Uncontroverted Fact	Boeing Evidence, DTSC Response
	SSFL site should be cleaned up to a stricter standard than would be required under generally applicable State law? MR. ROBINSON: Objection; lack of foundation. THE WITNESS: No.
104. If SB 990 could not be applied to all of the contamination at SSFL, it would not be possible to "sum" the risks for the entire site and to develop "cumulative risk" assessment as required by SB 990.	• **Not Disputed**
105. There is no technical, scientific, or environmental basis to single out SSFL for more onerous cleanup procedures than apply to other contaminated sites in California.	***Boeing's Evidence*** • Malinowski Dep. [28:22] – [29:3] ("Q. Is there anything that you can identify about the SSFL site that poses a more significant threat to public health than other sites in the state? … [A.] I am not aware of any imminent threat that is posed by SSFL at this point based on the available information I've had."); • *Id.* at [95:21] – [96:1] ("Q. Does the chemical contamination that is present at SSFL pose a different risk to the public or the environment than the similar chemical contamination found on the other industrial sites in the state? … [A.]

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Uncontroverted Fact	Boeing Evidence, DTSC Response
	No."); • *Id.* at [96:2] – [96:11] ("Q. … Am I correct that there are also other sites in the state that contain radiological contamination? A. Yes. Q. Is there anything about the radiological contamination that is present at SSFL that poses a different risk to the public or the environment than radiological contamination present at other sites in the state of California? A. Not to the best of my knowledge, no."); • *Id.* at [136:2] – [136:17] ("Q. … [I]s there anything about either the chemical or radiological contamination at SSFL that, in your view, would justify applying a different approach to the cleanup at SSFL than at other sites in the state? … [A.] … No. Q. … Is there anything else about the site other than the chemical or radiological contamination, and putting aside SB 990 for the moment, that would, in your view, justify applying a different approach to the cleanup at SSFL than at other sites in the state? … [A.] No."); • Brausch Dep. [107:17] – [107:22] (Q. Can you identify any reason to conclude that the SSFL site should be cleaned up to a stricter standard than would be required under generally applicable State law? … A. … No.").

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ATTACHMENT 1

Uncontroverted Fact	Boeing Evidence, DTSC Response
	DTSC Response **Disputed.** Objection: Defendant objects to Statement of Fact # 105 in that it mischaracterizes the witnesses' testimony cited [above] – the witnesses did not testify that there is no technical, scientific or environmental basis to single out SSFL for more onerous cleanup procedures that apply to other contaminated sites in California.
106. McClellan Air Force Base, roughly the same size as SSFL, is seven miles from Sacramento and is contaminated with all of the same contaminants listed in SB 990, many in higher concentrations, including TCE.	***Boeing's Evidence*** • Malinowski Dep. [26:3] – [26:23] (McClellan Air Force Base close to major population centers); • *Id.* at [28:7] – [28:9] ("[A.] McClellan Air Force Base was the most polluted Air Force Base out of all the Air Force. It ranked the highest."); • *Id.* at [34:9] – [36:16]; • *Id.* at [101:11] – [102:12]; • *Id.* at [128:11] – [134:24] (higher concentrations of volatile organic compounds than SSFL); • *Id.* at [141:11] – [141:16]; • *Id.* at [144:6] – [148:22] ("… Q. In your view, is the McClellan Air Force Base a fairly similar site to the SSFL site in terms of the contamination that is present? A. The types of contamination, yes. … Q. There was TCE as well; is that right? A. Yes.);

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Uncontroverted Fact	Boeing Evidence, DTSC Response
	• Greger Dep. [68:7] – [68:16]; • Bowers Decl. ¶¶35, 50, 53, 55, 58, 64; • Ex. 6 to Bowers Decl., *Public Health Assessment, McClellan Air Force Base, Sacramento, Sacramento, California* at 1-5 (Agency for Toxic Substances and Disease Registry 1994); • Ex. 7 to Bowers Decl., *McClellan Air Force Base Administrative Record 6504* at 2-1 (EPA 2008); • Ex. 8 to Bowers Decl., *McClellan Air Force Base (Groundwater Contamination)* at 2, 3, 7 (U.S. EPA Region 9); • Ex. 9 to Bowers Decl., *Five Year Review; Former McClellan Air Force Base, California*, July 2009, at 3-1 (MWH Americas, Inc.); • Ex. 10 to Bowers Decl., *Proposed Plan for Soil Cleanup, McClellan AFB Parcel C-6* at 3 (EPA October 2008). ***DTSC Response*** **Disputed.** Objection: Witnesses lack personal knowledge. Comparisons between the amount of contaminants at the SSFL and those detected at other sites in California lacks the necessary foundation (*i.e.*, a complete characterization of the SSFL site); see State's. SUF, ¶ 117.

