

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

Introduction

This report presents supporting detailed information for the July 28, 2009 and August 24, 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 SW planned excavation area are presented in TestAmerica reports ISG2199 issued on 8/13/09 and ISH2198 issued on 9/8/09. Initial results exhibited only trace concentrations of SVOCs with all analytes below 1 mg/kg individually and collectively, and SVOCs were not included in the second sampling event. No PCBs were detected, and they, too, were excluded from subsequent sample analysis. Considering both the initial and second sampling event samples together, the concentrations of regulated metals were low, with the exception of Lead detected in two samples. Lead concentrations ranged from 6.5 mg/kg to a high of 56 mg/kg. Another sample exhibited Lead at 52 mg/kg. Both of these samples were subjected to the California Waste Extraction Test (WET), a leachate simulation that is used to estimate the potential of a given waste to leach hazardous concentrations of substances when exposed to the environment. The WET resulted in Lead leachate concentrations from the samples of 1.5 mg/L and 0.83 mg/L, respectively. These concentrations are well below the California STLC hazardous waste limit of 5 mg/L for Lead. Taking the 17 total samples into account, and the Standard Error of the Mean for the sample pool, the results were determined to be representative of the prospective waste.

Chromium was also detected in the ELV-1C SW samples, ranging from 20 mg/kg to a maximum concentration of 39 mg/kg. The Chromium detections did not represent a concern, however, as they were fairly tightly grouped, with an acceptably small variance among the 17 total samples. All other regulated metals were well below applicable regulatory thresholds.

Determination

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

- Is Not a Listed Waste (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 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 soil in ELV-1C SW is NON-HAZARDOUS.

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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

			Object Name:			ISWC0049	ISWC0050	ISWC0051	ISWC0055	ISWC0055	ISWC0056	ISWC0057
			Sample Name:			ISWC0049S001	ISWC0050S001	ISWC0051S001	ISWC0055S001	ISWC0055AS001	ISWC0056S001	ISWC0057S001
			Collection Date:			7/28/2009	7/28/2009	7/28/2009	7/28/2009	8/28/2009	7/28/2009	7/28/2009
			Sample Depth (feet):			1.5 - 2.0	0.0 - 0.4	0.7 - 1.2	0.0 - 0.3	0.0 - 0.3	1.0 - 1.5	1.5 - 2.0
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	STLC	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
METALS										--		
Antimony	mg/kg	500	150	--	--	<10 M2	<10	<10	<10	--	<10	<10
Arsenic	mg/kg	500	50	100	--	5.5	6.6 B	6.8	6.8	--	6 B	6.5
Barium	mg/kg	10,000	1,000	2,000	--	77	69	78	77	--	73	87
Beryllium	mg/kg	75	7.5	--	--	0.5	0.61	0.55	0.54	--	0.47 J	0.57
Cadmium	mg/kg	100	10	20	--	<0.5	<0.5	<0.5	0.39 J	--	<0.5	<0.5
Chromium	mg/kg	500	50	100	--	21	21	23	33	--	22	27
Cobalt	mg/kg	8,000	800	--	--	6.3	5.9	7.3	6.7	--	6.4	7
Copper	mg/kg	2,500	250	--	--	15	22	15	22	--	15	17
Lead	mg/kg	1,000	50	100	--	8	11	9.3	42	--	6.5	16
Lead, WET	mg/L	--	--	--	5	--	--	--	--	--	--	--
Mercury	mg/kg	20	2	4	--	0.0078 J	0.014 J	0.007 J	0.038	--	<0.033	0.01 J
Molybdenum	mg/kg	3,500	3,500	--	--	<2	0.32 J	0.33 J	0.68 J	--	<2	0.44 J
Nickel	mg/kg	2,000	200	--	--	14	14	15	25	--	15	17
Selenium	mg/kg	100	10	20	--	1.2 J	<2	1.6 J	1.7 J	--	<2	<2
Silver	mg/kg	500	50	100	--	<1	<1	<1	<1	--	<1	<1
Thallium	mg/kg	700	70	--	--	<10	<10	<10	<10	--	<10	<10
Vanadium	mg/kg	2,400	240	--	--	36	35	39	38	--	39	41
Zinc	mg/kg	5,000	2,500	--	--	70	63	60	93	--	57	70
PCBs												
Aroclor 1016	µg/kg	50,000	50,000	--	--	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05
Aroclor 1221	µg/kg	50,000	50,000	--	--	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05
Aroclor 1232	µg/kg	50,000	50,000	--	--	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05
Aroclor 1242	µg/kg	50,000	50,000	--	--	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05
Aroclor 1248	µg/kg	50,000	50,000	--	--	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05
Aroclor 1254	µg/kg	50,000	50,000	--	--	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05
Aroclor 1260	µg/kg	50,000	50,000	--	--	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05
SVOCs												
1,2,4-Trichlorobenzene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
1,2-Dichlorobenzene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
1,2-Diphenylhydrazine/Azobenzene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
1,3-Dichlorobenzene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
1,4-Dichlorobenzene	µg/kg	--	--	150,000	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2,4,5-Trichlorophenol	µg/kg	--	--	8,000,000	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2,4,6-Trichlorophenol	µg/kg	--	--	40,000	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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

