

## WASTE CHARACTERIZATION: IN-SITU SOIL LOCATED AT ISRA AREA II PLANNED EXCAVATION ELV-1C NORTHEAST

### **Introduction**

This report presents supporting detailed information for the July 28, 2009 in-situ characterization of prospective soil wastes from planned ISRA excavations in SSFL Area II.

### **Background**

In-situ characterization of soil destined to be excavated from designated locations in SSFL Area II in accordance with the ISRA Workplan was performed. A step-by-step approach was followed to accomplish characterization of the soil prior to excavation. The first step was to review available information regarding historical area usage and existing analytical data from past soil sampling in the applicable SSFL Area II locations. The objective was to identify all substances that could have an impact on the determination of whether soil in each planned excavation footprint was hazardous or not.

The next step was to develop a random sampling plan for each of the planned excavation footprints to determine whether any of the identified substances are present at concentrations that require further investigation. An evaluation of the results of the initial random sampling was performed to determine whether the data was adequate for waste characterization based on the exhibited variance of any detected analytes and the relative difference between detected concentrations and regulatory thresholds. The soil was characterized non-hazardous when analyte concentrations among the samples exhibited a reasonably small variance and there was satisfactory margin between the mean of the samples and applicable regulatory thresholds. Otherwise, additional samples were collected and subjected to analysis or the soil was characterized as hazardous.

The review of historical information and existing analytical data relevant to planned excavation ELV-1C was based largely on the Group 2 RFI results, which indicated that Dioxins were of chief interest to the RFI team. However, detected concentrations of Dioxins were exceeding low with respect to applicable hazardous waste limits and they were not included in the characterization study. However, regulated Metals, Polychlorinated Biphenyls (PCB), and Semi-Volatile Organic Compounds (SVOC) were identified to be addressed in the ELV-1C excavation footprint. A random sampling plan was developed for collection of nine (12) samples from the planned excavation footprint. The samples were analyzed for CAM 17 metals, PCBs, and SVOCs. All samples were collected, contained, and handled according to field practice requirements in SW-846.

As a result of analytical findings from the first round of sampling pertaining to regulated metals, a decision was made to partition off the northeastern portion of the original ELV-1C excavation footprint for soil management purposes. This area is referred to as ELV-1C NORTHEAST (NE). An additional eight (8) random samples were collected from the remaining ELV-1C SOUTHWEST (SW) portion and subjected to analysis for CAM 17 metals. This area is referred to as ELV-1C SW for waste characterization purposes.

### **Results**

Analytical results for the ELV-1C NE planned excavation area are presented in TestAmerica report ISG2199 issued on 8/13/09. The results exhibited elevated concentrations of Lead, with a

maximum of 200 mg/kg. Lead at a concentration of 160 mg/kg was detected in another sample. Both of these samples were subjected to the RCRA TCLP and the California WET leachate tests. TCLP results of 0.35 mg/L and 0.28 mg/L, respectively, were well below the RCRA hazardous waste limit of 5 mg/L. California WET analyses resulted in respective Lead concentrations of 10 mg/L and 12 mg/L. These results did exceed the California hazardous waste limit of 5 mg/L.

Regulated metals other than Lead were below regulatory thresholds. SVOCs were detected, but all analytes were below 1 mg/kg individually and collectively. The same was true for PCBs, which were detected at low concentrations below 1 mg/kg for individual Aroclors and for the sum of the Aroclor concentrations detected in any given sample. Finally, the Fish Bioassay was passed.

### **Determination**

According to analytical results and generator knowledge, the soil in the planned excavation footprint of SSFL Area II ELV-1C NE:

Is Not a Listed Waste (generator knowledge)

Is Not ignitable (generator knowledge)

Is Not corrosive (generator knowledge)

Is Not reactive (generator knowledge)

Is toxic (analytical results)

Is Not Extremely or Acutely Hazardous Waste

**Exceeds the Title 22 threshold for Lead**

Is Not subject to the Prop. 65 listing

Is Not subject to Title 22 Appendix X list

Is Not known by experience or testing to pose a hazard to human health or environment because of its carcinogenicity, acute toxicity, chronic toxicity, bio-accumulative properties, or persistence in the environment.