ATTACHMENT 1

Uncontroverted Fact	Boeing Evidence, DTSC Response
107. Lawrence Livermore National Laboratory, more than twice the size of SSFL, is 48 miles from San Francisco and is a DOE laboratory used for nuclear weapons and other research. It is contaminated with all of the same contaminants listed in SB 990. Among other things, it has had higher historical concentrations of TCE and tritium than SSFL.	***Boeing's Evidence*** • Malinowski Dep. at [101:11] – [102:12]; • *Id.* at [163:13] – [163:24] (Lawrence Livermore close to major population centers); • *Id.* at [169:7] – [175:16] ("Q. Is the list of contaminants at the Lawrence Livermore National Laboratory similar to the list of contaminants of concern at SSFL?... A. Looking both together?... I would say they're similar, yes."); • *Id.* at [173:5] – [173:16] ("Q. [I]s there anything about [Lawrence Livermore National Laboratory] that would support taking a different approach to the cleanup than at SSFL? … [A.] No."); • *Id.* at [175:12] – [175:16] ("Q. Is it fair to say that the principal contaminants of concern at Lawrence Livermore National Laboratory are found in higher concentrations than the same contaminants found at SSFL? A. For those that I am aware of, yes."); • Bowers Decl. ¶¶32, 39, 48-49, 51-53, 58, 60, 62; • Ex. 4 to Bowers Decl., *Site-Wide Record of Decision Lawrence Livermore National Laboratory Site 300* at pages 1-1, 2-1, 2-2, 2-4, 2-5, 2-6, 2-8, and 2-9, and Tables 2.5-1, 2.5-2, 2.5-3, 2.5-4, and 2.4-1 (DOE July 2008).

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Uncontroverted Fact	Boeing Evidence, DTSC Response
	DTSC Response **Disputed.** Objection: Witnesses lack personal knowledge. Comparisons between the amount of contaminants at the SSFL and those detected at other sites in California lacks the necessary foundation (*i.e.*, a complete characterization of the SSFL site); see State's. SUF, ¶ 117.
108. The Pratt & Whitney/UTC site is twice as large as SSFL and located 14 miles south of San Jose. It was formerly used for the manufacture and testing of rocket engines, including the development, manufacturing, and testing of solid propellant rocket motors and propellants. The site has many of the same contaminants as SSFL and has had higher historical concentrations of key contaminants, including TCE and perchlorate.	***Boeing's Evidence*** • Malinowski Dep. at [175:24] – [178:21] ("… Q. Are the principal contaminants of concern that are found at the United Technologies Corporation Pratt & Whitney site higher than the concentrations of the similar contaminants found at SSFL? A. For those that I'm aware of, yes…."); • *Id.* ("Q. Can you think of any reason to apply a different cleanup process or different cleanup rules at the Pratt & Whitney United Technologies site than at SSFL? A. No."); • Bowers Decl. ¶¶ 32, 34, 48, 53, 54, 58, 65; • Ex. 1 to Bowers Decl., *Revised Human Health and Ecological Risk Assessment Work Plan* at 2-1, 4-24 (ARCADIS Aug. 2009); • Ex. 3 to Bowers Decl., *Closure Plan – Former Open Burning Facility* at 1-15 through 1-17 (ARCADIS June 2010);

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Uncontroverted Fact	Boeing Evidence, DTSC Response
	• Ex. 5 to Bowers Decl., Order No. R2-2004-0032 Revision to Final Site Cleanup Requirements; United Technologies Corporation at 2, 9 (California Regional Water Quality Control Board 2004). ***DTSC Response*** **Disputed.** Objection: Witnesses lack personal knowledge foundation. Comparisons between the amount of contaminants at the SSFL and those detected at other sites in California lacks the necessary foundation (*i.e.*, a complete characterization of the SSFL site); see State's. SUF, ¶ 117.
109. SB 990 will result in a substantially more burdensome, time consuming, and expensive cleanup process than that required under generally applicable law, resulting in years of delay in the cleanup schedule, and the unnecessary expenditure of hundreds of millions of additional dollars, which will be allocated between Boeing and the federal	***Boeing's Evidence*** • Whipple Decl. ¶¶22–31; • Lenox Decl. ¶¶34–36; • Bowers Decl. ¶¶71–76; • Rutherford Decl. ¶¶48–51; • Brausch Dep. [201:19] – [205:17]; • Rainey Dep. [38:23] – [39:24]. ***DTSC Response*** **Disputed.** Objection: Defendant objects to Statement of Fact # 109 in that what is "required under generally applicable law" is a conclusion of law. Defendant further objects that the witnesses lack personal knowledge of how much the cleanup will cost, as

