

WASTE CHARACTERIZATION: IN-SITU DEBRIS STOCKPILE LOCATED AT THE ISRA AREA II LOX EXCAVATION SITE

Introduction

Multiple, small debris piles were relocated from the ISRA Area II LOX excavation site to a nearby location that would not impede work progress. This report presents supporting detailed information relating to the August 1, 2013 in-situ characterization of the stockpiled debris, which consists of soil intermixed with sandstone (approximately 40%), broken up asphalt (approximately 5%), small pieces of concrete (approximately 5%), and small amounts of vegetation and metal (approximately 8% total). Asphalt, concrete, and sandstone pieces were generally no larger than approximately two-feet in diameter. The debris piles were consolidated into a stockpile measuring approximately forty-feet by sixty-feet and eight to nine-feet in height.

Background

Samples of the stockpile were collected according to a random sampling plan and analyzed by a state certified laboratory. Analytical results provided by the laboratory were evaluated to determine whether any regulated substances were present at concentrations exceeding regulatory thresholds governing waste management. Furthermore, the results were also evaluated to assure adequacy for waste characterization purposes based upon the guidelines presented in U.S. EPA SW-846. Based on this evaluation, the number of samples was sufficient and it was not necessary to collect any additional samples.

The analyte suite for sample analysis was based on the initial characterization of the area where the debris piles were originally situated. This data and prior testing of similar materials at SSFL indicated that testing should target Regulated Metals, Polychlorinated Biphenyls (PCB), Petroleum Fuel Hydrocarbons (TPH), and Semi-Volatile Organic Compounds (SVOC). The sample plan called for collection of six (6) samples from the stockpile at randomly determined depths. All samples were analyzed for CAM 17 metals, PCBs, TPH, and SVOCs. All samples were collected, contained, and handled according to field practice requirements in SW-846.

Results

Analytical results for the debris stockpile are presented in GEL Laboratories, LLC. report 330817, issued on 8/9/13. Regulated metals were detected, but in no case exceeded any applicable regulatory thresholds. With respect to hazardous waste regulations, Chromium was the most significant detection, with a mean of 13.07 mg/kg and concentrations ranging from 10.8 mg/kg to 15.8 mg/kg. Lead was detected at a maximum concentration of 23.1 mg/kg, but exhibited a mean of 10.08 mg/kg. These metals were below the California 10 X STLC hazardous waste threshold of 50 ppm, which applies to both of them.

Low concentrations of PCBs were detected. Aroclor 1254 was detected ranging between ND and 0.0139 mg/kg. Aroclor 1260 was also detected, with a range of ND to 0.0127 mg/kg. These detections compare to the California 10 X STLC threshold and the TSCA action level, both of which are at 50 parts per million. Petroleum Fuel Hydrocarbons were also detected at low concentrations. In the general total Extractible Fuel Hydrocarbon range of C11 – C30, detections ranged from 11.5 mg/kg to 106.23 mg/kg. This breaks out to a maximum concentration of 85.8 mg/kg in the general Diesel Range Organics C11 – C20 carbon range, and a maximum concentration of 103 mg/kg in the general Oil Range Organics C20 – C30

carbon range. Gasoline Range Organics (C8 – C11) were not detected. Despite acceptably low Method Detection Limits, no SVOCs were detected.

Determination

According to analytical results and generator knowledge, the material in the LOX debris stockpile:

Is Not a Listed Waste (analytical results and generator knowledge)

Is Not ignitable (generator knowledge)

Is Not corrosive (generator knowledge)

Is Not reactive (generator knowledge)

Is Not toxic (analytical results and generator knowledge)

Is Not Extremely or Acutely Hazardous Waste

Does not exceed any RCRA or Title 22 characteristic thresholds

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 LOX debris stockpile is NON-HAZARDOUS.