			Object Name:			ISWC0049	ISWC0050	ISWC0051	ISWC0055	ISWC0055	ISWC0056	ISWC0057
			Sample Name:			ISWC0049S001	ISWC0050S001	ISWC0051S001	ISWC0055S001	ISWC0055AS001	ISWC0056S001	ISWC0057S001
			Collection Date:			7/28/2009	7/28/2009	7/28/2009	7/28/2009	8/28/2009	7/28/2009	7/28/2009
			Sample Depth (feet):			1.5 - 2.0	0.0 - 0.4	0.7 - 1.2	0.0 - 0.3	0.0 - 0.3	1.0 - 1.5	1.5 - 2.0
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	STLC	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
2,4-Dichlorophenol	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2,4-Dimethylphenol	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2,4-Dinitrophenol	µg/kg	--	--	--	--	<0.66	<0.66	<0.66	<1.3	--	<0.66	<1.3
2,4-Dinitrotoluene	µg/kg	--	--	2,600	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2,6-Dinitrotoluene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2-Chloronaphthalene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2-Chlorophenol	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2-Methylnaphthalene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2-Methylphenol	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2-Nitroaniline	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
2-Nitrophenol	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
3,3'-Dichlorobenzidine	µg/kg	--	--	--	--	<0.83	<0.83	<0.83	<1.7	--	<0.83	<1.7
3-Nitroaniline	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
4,6-Dinitro-2-methylphenol	µg/kg	--	--	--	--	<0.42	<0.42	<0.42	<0.84	--	<0.42	<0.84
4-Bromophenyl phenyl ether	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
4-Chloro-3-methylphenol	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
4-Chloroaniline	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
4-Chlorophenyl phenyl ether	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
4-Methylphenol	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
4-Nitroaniline	µg/kg	--	--	--	--	<0.83	<0.83	<0.83	<1.7	--	<0.83	<1.7
4-Nitrophenol	µg/kg	--	--	--	--	<0.83	<0.83	<0.83	<1.7	--	<0.83	<1.7
Acenaphthene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Acenaphthylene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Aniline	µg/kg	--	--	--	--	<0.42	<0.42	<0.42	<0.84	--	<0.42 C-2b	<0.84
Anthracene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Benzidine	µg/kg	--	--	--	--	<0.66	<0.66	<0.66	<1.3	--	<0.66 M2	<1.3
Benzo(a)anthracene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Benzo(a)pyrene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Benzo(b)fluoranthene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Benzo(g,h,i)perylene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Benzo(k)fluoranthene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Benzoic acid	µg/kg	--	--	--	--	<0.83	<0.83	<0.83	<1.7	--	<0.83	<1.7
Benzyl alcohol	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Bis(2-chloroethoxy)methane	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Bis(2-chloroethyl)ether	µg/kg	--	--	--	--	<0.17	<0.17	<0.17	<0.34	--	<0.17	<0.34