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Uncontroverted Fact	Boeing Evidence, DTSC Response
government.	the characterization of the site has not been completed. *See* State's. SUF, ¶ 117. Defendant further objects that the expert witnesses cited by Boeing lacked sufficient facts upon which to base their opinion about the cost of the cleanup because the characterization of the site is incomplete.
110. DTSC has made no attempt to determine whether any potential benefit SB 990's cleanup procedures might have on public health and safety would outweigh the significant potential adverse consequences.	• **Not Disputed**
111. SB 990 will require a substantial amount of additional soil to be removed from the site than under generally applicable law.	***Boeing's Evidence*** • Bowers Decl. ¶¶74–75; • Whipple Decl. ¶¶32–34; • Brausch Dep. [286:5] – [286:24]; • Rainey Dep. [91:2] – [91:17]; • *Id.* at [108:15] – [109:13]. ***DTSC Response*** **Disputed.** Objection: Defendant objects to Statement of Fact # 111 in that what is required under "generally applicable law" is a legal conclusion. Defendant further objects that the witnesses lack foundational

ATTACHMENT 1

Uncontroverted Fact	Boeing Evidence, DTSC Response
	personal knowledge of how much the cleanup will cost, as the characterization of the site has not been completed. *See* State's SUF, ¶ 117. Defendant further objects that the expert witnesses cited by Boeing lacked sufficient facts upon which to base their opinion about the amount of soil to be removed because the characterization of the site is incomplete.
112. Soil removal on a scale necessary to comply with SB 990 would require numerous additional dump-truck round trips through the community, greatly increasing the risk of traffic deaths and illness from pollution by diesel particulates.	***Boeing's Evidence*** • Whipple Decl. ¶¶32–34; • Bowers Decl. ¶¶77–80; • Brausch Dep. [293:15] – [294:17] ("Q. And am I correct that there is some risk to the public associated with additional trucking of soil from a site away from the site? A. Yes. … Q. … What is the nature of that risk? A. As I understand it, any time you have vehicular activity on a road, you have some measure of risk associated with accident rates and those sorts of risks that come to bear. Q. Also, diesel particulates? A. Sure. You have emissions from vehicles that travel on the roads."); • Rainey Dep. [91:2] – [92:23]; [107:10] – [109:10]. ***DTSC Response*** **Disputed.** Objection: Defendant objects that the witnesses

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Uncontroverted Fact	Boeing Evidence, DTSC Response
	lack foundational personal knowledge of how much the cleanup will cost, as the characterization of the site has not been completed. *See* State's SUF, ¶ 117. Defendant further objects that the expert witnesses cited by Boeing lacked sufficient facts upon which to base their opinion about the amount of soil to be removed because the characterization of the site is incomplete.
113. The excavation activities required to comply with SB 990 would destroy considerably more of the existing ecological habitat at SSFL than would otherwise occur.	***<u>Boeing's Evidence</u>*** • Bowers Decl. ¶74, 75. ***<u>DTSC Response</u>*** **Disputed.** <u>Objection:</u> Defendant objects that the witnesses lack foundational personal knowledge to testify about the quantification of ecological habitat that will be affected by SB 990's cleanup standard because it cannot be determined in the absence of a complete site characterization. *See* State's SUF, ¶ 117. Defendant further objects that the expert witnesses cited by Boeing lacked sufficient facts upon which to base their opinion about the amount of habitat that might be destroyed because the characterization of the site is incomplete.
114. The method by which contamination is released into the environment at a	• **Not Disputed**

Uncontroverted Fact	Boeing Evidence, DTSC Response
particular site has no relevance to the appropriate future land-use assumption or the amount of residual contamination that can safely remain at that site at the end of the cleanup.	