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

**WASTE CHARACTERIZATION RESULTS - LOX DEBRIS PILE
THE BOEING COMPANY
SANTA SUSANA FIELD LABORATORY**

		Object Name: Sample Name: Collection Date: Sample Depth (feet bgs):			LOXDRS LOXDRS_S1 8/1/2013 5.5 - 6.0	LOXDRS LOXDRS_S2 8/1/2013 0.5 - 1.0	LOXDRS LOXDRS_S3 8/1/2013 2.5 - 3.0	LOXDRS LOXDRS_S4 8/1/2013 3.5 - 4.0	LOXDRS LOXDRS_S5 8/1/2013 1.5 - 2.0	LOXDRS LOXDRS_S6 8/1/2013 4.5 - 5.0
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c
METALS										
Antimony	mg/kg	500	150	--	1.82	1.91	1.93	1.96	1.69	1.73
Arsenic	mg/kg	500	50	100	1.76	1.72	2.76	2.76	3.91	1.35
Barium	mg/kg	10000	1000	2000	67.9	52.2	60.3	60.3	50	62.1
Beryllium	mg/kg	75	7.5	--	0.523	0.369	0.407	0.488	0.442	0.329
Cadmium	mg/kg	100	10	20	< 0.0988	< 0.0954	0.198	< 0.0967	< 0.0977	0.172
Chromium	mg/kg	500	50	100	15.8	11.5	15.6	13.5	11.2	10.8
Cobalt	mg/kg	8000	800	--	6.61	5.61	5.72	5.59	5.18	5.45
Copper	mg/kg	2500	250	--	10.6	9.09	9.27	7.19	10	9.89
Lead	mg/kg	1000	50	100	6.43	10.6	8.16	5.18	23.1	6.99
Mercury	mg/kg	20	2	4	< 0.00387	< 0.00357	0.00962	< 0.00387	< 0.00362	0.00526
Molybdenum	mg/kg	3500	3500	--	0.636	0.678	0.727	0.669	0.702	0.594
Nickel	mg/kg	2000	200	--	11.7	8.29	10.3	9.03	7.32	7.69
Selenium	mg/kg	100	10	20	< 0.494	< 0.477	< 0.475	< 2.42	< 0.488	< 0.486
Silver	mg/kg	500	50	100	1.61	1.23	1.41	1.36	1.28	1.34
Thallium	mg/kg	700	70	--	3.33	2.64	3.03	2.72	2.12	2.89
Vanadium	mg/kg	2400	240	--	29.9	21	23.8	23.4	21	23.2
Zinc	mg/kg	5000	2500	--	52	45.1	52.8	47.9	44.5	50.2
TPH										
EFH (>C8 - C11)	mg/kg	--	--	--	< 2.74	< 0.546	< 2.74	< 0.546	< 0.547	< 0.545
EFH (>C11 - C14)	mg/kg	--	--	--	< 2.74	< 0.546	< 2.74	< 0.546	< 0.547	< 0.545
EFH (>C14 - C20)	mg/kg	--	--	--	3.23	2.28	4.26	2.16	2.28	1.62
EFH (>C20 - C30)	mg/kg	--	--	--	103	27.4	85.8	16	9.22	35.8
PCBs										
Aroclor 1016	ug/kg	50000	50000	--	< 5.52	< 5.5	< 5.51	< 1.11	< 1.11	< 5.55
Aroclor 1221	ug/kg	50000	50000	--	< 5.52	< 5.5	< 5.51	< 1.11	< 1.11	< 5.55
Aroclor 1232	ug/kg	50000	50000	--	< 5.52	< 5.5	< 5.51	< 1.11	< 1.11	< 5.55
Aroclor 1242	ug/kg	50000	50000	--	< 5.52	< 5.5	< 5.51	< 1.11	< 1.11	< 5.55
Aroclor 1248	ug/kg	50000	50000	--	< 5.52	< 5.5	< 5.51	< 1.11	< 1.11	< 5.55
Aroclor 1254	ug/kg	50000	50000	--	13.9	< 5.5	13.4	6.42	3.86	< 5.55
Aroclor 1260	ug/kg	50000	50000	--	10.9	12.7	10.3	4.69	3.23	< 5.55

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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THE BOEING COMPANY
SANTA SUSANA FIELD LABORATORY**