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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THE BOEING COMPANY
SANTA SUSANA FIELD LABORATORY**

			Object Name:			ISWC0049	ISWC0050	ISWC0051	ISWC0055	ISWC0055	ISWC0056	ISWC0057
			Sample Name:			ISWC0049S001	ISWC0050S001	ISWC0051S001	ISWC0055S001	ISWC0055AS001	ISWC0056S001	ISWC0057S001
			Collection Date:			7/28/2009	7/28/2009	7/28/2009	7/28/2009	8/28/2009	7/28/2009	7/28/2009
			Sample Depth (feet):			1.5 - 2.0	0.0 - 0.4	0.7 - 1.2	0.0 - 0.3	0.0 - 0.3	1.0 - 1.5	1.5 - 2.0
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	STLC	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
Bis(2-chloroisopropyl)ether	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Bis(2-ethylhexyl)phthalate	µg/kg	--	--	--	--	<0.33	<0.33	0.2 J	0.26 J	--	<0.33	0.22 J
Butyl benzyl phthalate	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	0.18 J
Chrysene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Dibenz(a,h)anthracene	µg/kg	--	--	--	--	<0.42	<0.42	<0.42	<0.84	--	<0.42	<0.84
Dibenzofuran	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Diethyl phthalate	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Dimethyl phthalate	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Di-n-butyl phthalate	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Di-n-octyl phthalate	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Fluoranthene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Fluorene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Hexachlorobenzene	µg/kg	--	--	2,600	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Hexachlorobutadiene	µg/kg	--	--	10,000	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Hexachlorocyclopentadiene	µg/kg	--	--	--	--	<0.83	<0.83	<0.83 C-2	<1.7	--	<0.83	<1.7
Hexachloroethane	µg/kg	--	--	60,000	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Indeno(1,2,3-cd)pyrene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Isophorone	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Naphthalene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Nitrobenzene	µg/kg	--	--	40,000	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
N-Nitrosodimethylamine	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
N-Nitroso-di-n-propylamine	µg/kg	--	--	--	--	<0.25	<0.25	<0.25	<0.5	--	<0.25	<0.5
N-Nitrosodiphenylamine	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Pentachlorophenol	µg/kg	17,000	17,000	2,000,000	--	<0.83	<0.83	<0.83	<1.7	--	<0.83	<1.7
Phenanthrene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Phenol	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
Pyrene	µg/kg	--	--	--	--	<0.33	<0.33	<0.33	<0.66	--	<0.33	<0.66
RADIONUCLIDES	--	--	--	--	--	R	R	R	R	R-G	R	R

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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