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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

THE BOEING COMPANY, Plaintiff, v. LEONARD ROBINSON, in his official capacity as the Acting Director of the California Department of Toxic Substances Control, Defendant.	Case No. CV 10-04839-JFW (MANx) **JUDGMENT PURSUANT TO FED. R. CIV. P. 54(b)**

The Court having granted Plaintiff The Boeing Company's Motion for Summary Judgment based on its determination that there were no genuine issues as to any material fact and that Plaintiff was entitled to judgment as a matter of law on Counts One, Two, and Three of the Amended Complaint, IT IS NOW, THEREFORE, HEREBY ORDERED, ADJUDGED, AND DECREED that judgment is entered in this action as follows:

1. Judgment is entered in favor of Plaintiff The Boeing Company as to Counts One, Two, and Three of the Amended Complaint.

2. California Senate Bill 990 ("SB 990"), codified at Cal. Health & Safety Code § 25359.20, is declared invalid and unconstitutional in its entirety under the Supremacy Clause of the United States Constitution.

ATTACHMENT 2

3. Defendant in his official capacity as Acting Director of the California Department of Toxic Substances Control ("DTSC") and any successors, as well as any officers, agents, servants, employees, or attorneys acting for or on behalf of DTSC, or persons in active concert or participation with any such person or DTSC, are hereby enjoined from enforcing or implementing SB 990.

4. The Court finds that there is no just reason for delay of the entry of final judgment. In light of this finding, final judgment for Plaintiff is entered pursuant to Rule 54(b) as to Counts One, Two, and Three of the Amended Complaint. Counts Four through Nine of the Amended Complaint, which seek the same relief sought in Counts One, Two, and Three, are stayed pending further order of the Court.

The Clerk is ordered to enter this Judgment.

DATED: May 5, 2011

HON. JOHN F. WALTER
UNITED STATES DISTRICT JUDGE

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ATTACHMENT 2

NASA COMMITTED TO AN EXCESSIVE AND UNNECESSARILY COSTLY CLEANUP

NASA has agreed to clean its portion of the Santa Susana site to a level that exceeds the generally accepted standard necessary to protect human health in light of the expected future use of the site. Moreover, the cleanup is likely to cost taxpayers significantly more than the cleanup effort NASA agreed to in its 2007 Consent Order with the State of California – a remediation level that was more stringent than what would be required based on the expected use of the site. Although the precise outlines of the cleanup effort and therefore its ultimate cost have not been finalized, NASA estimates that the cost to clean the soil to background levels could exceed more than $200 million. This is more than twice the cost to clean the site to residential levels and more than eight times the approximately $25 million NASA estimates it would cost to clean the site to a recreational use standard.[25] In addition, because cleanup to background levels may require highly invasive soil removal, there is a greater risk that such a cleanup may result in significant damage to the surrounding environment as well as to archeological, historical, and natural resources at the site.

NASA's Remediation Plan Commits the Agency to a Cleanup Standard Not Based on Risk to Health. Environmental cleanup standards generally are set after measuring the risks to human health in light of the expected future use of the property. While Boeing is cleaning its portion of the SSFL site – by far the largest section – to residential cleanup standards, it has publicly stated that it intends to preserve the site for use as open space parkland upon completion of its cleanup activities. Although final disposition of the NASA-administered portions of the SSFL lies with the GSA, NASA officials said they also expect the Agency's portion will ultimately be used for recreation. According to NASA, DOE, and EPA officials and in light of this expected land use, a normal NEPA process – where the full range of alternatives would be identified and evaluated prior to deciding on the course of action – would likely have led to a decision to clean the area to a less stringent standard than background levels. Although California officials have not yet established the specific criteria necessary for NASA to achieve background levels for the various contaminants at the site, these levels are expected to approximate the natural concentrations that would have been found in the soil prior to any rocket testing activities.

Less Costly Cleanup Alternatives Exist. NASA estimates potential costs of more than $200 million to clean its portion of the SSFL site to background levels to meet the terms of the AOC. This compares to $76 million to make the site appropriate for residential use and $25 million for recreational use. As shown in Table 2, the possible scenarios for NASA's remediation efforts at the SSFL site vary considerably in effort required and in

[25] The estimates above are for the soil cleanup at SSFL based on the 2010 AOC. They do not include the cost of groundwater cleanup, which is still governed by the 2007 agreement.