		Object Name: Sample Name: Collection Date: Sample Depth (feet bgs):			LOXDRS LOXDRS_S1 8/1/2013 5.5 - 6.0	LOXDRS LOXDRS_S2 8/1/2013 0.5 - 1.0	LOXDRS LOXDRS_S3 8/1/2013 2.5 - 3.0	LOXDRS LOXDRS_S4 8/1/2013 3.5 - 4.0	LOXDRS LOXDRS_S5 8/1/2013 1.5 - 2.0	LOXDRS LOXDRS_S6 8/1/2013 4.5 - 5.0
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c
Aroclor 1262	ug/kg	50000	50000	--	< 5.52	< 5.5	< 5.51	< 1.11	< 1.11	< 5.55
Aroclor 1268	ug/kg	50000	50000	--	< 5.52	< 5.5	< 5.51	< 1.11	< 1.11	< 5.55
Aroclor 5432	ug/kg	--	--	--	< 16.6	< 16.5	< 16.6	< 3.33	< 3.33	< 16.7
Aroclor 5442	ug/kg	--	--	--	< 16.6	< 16.5	< 16.6	< 3.33	< 3.33	< 16.7
Aroclor 5460	ug/kg	--	--	--	< 16.6	< 16.5	< 16.6	< 3.33	< 3.33	< 16.7
SVOCs										
1,1'-Biphenyl	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
1,2,4-Trichlorobenzene	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
1,2-Dichlorobenzene	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
1,2-Diphenylhydrazine	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
1,3-Dichlorobenzene	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
1,4-Dichlorobenzene	ug/kg	--	--	150000	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
1-Methylnaphthalene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
1-Naphthylamine	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2,4,5-Trichlorophenol	ug/kg	--	--	8000000	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2,4,6-Trichlorophenol	ug/kg	--	--	40000	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2,4-Dichlorophenol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2,4-Dimethylphenol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2,4-Dinitrophenol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2,4-Dinitrotoluene	ug/kg	--	--	2600	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2,6-Dinitrotoluene	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2-Chloronaphthalene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
2-Chlorophenol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2-Methyl-4,6-dinitrophenol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2-Methylnaphthalene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
2-Naphthylamine	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
2-Nitrophenol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
3,3'-Dichlorobenzidine	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
3,5-Dimethylphenol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
4-Aminobiphenyl	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
4-Bromophenylphenylether	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497

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ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c
4-Chloro-3-methylphenol	ug/kg	--	--	--	< 1320	< 132	< 133	< 133	< 131	< 663
4-Chloroaniline	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
4-Chlorophenylphenylether	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
4-Nitrophenol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Acenaphthene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Acenaphthylene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Acetophenone	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Aniline	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Anthracene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Atrazine	ug/kg	--	--	--	< 1320	< 132	< 133	< 133	< 131	< 663
Benzaldehyde	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Benidine	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Benzo(a)anthracene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Benzo(a)pyrene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Benzo(b)fluoranthene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Benzo(ghi)perylene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Benzo(k)fluoranthene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Benzoic acid	ug/kg	--	--	--	< 1650	< 165	< 166	< 166	< 164	< 828
Benzyl alcohol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
bis(2-Chloroethoxy)methane	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Bis(2-chloroethyl)ether	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
bis(2-Chloroisopropyl)ether	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
bis(2-Ethylhexyl)phthalate	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Butyl benzyl phthalate	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Caprolactam	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Carbazole	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Chrysene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Dibenz(a,h)anthracene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Dibenzofuran	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Diethylphthalate	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Dimethylphthalate	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c
Di-n-butylphthalate	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Di-n-octylphthalate	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Diphenylamine	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Fluoranthene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Fluorene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Hexachlorobenzene	ug/kg	--	--	2600	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Hexachlorobutadiene	ug/kg	--	--	10000	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Hexachlorocyclopentadiene	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Hexachloroethane	ug/kg	--	--	60000	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Indeno(1,2,3-cd)pyrene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Isophorone	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
m,p-Cresols	ug/kg	--	--	4000000	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
m-Nitroaniline	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Naphthalene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Nitrobenzene	ug/kg	--	--	40000	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
N-Methyl-N-nitrosomethylamine	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
N-Nitrosodipropylamine	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
o-Cresol	ug/kg	--	--	4000000	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
o-Nitroaniline	ug/kg	--	--	--	< 1090	< 109	< 109	< 109	< 108	< 547
p-(Dimethylamino)azobenzene	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Pentachlorophenol	ug/kg	17000	17000	2000000	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Phenanthrene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Phenol	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
p-Nitroaniline	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
Pyrene	ug/kg	--	--	--	< 99	< 9.9	< 9.94	< 9.95	< 9.84	< 49.7
Pyridine	ug/kg	--	--	--	< 990	< 99	< 99.4	< 99.5	< 98.4	< 497
RADIONUCLIDES	--	--	--	--	R	R	R	R	R	R

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ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c	RESULT ^c

Notes:

--" - not applicable

< - Analyte not detected at or above the stated method detection limit.

^a - WET Leachate Testing Trigger = STLC limit * 10

^b - TCLP Leachate Testing Trigger = TCLP limit * 20

^c Waste characterization sample results not validated

µg/kg - micrograms per kilogram

mg/kg - milligrams per kilogram

mg/L - milligrams per liter

R - Radiological analysis performed on sample. Boeing has prepared a separate document that provides the radiological results and compares them to the draft provisional DTSC look-up table (LUT) values in order to determine if soil exceeds background as required for the NASA/DTSC Administrative Order on Consent (AOC).