**The soil in ELV-1C NE is HAZARDOUS.**

**INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009**

**ELV-1C (NORTHEASTERN PORTION) WASTE CHARACTERIZATION RESULTS  
THE BOEING COMPANY  
SANTA SUSANA FIELD LABORATORY**

							Object Name:	ISWC0052	ISWC0052	ISWC0053	ISWC0053	ISWC0054	ISWC0054
							Sample Name:	ISWC0052S001	ISWC0052AS001	ISWC0053S001	ISWC0053AS001	ISWC0054S001	ISWC0054AS001
							Collection Date:	7/28/2009	8/28/2009	7/28/2009	8/28/2009	7/28/2009	8/28/2009
							Sample Depth (feet):	0.3 - 0.7	0.3 - 0.7	0.6 - 1.1	0.6 - 1.1	0.0 - 0.4	0.0 - 0.4
ANALYTE	UNITS	TCLC	WET Leachate Testing Trigger <sup>1</sup>	TCLP Leachate Testing Trigger <sup>2</sup>	STLC	TCLP	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	
<b>METALS</b>													
Antimony	mg/kg	500	150	--	--	--	<10	--	<10	--	<10	--	
Arsenic	mg/kg	500	50	100	--	--	7.1 B	--	5.7	--	5.9 B	--	
Barium	mg/kg	10,000	1,000	2,000	--	--	77	--	79	--	79	--	
Beryllium	mg/kg	75	7.5	--	--	--	0.55	--	0.46 J	--	0.62	--	
Cadmium	mg/kg	100	10	20	--	--	0.57	--	1.7	--	1.7	--	
Chromium	mg/kg	500	50	100	--	--	24	--	40	--	36	--	
Cobalt	mg/kg	8,000	800	--	--	--	6.9	--	6.8	--	8.5	--	
Copper	mg/kg	2,500	250	--	--	--	32	--	58	--	34	--	
Lead	mg/kg	1,000	50	100	--	--	37	--	160	--	200	--	
Lead, WET	mg/L	--	--	--	5	--	--	--	12	--	10	--	
Lead, TCLP	mg/L	--	--	--	--	5	--	--	0.28	--	0.35	--	
Mercury	mg/kg	20	2	4	--	--	0.33	--	0.48	--	0.3	--	
Molybdenum	mg/kg	3,500	3,500	--	--	--	0.29 J	--	1.6 J	--	0.84 J	--	
Nickel	mg/kg	2,000	200	--	--	--	18	--	24	--	21	--	
Selenium	mg/kg	100	10	20	--	--	<2	--	<2	--	<2	--	
Silver	mg/kg	500	50	100	--	--	<1	--	0.96 J	--	<1	--	
Thallium	mg/kg	700	70	--	--	--	<10	--	<10	--	<10	--	
Vanadium	mg/kg	2,400	240	--	--	--	38	--	35	--	36	--	
Zinc	mg/kg	5,000	2,500	--	--	--	86	--	180	--	180	--	
<b>PCBs</b>													
Aroclor 1016	µg/kg	50,000	50,000	--	--	--	<0.05	--	<0.05	--	<0.05	--	
Aroclor 1221	µg/kg	50,000	50,000	--	--	--	<0.05	--	<0.05	--	<0.05	--	
Aroclor 1232	µg/kg	50,000	50,000	--	--	--	<0.05	--	<0.05	--	<0.05	--	
Aroclor 1242	µg/kg	50,000	50,000	--	--	--	<0.05	--	<0.05	--	<0.05	--	
Aroclor 1248	µg/kg	50,000	50,000	--	--	--	<0.05	--	<0.05	--	<0.05	--	
Aroclor 1254	µg/kg	50,000	50,000	--	--	--	0.076	--	0.3 A-01b	--	0.29 A-01, R-1	--	
Aroclor 1260	µg/kg	50,000	50,000	--	--	--	<0.05	--	0.27 A-01c, R-1	--	0.22 A-01a, R-1	--	
<b>SVOCs</b>													
1,2,4-Trichlorobenzene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
1,2-Dichlorobenzene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
1,2-Diphenylhydrazine/Azobenzene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
1,3-Dichlorobenzene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
1,4-Dichlorobenzene	µg/kg	--	--	150,000	--	--	<0.66	--	<1.3	--	<2.6	--	

**INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009**

**ELV-1C (NORTHEASTERN PORTION) WASTE CHARACTERIZATION RESULTS  
THE BOEING COMPANY  
SANTA SUSANA FIELD LABORATORY**

							Object Name:	ISWC0052	ISWC0052	ISWC0053	ISWC0053	ISWC0054	ISWC0054
							Sample Name:	ISWC0052S001	ISWC0052AS001	ISWC0053S001	ISWC0053AS001	ISWC0054S001	ISWC0054AS001
							Collection Date:	7/28/2009	8/28/2009	7/28/2009	8/28/2009	7/28/2009	8/28/2009
							Sample Depth (feet):	0.3 - 0.7	0.3 - 0.7	0.6 - 1.1	0.6 - 1.1	0.0 - 0.4	0.0 - 0.4
ANALYTE	UNITS	TTLC	WET Leachate Testing Trigger <sup>1</sup>	TCLP Leachate Testing Trigger <sup>2</sup>	STLC	TCLP	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	
2,4,5-Trichlorophenol	µg/kg	--	--	8,000,000	--	--	<0.66	--	<1.3	--	<2.6	--	
2,4,6-Trichlorophenol	µg/kg	--	--	40,000	--	--	<0.66	--	<1.3	--	<2.6	--	
2,4-Dichlorophenol	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
2,4-Dimethylphenol	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
2,4-Dinitrophenol	µg/kg	--	--	--	--	--	<1.3	--	<2.6	--	<5.3	--	
2,4-Dinitrotoluene	µg/kg	--	--	2,600	--	--	<0.66	--	<1.3	--	<2.6	--	
2,6-Dinitrotoluene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
2-Chloronaphthalene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
2-Chlorophenol	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
2-Methylnaphthalene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
2-Methylphenol	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
2-Nitroaniline	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
2-Nitrophenol	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
3,3'-Dichlorobenzidine	µg/kg	--	--	--	--	--	<1.7	--	<3.3	--	<6.6	--	
3-Nitroaniline	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
4,6-Dinitro-2-methylphenol	µg/kg	--	--	--	--	--	<0.84	--	<1.7	--	<3.4	--	
4-Bromophenyl phenyl ether	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
4-Chloro-3-methylphenol	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
4-Chloroaniline	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
4-Chlorophenyl phenyl ether	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
4-Methylphenol	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
4-Nitroaniline	µg/kg	--	--	--	--	--	<1.7	--	<3.3	--	<6.6	--	
4-Nitrophenol	µg/kg	--	--	--	--	--	<1.7	--	<3.3	--	<6.6	--	
Acenaphthene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Acenaphthylene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Aniline	µg/kg	--	--	--	--	--	<0.84 C-2a	--	<1.7	--	<3.4	--	
Anthracene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Benzidine	µg/kg	--	--	--	--	--	<1.3	--	<2.6	--	<5.3	--	
Benzo(a)anthracene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Benzo(a)pyrene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Benzo(b)fluoranthene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Benzo(g,h,i)perylene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Benzo(k)fluoranthene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Benzoic acid	µg/kg	--	--	--	--	--	<1.7	--	<3.3	--	<6.6	--	

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							Sample Depth (feet):	0.3 - 0.7	0.3 - 0.7	0.6 - 1.1	0.6 - 1.1	0.0 - 0.4	0.0 - 0.4
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger <sup>1</sup>	TCLP Leachate Testing Trigger <sup>2</sup>	STLC	TCLP	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	
Benzyl alcohol	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Bis(2-chloroethoxy)methane	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Bis(2-chloroethyl)ether	µg/kg	--	--	--	--	--	<0.34	--	<0.68	--	<1.4	--	
Bis(2-chloroisopropyl)ether	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Bis(2-ethylhexyl)phthalate	µg/kg	--	--	--	--	--	<0.66	--	0.43 J	--	0.74 J	--	
Butyl benzyl phthalate	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Chrysene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Dibenz(a,h)anthracene	µg/kg	--	--	--	--	--	<0.84	--	<1.7	--	<3.4	--	
Dibenzofuran	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Diethyl phthalate	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Dimethyl phthalate	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Di-n-butyl phthalate	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Di-n-octyl phthalate	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Fluoranthene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Fluorene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Hexachlorobenzene	µg/kg	--	--	2,600	--	--	<0.66	--	<1.3	--	<2.6	--	
Hexachlorobutadiene	µg/kg	--	--	10,000	--	--	<0.66	--	<1.3	--	<2.6	--	
Hexachlorocyclopentadiene	µg/kg	--	--	--	--	--	<1.7	--	<3.3	--	<6.6	--	
Hexachloroethane	µg/kg	--	--	60,000	--	--	<0.66	--	<1.3	--	<2.6	--	
Indeno(1,2,3-cd)pyrene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Isophorone	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Naphthalene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Nitrobenzene	µg/kg	--	--	40,000	--	--	<0.66	--	<1.3	--	<2.6	--	
N-Nitrosodimethylamine	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
N-Nitroso-di-n-propylamine	µg/kg	--	--	--	--	--	<0.5	--	<1	--	<2	--	
N-Nitrosodiphenylamine	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Pentachlorophenol	µg/kg	17,000	17,000	2,000,000	--	--	<1.7	--	<3.3	--	<6.6	--	
Phenanthrene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Phenol	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
Pyrene	µg/kg	--	--	--	--	--	<0.66	--	<1.3	--	<2.6	--	
<b>RADIONUCLIDES</b>	--	--	--	--	--	--	R	R-G	R	R-G	R	R-G	

## INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

### ELV WASTE CHARACTERIZATION SUMMARY NOTES THE BOEING COMPANY SANTA SUSANA FIELD LABORATORY

#### Notes:

--" - not analyzed / not applicable

<sup>1</sup> - WET Leachate Testing Trigger = STLC limit \* 10

<sup>2</sup> - TCLP Leachate Testing Trigger = TCLP limit \* 20

Grey highlighted cells indicate concentration meets or exceeds STLC.

A-01 - Sample result might be biased high due to coelution of Aroclors 1254 and 1260. The data was reprocessed in a different way as the calibration (3 peaks were used in the confirmation column).

A-01a - Sample result might be biased high due to coelution of Aroclors 1254 and 1260. The data was reprocessed in a different way as the calibration (4 peaks were used in the primary column).

A-01b - Sample result might be biased high due to coelution of Aroclors 1254 and 1260. The data was reprocessed in a different way as the calibration (4 peaks were used in the primary and 3 peaks were used in the confirmation column).

A-01c - Sample result might be biased high due to coelution of Aroclors 1254 and 1260. The data was reprocessed in a different way as the calibration (4 peaks were used in the primary column).

B - Analyte was detected in the associated Method Blank.

C - Calibration Verification recovery was above the method control limit for this analyte. Analyte not detected, data not impacted

C-2 - Calibration Verification recovery was below the method control limit for this analyte, however the average % difference for all analytes met method criteria.

I - Internal Standard recovery was outside of method limits. Matrix interference was confirmed.

J - Estimated value. Analyte detected at a level less than the Reporting Limit (RL) and greater than or equal to the Method Detection Limit (MDL). The user of this data should be aware that this data is of limited reliability.

L - Laboratory Control Sample and/or Laboratory Control Sample Duplicate recovery was above the acceptance limits. Analyte not detected, data not impacted.

M1 - The MS and/or MSD were above the acceptance limits due to sample matrix interference. See Blank Spike (LCS).

**INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009**

**ELV WASTE CHARACTERIZATION SUMMARY NOTES  
THE BOEING COMPANY  
SANTA SUSANA FIELD LABORATORY**

M2 - The MS and/or MSD were below the acceptance limits due to sample matrix interference. See Blank Spike (LCS).

µg/kg - micrograms per kilogram

mg/kg - milligrams per kilogram

mg/L - milligrams per liter

R - Radiological analysis includes gamma spectroscopy (Na-22, K-40, Mn-54, Co-60, Cs-134, Cs-137, Eu-152, Eu-154, Th-228, Th-232, U-235, U-238 and Am-241), strontium-90, and tritium. Boeing has prepared a document dated August 17, 2009 that provides the radiological results and statistical analysis of the Outfall 008 waste characterization samples. Based on the results, the document certifies the soil represented by these waste characterization samples to be "radiologically" acceptable for shipment to Class 1, 2, and/or 3 disposal facilities. The analysis and data interpretation complies with procedures approved by the California Department of Public Health.

R-1 - The relative percent difference (RPD) between the primary and confirmatory analysis exceeded 40%. Per method 8000B, the higher value was reported

R-G - Samples were recollected for gamma spectroscopy only (Na-22, K-40, Mn-54, Co-60, Cs-134, Cs-137, Eu-152, Eu-154, Th-228, Th-232, U-235, U-238 and Am-241)