ATTACHMENT 3

To: John Jones and Stephanie Jennings, US Department of Energy (DOE)

From: David Collins, Mark Sherwin, Dixie Hambrick (MWH)

Cc: Dave Dassler (Boeing)

Date: September 4, 2013

Re: Rough Order of Magnitude Estimates for AOC Soil Cleanup Volumes in Area IV, and Associated Truck Transport Estimates based on DTSC Look-up Table Values - DRAFT

I. Introduction

In June 2013, United States Department of Energy (DOE) requested that MWH Americas, Inc. (MWH) use available Area IV soil sampling data and the Geographic Information System (GIS) to estimate rough-order-of-magnitude (ROM) soil cleanup volumes based on recently issued Lookup Table (LUT) values, and associated soil transport truckloads. This Technical Memorandum (TM) summarizes the evaluation, and presents ROM soil volumes and associated truckloads for three scenarios: Chemical Clearly Contaminated Areas (CCAs), Radiological Cleanup Areas, and Chemical LUT Cleanup Areas. Information presented below for the CCA and Radiological Cleanup Areas is the same as provided to DOE in April 2013, but included here for completeness and to provide contrast with the Chemical LUT estimate.

Prior to describing the applied cleanup criteria and evaluation results, the following describes the approach used to develop estimated soil volumes common to each case.

1. Cleanup footprints were drawn around locations where sampling results displayed in GIS exceeded the cleanup criteria established for each scenario (see below). As described below, all soil volume estimates exclude areas where volatile organic compounds (VOCs) exist alone since these are assumed to be remediated using different treatment technologies.
2. To estimate the average depth of cleanup for each footprint area, filterable analytical result datasets were used to evaluate the depth of exceedances in the cleanup footprints. The range of exceedance depths within each footprint area was used to estimate an average depth of soil above screening levels within each footprint. Average depths were multiplied by respective footprint areas to calculate *in situ* cleanup volumes. Also, additional GIS data displays have been prepared to aid in this evaluation as described below.
3. *In situ* soil volumes were converted to *ex situ* soil volumes using a 30% factor to account for soil volume expansion following excavation. *Ex situ* soil volumes are used in the summaries provided below.
4. In some cases topographic features, including surface water drainage pathways, lined and unlined channels, ponds, and bedrock extents, were evaluated to estimate cleanup footprints and volumes. In drainages and channels with multiple exceedances, large sections (or in some cases entire sections) of the drainage or the channel feature were used as the cleanup footprint. Sampling data within the banks of the drainage or sides of the channel were used to define lateral extent, and depth of bedrock was used to define vertical extent. If several exceedances occurred in a pond or surface water collection area, the entire footprint of the

feature was considered for cleanup. Bedrock outcrops were used to define lateral extent of cleanup volumes.

5. The extent of historical operational areas was also considered in estimating cleanup footprints and volumes. In areas with multiple exceedances and significant historical operations and chemical use (i.e., Sodium Reactor Experiment [SRE], Radioactive Materials Handling Facility [RMHF]), the cleanup area included the entire footprint of historical operations and the cleanup depth was assumed to be the deepest exceedance depth (also considering physical constraints such as depth to bedrock).

6. Geophysical anomalies mapped by United States Environmental Protection Agency (EPA) were considered in estimation of cleanup footprints and volumes in soil fill areas where fill was extensive and multiple exceedances were observed throughout (i.e., Building 4059 Systems for Nuclear Auxiliary Power [SNAP], SRE, Sodium Component Test Installation [SCTI], Building 4015 field).

7. Consideration of exclusion criteria as allowed by the Administrative Order on Consent (AOC) for federally protected species or cultural resources, or a 5% exclusion factor for yet-to-be-determined reasons, have not been applied to reduce the soil volume estimates presented in this TM. The amount of excluded soil based on these AOC allowances may be substantial for the Chemical LUT estimates provided below.

The estimated soil volumes presented in this TM represent ROM engineering estimates based on the information available to MWH in August 2013, and are considered accurate within a tolerance factor of +50/-30%. These estimates should only be used for project planning purposes, and are not meant to represent the final Area IV cleanup requirements.

II. Clearly Contaminated Cleanup Volume Estimates

As part of DOE's Phase 1 co-located sampling program with EPA, criteria were developed to identify CCAs that would require cleanup based on conservative assumptions regarding the range of anticipated values in the pending Chemical LUT. The CCA approach was utilized to limit EPA's radiological sampling and chemical co-located Phase 1 sampling since the CCAs would require cleanup in any case and further radiological sampling was not warranted.

