, 2011), which is provided in Appendix J.

3.2 SWPPP IMPLEMENTATION

Erosion control BMPs were installed at the Phase II ISRA areas beginning on July 15-19, 2010, prior to the start of remediation activities, per the ISRA SWPPP. Bi-weekly BMP inspections were conducted during the non-rainy season, and weekly BMP inspections were conducted during the rainy season, beginning on October 1, 2010. BMP conditions have been documented during inspections, and BMP repairs and maintenance have been performed on an ongoing basis.

Several rain events occurred during Phase II excavation and restoration activities. A list of each rain event and the total measured rainfall, as reported in the Quarter 4 2010 NPDES Discharge Monitoring Report (Boeing, 2011b) is provided below:

- October 6-7, 2010 0.93 inches;
- October 16-20, 2010 0.69 inches;
- November 19-21, 2010 0.74 inches;
- December 5-6, 2010 0.41 inches;
- December 17-23, 2010 7.22 inches;
- December 25-26, 2010 0.57 inches;
- December 29-30, 2010 0.43 inches;
- January 2-3, 2011 0.38 inches;

In anticipation of and prior to these rain events, all in-progress ISRA area excavations were covered with plastic tarps and secured with sandbags to prevent soil erosion. BMP inspections were conducted prior to each rain event, daily during the rain events, and after each rain event. Based on observations during the BMP inspections, no SWPPP surface water samples were collected. During and following these rain events, BMPs were repaired or replaced as necessary.

3.3 SITE RESTORATION

Restoration of each Phase II ISRA area was performed after RWQCB concurred that the excavation was complete, based on a comparison of confirmation sample results to SRGs or that additional excavation is limited by the presence of a plant species (Coastal Live Oak), active utilities, or infrastructure (road), as described in Section 3.1. Site restoration consisted of excavation backfill, excavation re-contouring, and/or installation of erosion control BMPs, as described below. Photographs of ISRA Phase II restoration activities are included in Appendix I.

Site restoration at the 11 Phase II ISRA areas began on October 27, 2010, and was completed on February 14, 2011. Excavations on Boeing property were backfilled using soil from the soil borrow area, as described in Section 2.5, and/or adjacent soils were utilized for re-contouring. At excavations on NASA property, adjacent soils were utilized for re-contouring. The estimated backfill volume for each ISRA area is listed in Table 3-1. Restored excavations approximately matched the previously existing topographic grade and sloped to ensure there were no areas where water might pond. Erosion control BMPs including fiber rolls, hay bales, silt fences, and hydroseed mulch were installed on and near the restored excavations.

The need for a treatment control BMP was identified at ISRA area B1-2 to minimize erosion and allow re-vegetation of the slope in the northern portion of the ISRA area. MWH, with support of the Surface Water Expert Panel, developed a conceptual design of the BMP. A temporary version of the conceptual treatment control BMP was installed in January and February 2011 to provide erosion control through the 2010-2011 rainy season. The temporary BMP consists of a lined retention basin located on the western side of the upland portion of the ISRA area and earthen berms located along the top of the slope to direct surface water flow into the basin.

Surface water collects in the basin and drains through a perforated standpipe surrounded by a gravel filter, discharging into the drainage west of the ISRA area, immediately upgradient of a culvert inlet that discharges into the Outfall 009 drainage. The location of the BMP and discharge pipeline is shown on Figure 3-4. MWH, with support of the Surface Water Expert Panel, is currently designing the final treatment control BMP. In addition, Geosyntec Consultants, with support of the Surface Water Expert Panel, developed a conceptual design for an upgrade of the culvert at the western end of the drainage at the base of the slope within the B1-2 ISRA area, which is currently in the design phase. The culvert modification will consist of a perforated standpipe surrounded by filtration media to reduce sediment loads in stormwater discharging to the Outfall 009 drainage. Installation of both the final BMP and the culvert modification are anticipated in summer 2011.