Working with the California EPA Department of Toxic Substances Control (DTSC), the following criteria were established to identify the CCAs:

1. Chemical concentrations of previously identified risk-driving compounds are generally 10 times (10x) above DTSC-approved Interim Screening Levels (ISLs). Concentrations exceeding two times (2x) ISLs were considered on a case by case basis.
    a. Data screening was conducted using ISLs and displayed in GIS using color coded ranges based on multiples of the ISL to represent exceedance levels.
    b. Chemical classes considered in this evaluation include: Dioxins (TEQs), polyaromatic hydrocarbons (PAHs) (particularly benzo(a)pyrene [B(a)P]), polychlorinated biphenyls (PCBs), metals, perchlorate, pesticides, and herbicides.

c. Total petroleum hydrocarbons (TPH) was only considered if co-located with other chemicals meeting the CCA criteria, and present at concentrations more than 10x the ISLs.

d. VOCs, phthalates, and metals considered essential nutrients (sodium, calcium, iron, etc.) were excluded from this evaluation.

2. The areas contain a high frequency and number of chemicals exceeding ISLs. Again, on a case-by-case basis, single chemical exceedances above 2x ISLs were considered.
3. Chemical contaminant distribution was sufficiently defined for future planning of step-out samples or remedial planning.
4. DOE agreed that the area would most likely require cleanup.

During the Phase 1 co-located sampling program, 50 CCAs were identified within Area IV. During the Phase 3 chemical sampling program, DOE requested that the above criteria be applied to any new sampling data available to identify any additional CCAs present within Area IV. This evaluation resulted in identification of four new CCAs and the combination of two previous CCAs into a single area (SRE Excavation Area).

The 53 CCAs are shown on Figure 1 and listed in Table 1, along with chemical concentration data, average depth of exceedance, and estimated *in situ* and *ex situ* soil volume estimates. In summary, the 53 CCAs represent approximately 238,000 cubic yards of soil requiring remedial treatment or disposal. The basis for estimating truckloads for transport offsite for this CCA soil volume are presented below and summarized in Table 4.

III. Radiological Cleanup Volume Estimates

In December 2012, EPA published the Final Radiological Soil Characterization Report, including radiological results screened against Field Action Levels (FALs). FALs represent EPA's radiological background threshold value (BTV) and method detection concentration (MDC) screening levels, and do not include Method Uncertainty as recommended in EPA's LUT TM. They are based on BTVs and laboratory MDCs achieved during the EPA characterization program, and are in some cases more than the DTSC Provisional LUT value (e.g., Sr-90), and in some cases less than the Provisional LUT value (e.g., Cs-137). Thus, the ROM volume estimates provided in this TM are very preliminary.

Criteria applied to GIS displays of EPA data using FALs include:

1. EPA data for select radionuclides (as displayed on Figure 5.1 of their final report) were displayed in GIS, with individual radionuclides also available for evaluation.
2. The radionuclides included in this evaluation were: Americium-241, Curium-243/244, Cesium-137, Cobalt-60, Europium-152, Europium-154, Nickel-59, Plutonium-238, Plutonium-239/240, Tritium, and Strontium-90. These radionuclides were those identified by EPA as having activities equal to or exceeding the FAL and that resulted from historical operations.
3. Consistent with EPA's approach, naturally occurring radioactive material (NORM) exceedances were excluded from this evaluation.

ATTACHMENT 4

4. The FAL exceedances displayed in GIS represent the composite of the individual radionuclide comparisons at any one sampling location. The results were not considered using a factored value above FAL value, rather GIS was used to only show ‘exceedance / non-exceedance’ screening results.

As a conservative assumption, all exceedance areas were included in the estimated ROM volumes, even if the result was equal to the FAL. The extent of radiological soil cleanup areas is shown on Figure 2 and listed in Table 2, along with estimated average depth of exceedance, and *in situ* and *ex situ* soil volume estimates.

In summary, the radiological soil cleanup areas based on EPA data represent approximately 82,000 cubic yards for treatment or disposal. The basis for estimated truckloads for transport offsite for this radiological soil volume are presented below and summarized in Table 4.

IV. Chemical LUT Cleanup Volumes

In June 2013, DTSC issued the Chemical LUT values for 125 chemicals most frequently detected within Area IV, including all background constituents and additional chemicals of interest to DTSC. These values were based on chemical BTVs and method reporting limits (MRLs), with background chemicals adjusted for analytical and decision error uncertainty.

Several of the final LUT values were less than previously estimated LUT values since they were based on the chemical background study BTVs and MRLs, rather than values routinely achievable by multiple laboratories. Also, TPH was included in the Chemical LUT, whereas the preliminary estimate did not include TPH since it was assumed it would be subject to soil treatability findings and would be remediated separately.

DTSC indicated that a second part of the Chemical LUT will be issued during summer 2013, and would reflect required MRLs for the remaining chemicals being investigated at the site. Since the second part of the Look-Up Table has not yet been issued by DTSC, MRLs achievable by several analytical laboratories, similar to or lower than the ISL MRLs, have been used in this evaluation for chemicals not included in the June 2013 Chemical LUT.

LUT Estimates using RFI / Phase 1, 2, and 3 Data

Chemical LUT values issued by DTSC were used to screen previous Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and recent AOC chemical sampling data and develop estimated cleanup footprints, called ‘Preliminary Remediation Areas’ (PRAs), and associated soil volumes. AOC data available for this evaluation included all Phase 1 and 2 data, and a partial Phase 3 dataset (including Subareas 5B, 5C, 3/6, and 7).

Criteria applied to GIS displays using the Chemical LUT values based on BTV or Multi-Lab MRLs include:

1. A comprehensive “all dot” in GIS was used to represent the maximum ratio of detected analytes at each location to their respective Chemical LUT values, comprehensive of included chemical groups.
2. Chemical groups included in this evaluation were: PAHs, B(a)P TEQ, semi-volatile organic compounds (SVOCs) (including phthalates), PCBs, Dioxin TEQ, metals, perchlorate, energetics, pesticides, herbicides, terphenyls, and TPH.

   a. Select metals considered essential nutrients (iron, calcium, phosphorous, etc.) were not included by DTSC in the Chemical LUT and were not used in this ROM volume estimate.

   b. VOCs were excluded from this evaluation because they can be remediated using different technologies and may be related to groundwater contamination. Although excluded, this decision had no substantive impact on the estimated cleanup volumes since the vast majority (if not all) VOC exceedances are co-located with other chemical exceedances.

3. TPH was screened against the LUT values using a 'light' (gasoline) and combined 'heavy' (kerosene, diesel, and oil) fraction approach consistent to what had been required by DTSC for the RFI. This approach is conservative since in a few cases, the individual TPH results may be less than the LUT value, while the sum is above. This situation occurs rarely in areas impacted by TPH alone.

   a. Areas where TPH had not been previously analyzed in samples, but that were surrounded by numerous TPH exceedances were included in PRA footprints even if the primary chemical class results were less than Chemical LUT values.

4. The "all dots" were displayed in GIS to represent a composite of individual chemical comparisons at each sampling location. The results were not considered using any factored value above the Chemical LUT value; rather GIS was used to only show 'exceedance / non-exceedance' of screening values.

5. GIS was used to display the depth of a LUT value exceedance at each location along with the depth of analysis at that location. This information was available both for the 'all dot' as well as the individual chemical classes. The maximum exceedance and analysis depths were used to help estimate depths for each of the PRA footprints.

6. Sporadic low-level exceedances in the Northern Buffer Zone (NBZ) were considered sufficiently localized to include in unique, small PRAs. These exceedances appear to result from concentrations of naturally occurring compounds or laboratory issues.

7. Volumes of soil that exceed Chemical LUT values and are contiguous and emanating from Area IV and the NBZ were included in this ROM estimate where data currently exist to define extent. Additional sampling is being proposed offsite and in Administrative Area III where necessary to define extent of Chemical LUT exceedances.

Chemical LUT soil cleanup PRAs are shown on Figure 3 and listed in Table 3, along with *in situ* and *ex situ* soil volume estimates and estimated average depth of exceedance. Table 3 also indicates where all or part of a radiological cleanup area is co-located with a PRA.

In summary, the Chemical LUT soil cleanup areas based on RFI and available AOC chemical data represent approximately 1,070,220 cubic yards for treatment or disposal (note: includes soil with co-located radiological exceedances). The basis for estimated truckloads for transport offsite for this Chemical LUT soil volume are presented below and summarized in Table 4.

<u>Upper Range Evaluation</u>

DOE also asked that the Chemical LUT soil volume evaluation consider what an upper-range of soil cleanup volumes might be since not all Phase 3 data were available at the time this ROM estimate was prepared. The upper range evaluation was done considering the impact of recently available Phase 3 chemical data in Subareas 5B, 5C, 3/6, and 7 compared to the remaining portions of Area IV where Phase 3 data are not yet available. This comparison resulted in an approximate 35% increase in soil volumes compared to RFI and existing AOC data. It should be noted that the recent Phase 3 data showed exceedances of Chemical LUT values in almost the entire footprint of the historical operational areas within the subareas that had been sampled.