In addition, closure and rehabilitation of unpaved roads that were no longer needed for use were performed, including two dirt roads within the Outfall 009 watershed (the road between B1-1 ISRA areas and Woolsey Canyon Road, and the road between CTLI-1 ISRA areas and the Area II Service Road) and fire roads in the in the Outfall 008 watershed (between Happy Valley South and Outfall 008). Road closure and rehabilitation was performed according to the Technical Memorandum, Recommended Procedures for Road Closures in the Outfall 008 and Outfall 009 Watersheds (Surface Water Expert Panel, 2010b). To prevent soil erosion in the Phase II ISRA areas, containerized plants were planted in several locations within and near the ISRA areas. The locations of hydroseed/mulch application, plant installation, and road rehabilitation within the Outfalls 008 and 009 watersheds are shown in Figures 3-3, 3-4, and 3-5. Information on other BMP activities that are planned, are underway, or have been completed in the Outfalls 008 and 009 watersheds can be found in the BMP Plan (MWH *et al.*, 2010).

Post-restoration ground-based topographic surveys of the Phase II ISRA areas was conducted by Sage Consultants, Inc., between December 1, 2010 and February 15, 2011, after excavation backfill and re-contouring activities were completed. Post-restoration topographic survey drawings are included in Appendix C.

Biological monitoring was conducted throughout Phase II restoration activities by Padre Inc. A summary of the monitoring is presented in the Santa Susana Site Outfall 009 ISRA Biological Survey and Construction Monitoring Report – June 2010 to February 2011 (Padre, 2011), which is provided in Appendix J.

3.4 PERFORMANCE MONITORING

The 2010-2011 BMP and ISRA Performance Monitoring Sampling and Analysis Plan (MWH, 2010m) was developed for monitoring stormwater runoff during the 2010-2011 rainy season at Phase I and II ISRA areas and select culverts within the Outfall 009 watershed. The monitoring plan also includes sampling at potential treatment BMP locations as described in the BMP Plan (MWH *et al.*, 2010) mentioned in Section 1.1. Per the plan, monitoring of completed ISRA areas and culverts consists of collecting upgradient and downgradient stormwater runoff samples once per rain event, if surface water flow is observed. Performance monitoring samples are analyzed for the ISRA COCs for that ISRA area or culvert, and screened against NPDES permit limits for comparison and evaluation purposes only.

Performance monitoring at the Phase II ISRA areas was conducted during the 2010-2011 rainy season, and is planned to continue through the 2011-2012 rainy season. Performance monitoring at Phase I ISRA areas and selected culverts was conducted during the 2009-2010 rainy season and the 2010-2011 rainy season. Sampling results from the 2009-2010 rainy season were presented in a memorandum submitted to the RWQCB on June 30, 2010 (MWH, 2010k). Sampling results from the 2010-2011 rainy season are being reviewed with the RWQCB and DTSC on an ongoing basis as data are received, and will be presented in a summary report scheduled to be submitted to the RWQCB in July 2011. This report will also include an overall summary of performance monitoring sampling results collected to date, and recommendations for future sampling and ISRA activities.

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4.0 SUMMARY AND ONGOING WORK

Phase II ISRA remedial activities during 2010 consisted of excavation and site restoration at 11 ISRA areas in the Outfall 009 watershed. A total of approximately 7,500 cy (*ex situ*) of soil was removed from Phase II ISRA area excavations. Confirmation sampling and analysis results demonstrate that the soil remaining in place at the Phase II ISRA areas contain ISRA COCs at concentrations that are below or consistent with the ISRA SRGs, or additional excavation is limited by the presence of a plant species (Coastal Live Oak), active utilities, or infrastructure (road). The RWQCB and DTSC reviewed the confirmation sampling data and agreed that the soil removal actions at the 11 ISRA areas were complete prior to the implementation of restoration activities.

Restoration activities at Phase II ISRA areas included backfilling excavations using a local soil borrow source approved by RWQCB and DTSC, re-contouring the areas to approximately pre-existing topographic grades, and installing erosion control BMPs. Site restoration at ISRA area B1-2 included construction of a temporary treatment control BMP consisting of a lined retention basin, earthen berms, and a discharge pipeline. Closure and rehabilitation of unpaved roads was conducted within the Outfall 009 watershed at the road between B1-1 ISRA areas and Woolsey Canyon Road, the road between the CTLI-1 ISRA areas and the Area II Service Road, and within the Outfall 008 watershed at fire roads in the Happy Valley South area. Also, containerized native plants were installed in the Outfall 009 watershed, and BMP inspections have continued in both outfalls throughout the rainy season per the ISRA SWPPP.

Performance monitoring of stormwater runoff upgradient and downgradient of the Phase I and II ISRA areas and selected culverts was conducted during the 2010-2011 rainy season, and results will be presented in a summary report scheduled to be submitted to the RWQCB in July 2011. The report will also include a summary of the 2009-2010 rainy season results and recommendations for monitoring at Phase I ISRA areas and culverts. Performance monitoring at Phase II ISRA areas is planned to continue through the end of the 2011-2012 rainy season.

Phase III ISRA implementation will be performed in 2011 and is planned to consist of seven ISRA areas in the Outfall 009 watershed, including IEL-2 and the six remaining AP/STP ISRA areas. The locations of these ISRA areas are shown on Figures 1-5 and 1-6. At this time, the field preparation at ISRA area IEL-2 is complete and excavation is anticipated to begin in the near future. Phase IV ISRA implementation will be performed in 2012 and is planned to consist of 11 ISRA areas in the Outfall 009 watershed, including the two A2LF ISRA areas, the two ELV ISRA areas, and the seven LOX ISRA areas. Remedial action at the two A1LF ISRA areas will be scheduled following completion of the remedial alternatives evaluation, and remedial action at the ISRA area IEL-3 will be scheduled following asphalt removal.

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TABLES

TABLE 3-1
Phase II ISRA Area Excavation Summary
(Page 1 of 1)

Area	ISRA COCs ^a	Collocated RCRA Risk Drivers ^b	Planned Excavation Graded Area ^c (acres)	Planned Excavation Volume ^d (cubic yards)	Actual Excavation Surface Area ^e (acres)	Actual <i>In Situ</i> Excavation Volume ^f (cubic yards)	Actual <i>Ex Situ</i> Excavation Volume ^g (cubic yards)	<i>In Situ</i> Backfill Volume ^h (cubic yards)	Maximum Depth ⁱ (feet)	Average Depth ⁱ (feet)	Number of Waste Characterization Soil Samples ^j	Total Number of Confirmation Soil Samples ^k	Number of Sidewall Soil Samples ^l	Number of Floor Soil Samples ^m	Number of RWQCB Split Soil Samples ⁿ	Waste Classification ^p
AP/STP-1A	Lead, Dioxins	none	0.02	77	0.03	23	30	0	1	0.5	3	12	8	4	1	Non-Hazardous
AP/STP-1D	Dioxins	none	0.08	259	0.07	131	170	0	2	1.25	5	21	5	16	3	Non-Hazardous
AP/STP-1F	Dioxins	none	0.04	122	0.05	50	65	0	2	1	3	18	5	13	4	Non-Hazardous
B1-1A	Cadmium, Copper, Dioxins	none	0.09	280	0.08	229	298	150	5	2	4	14	5	9	1	Non-Hazardous
B1-1B	Dioxins	none	0.21	340	0.23	500	650	0	3	2	4	32	8	24	1	Non-Hazardous
B1-1C	Dioxins	none	0.004	12	0.005	22	29	0	3	2	1	3	1	2	1	Non-Hazardous
B1-1D	Dioxins, Mercury	none	0.24	775	0.29	850	1105	0	5	2	10	34	2	32	4	Hazardous & Non-Hazardous
B1-2	Cadmium, Copper, Dioxins, Lead, Mercury	Silver, TPH, BTEX	0.19	911	1.01	3000	3900	1623	8	2	16	268	46	222	35	Hazardous & Non-Hazardous
CTLI-1A	Copper, Dioxins, Lead	Benzo(a)-pyrene, Zinc	0.22	706	0.26	921	1197	0	7	2	8	33	13	20	3	Hazardous & Non-Hazardous
CTLI-1B	Copper, Dioxins, Lead	Benzo(a)-pyrene, Zinc	0.04	130	0.06			0	3	2	4	17	12	5	2	Non-Hazardous
IEL-1	Copper, Mercury	Arsenic, PCBs	0.02	61	0.01	23	30	23	1	1	3	7	4	3	1	Non-Hazardous

Notes:

^a ISRA COCs are those constituents in surface water that have resulted in exceedances of NPDES permit limits and benchmark limits at Outfall 009 since August 2004, including sample data collected for monitoring before the NPDES permit limits/benchmarks were established in 2006 for Outfall 009 (cadmium, copper, lead, mercury, dioxins). Listed ISRA COCs are those present at each ISRA area in soil samples above the Soil Remediation Goal.