A separate upper range estimate evaluation was performed to identify the difference in remedial footprints developed using the Chemical LUT, and the extent of soil within Area IV. This estimate was developed by mapping the extent of major bedrock outcrops shown in aerial photos as a layer in GIS, and assuming soil areas outside of the bedrock outcrops and existing PRA footprints would require remediation to a 2 foot depth. For this evaluation, the soil on the hill slope in the southern portion of Area IV was included in the upper range estimate since there are several chemical PRAs to the west and higher on the slope, radiological cleanup areas also exist in this area, and it is proximal to operational areas to the north. In contrast, the soil areas outside of PRAs within the NBZ were not included in the upper range estimate since the chemical PRAs in the NBZ are based on sporadic exceedances with no discernible pattern related to operational areas onsite, and only a few radiological cleanup areas were identified west or north of the Former Sodium Disposal Facility. This approach to developing an upper range estimated reflects 56% more soil that may have exceedances above the Chemical LUT.

Since the extent of soil outside current PRAs reflects a more conservative estimate for potential Area IV and NBZ AOC soil cleanup, it was used to display the Chemical LUT upper range soil cleanup areas and is shown on Figure 4. In summary, the Chemical LUT upper range soil cleanup areas based on this evaluation represent approximately 1,666,000 cubic yards for treatment or disposal (note: includes soil with co-located radiological exceedances). The basis for estimated truckloads for transport offsite for this Chemical LUT upper range soil volume are presented below and summarized in Table 4.

V. Truckload and Transport Estimates

For truckload transport planning, an average volume of 16 cubic yards per truckload has been assumed based on previous soil removal actions at SSFL. This basis is consistent with Boeing remediation estimates since some waste will be hauled off in 10- to 15-cubic yard capacity roll-off bins, and some will be hauled off in 16- to 18-cubic yard end-dump trucks. Although a more detailed transport/trucking estimate could be prepared, given the ROM nature of the soil volume estimates a more detailed trucking estimate does not seem warranted at this time.

The estimated duration needed for transport of these soil volumes has also been evaluated using a limit of 35 truckloads per day, 5 days per week, and 50 weeks per year. Estimated truckloads for the three soil cleanup scenarios described above are presented in Table 4.

VI. Additional Notes / Assumptions

1. Radiological screening using FALs may result in a conservative volume estimate since FALs do not include uncertainty. However, they are also laboratory dependent and

Table 4
Summary of Transportation for Area IV Soil Volumes - Draft
Santa Susana Field Laboratory
Date Prepared - September 5, 2013

Soil Cleanup Scenario[1]	Chemical (only)	Co-Located Chemical + Radiological	Radiological (only)	Total
1) Chemical Clearly Contaminated Area Soil Volumes				
Volume of Soil Requiring Remediation	220,000	18,000	64,400	302,400
Number of Truckloads	13,750	1,125	4,025	18,900
Disposal Duration (years)	1.6	0.1	0.5	2.2
2) Chemical Look-Up Table Preliminary Remediation Area Soil Volumes				
Volume of Soil Requiring Remediation	997,000	74,000	8,400	1,079,400
Number of Truckloads	62,313	4,625	525	67,463
Disposal Duration (years)	7.1	0.5	0.1	7.7
3) Upper Range Soil Volumes				
Volume of Soil Requiring Remediation	1,585,000	82,000	400	1,667,400
Number of Truckloads	99,063	5,125	25	104,213
Disposal Duration (years)	11.3	0.6	<0.1	11.9

Notes

1. Criteria for identifying Chemical Clearly Contaminated Area, Chemical Look-Up Table PRAs, Upper Range, and Radiological soil volumes is provided in the text of this document.

2. Volume estimates are based on validated data available as of August 2013 and are considered preliminary, working draft ROM estimates that will need refinement once validated data is available for all subareas and/or during remedial planning.

3. For truckload transport planning, an average volume of 16 cubic yards per truckload has been assumed based on previous soil removal actions at SSFL.

4. Truckloads estimated assuming 35 truckloads allowed per day, 5 days per week, 50 weeks per year. Does not include allowance for NASA or Boeing trucks leaving property.

ATTACHMENT 4