^b Collocated RCRA risk drivers are those constituents detected in soil samples at each ISRA area that contribute to unacceptable human risks and ecological risks within the Outfall 008 and 009 watersheds, as presented in the RFI Group reports.

^c Planned graded area of each excavation, as provided in the grading permit application submitted to Ventura County in May 2010 for ISRA areas B1-1A, B1-1B, B1-1C, B1-1D, B1-2, CTLI-1A, CTLI-1B, and IEL-2 (subsequent to submittal of grading permit, planned graded areas changed for several ISRA areas based on receipt of additional sample results); and calculated from the final planned excavation boundaries projected onto the pre-excavation topographic surface, for ISRA areas AP/STP-1A, AP/STP-1D, and AP/STP-1F.

^d Planned volume of each excavation, as provided in the grading permit application submitted to Ventura County in May 2010 for ISRA areas B1-1A, B1-1B, B1-1C, B1-1D, B1-2, CTLI-1A, CTLI-1B, and IEL-2 (subsequent to submittal of grading permit, planned excavation volumes changed for several ISRA areas based on receipt of additional sample results); and calculated from the final planned excavation boundaries projected onto the pre-excavation topographic surface, for ISRA areas AP/STP-1A, AP/STP-1D, and AP/STP-1F.

^e Actual surface area of each excavation, calculated from the actual excavation boundaries identified in the post-excavation topographic survey projected onto the pre-excavation topography (topographic survey sheets provided in Appendix C).

^f Actual *in situ* volume of each excavation. For ISRA areas AP/STP-1A, AP/STP-1D, and B1-2, *in situ* volume was calculated by dividing the *ex situ* volume by an expansion factor of 1.3 (note G explains source of *ex situ* volume estimate for these ISRA areas). For other ISRA areas, *in situ* volume was calculated by Sage Consultants, Inc., by measuring the volume difference within the actual excavation boundary between the post-excavation and pre-excavation topographic surveys (topographic survey sheets provided in Appendix C).

^g Actual *ex situ* volume of each excavation. For ISRA areas AP/STP-1A, AP/STP-1F, and B1-2, reliable estimates of *in situ* volume from topographic surveys were not available, so *ex situ* volumes were developed using field estimates of excavated soil quantities, excavation depths from trench logs, and shipping weights from waste manifests. For other ISRA areas, *ex situ* volume was calculated by multiplying the actual *in situ* excavation volume by an expansion factor of 1.3.

^h *In situ* volume of backfill material for each excavation, calculated from known volumes of backfill soil from the Outfall 009 soil borrow area for ISRA areas B1-1A, B1-2, and IEL-1. Other ISRA areas were re-contoured without backfill. Fill volumes presented on topographic survey sheets in Appendix C represent backfill soil and/or adjacent soils used for re-contouring, and were calculated by Sage Consultants, Inc. by measuring the volume difference within the actual excavation boundary between the post-excavation and post-restoration topographic surveys (topographic survey sheets provided in Appendix C).

ⁱ Approximate maximum and average depths of each excavation, from the post-excavation topographic survey (topographic survey sheets provided in Appendix C).

^j Number of soil samples collected within the boundaries of each excavation, for purposes of characterizing soil for disposal. Waste characterization samples were collected *in situ* prior to excavation, except for ISRA area B1-2, which had *in situ* and *ex situ* waste characterization samples (four *ex situ* waste characterization samples were collected from a stockpile containing soil removed from ISRA area B1-2).

^k Total number of soil samples collected from floor and sidewall of excavation, for purposes of confirming that Soil Remediation Goals for ISRA COCs had been met, per the Final ISRA Work Plan (MWH, 2009b).

^l Number of confirmation soil samples collected from the sidewall of the excavation; includes samples collected prior to ISRA implementation that are located on excavation sidewalls.

^m Number of confirmation soil samples collected from the floor of the excavation.

ⁿ Number of confirmation soil samples of which RWQCB collected split samples for analysis at a separate laboratory.

^p Classification of waste soils for each excavation as hazardous or non-hazardous, from results of waste characterization samples. Waste certifications are provided in Appendix B.

Acronyms:

COC - Constituent of Concern
 ISRA - Interim Source Removal Action

NPDES - National Pollutant Discharge Elimination System
 RCRA - Resource Conservation and Recovery Act

RFI - RCRA Facility Investigation
 RWQCB - Los Angeles Regional Water Quality Control Board