			Object Name:		ISWC0058	ISWC0058	ISWC0059	ISWC0060	ISWC0096	ISWC0097	ISWC0098
			Sample Name:		ISWC0058S001	ISWC0058AS001	ISWC0059S001	ISWC0060S001	ISWC0096S001	ISWC0097S001	ISWC0098S001
			Collection Date:		7/28/2009	8/28/2009	7/28/2009	7/28/2009	8/24/2009	8/24/2009	8/24/2009
			Sample Depth (feet):		0.3 - 0.7	0.3 - 0.7	0.1 - 0.6	0.3 - 0.8	0.0 - 0.5	0.0 - 0.5	0.6 - 1.1
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	STLC	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
METALS											
Antimony	mg/kg	500	150	--	--	<10	--	<10	<10	<10	<10
Arsenic	mg/kg	500	50	100	--	6.7 B	--	6	5.4 B	6.4	7.1
Barium	mg/kg	10,000	1,000	2,000	--	74	--	77	68	81	100
Beryllium	mg/kg	75	7.5	--	--	0.57	--	0.49 J	0.55	0.63	0.86
Cadmium	mg/kg	100	10	20	--	0.34 J	--	0.24 J	<0.5	<0.5	1.3
Chromium	mg/kg	500	50	100	--	28	--	25	21	24	28
Cobalt	mg/kg	8,000	800	--	--	7.7	--	6.4	6.3	6.8	8.4
Copper	mg/kg	2,500	250	--	--	18	--	15	13	18	20
Lead	mg/kg	1,000	50	100	--	52	--	11	8.1	24	9.7
Lead, WET	mg/L	--	--	--	5	0.83	--	--	--	--	1.5
Mercury	mg/kg	20	2	4	--	0.022 J	--	0.016 J	0.017 J	0.028 J	0.032 J
Molybdenum	mg/kg	3,500	3,500	--	--	0.56 J	--	0.33 J	<2	<2	0.22 J
Nickel	mg/kg	2,000	200	--	--	19	--	15	13	17	21
Selenium	mg/kg	100	10	20	--	1.2 J	--	<2	<2	<2	<2
Silver	mg/kg	500	50	100	--	<1	--	<1	<1	<1	<1
Thallium	mg/kg	700	70	--	--	<10	--	<10	<10	<10	<10
Vanadium	mg/kg	2,400	240	--	--	38	--	40	36	42	48
Zinc	mg/kg	5,000	2,500	--	--	92	--	83	61	76	82
PCBs											
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	--	--	<0.05	--	<0.05	<0.05	--	--
Aroclor 1260	µg/kg	50,000	50,000	--	--	<0.05	--	<0.05	<0.05	--	--
SVOCs											
1,2,4-Trichlorobenzene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--
1,2-Dichlorobenzene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--
1,2-Diphenylhydrazine/Azobenzene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--
1,3-Dichlorobenzene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--
1,4-Dichlorobenzene	µg/kg	--	--	150,000	--	<0.33	--	<0.33	<0.33	--	--
2,4,5-Trichlorophenol	µg/kg	--	--	8,000,000	--	<0.33	--	<0.33	<0.33	--	--
2,4,6-Trichlorophenol	µg/kg	--	--	40,000	--	<0.33	--	<0.33	<0.33	--	--

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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

			Object Name:		ISWC0058	ISWC0058	ISWC0059	ISWC0060	ISWC0096	ISWC0097	ISWC0098	
			Sample Name:		ISWC0058S001	ISWC0058AS001	ISWC0059S001	ISWC0060S001	ISWC0096S001	ISWC0097S001	ISWC0098S001	
			Collection Date:		7/28/2009	8/28/2009	7/28/2009	7/28/2009	8/24/2009	8/24/2009	8/24/2009	
			Sample Depth (feet):		0.3 - 0.7	0.3 - 0.7	0.1 - 0.6	0.3 - 0.8	0.0 - 0.5	0.0 - 0.5	0.6 - 1.1	
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	STLC	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	
2,4-Dichlorophenol	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
2,4-Dimethylphenol	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
2,4-Dinitrophenol	µg/kg	--	--	--	--	<0.66	--	<0.66	<0.66	--	--	--
2,4-Dinitrotoluene	µg/kg	--	--	2,600	--	<0.33	--	<0.33	<0.33	--	--	--
2,6-Dinitrotoluene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
2-Chloronaphthalene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
2-Chlorophenol	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
2-Methylnaphthalene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
2-Methylphenol	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
2-Nitroaniline	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
2-Nitrophenol	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
3,3'-Dichlorobenzidine	µg/kg	--	--	--	--	<0.83	--	<0.83	<0.83	--	--	--
3-Nitroaniline	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
4,6-Dinitro-2-methylphenol	µg/kg	--	--	--	--	<0.42	--	<0.42	<0.42	--	--	--
4-Bromophenyl phenyl ether	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
4-Chloro-3-methylphenol	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
4-Chloroaniline	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
4-Chlorophenyl phenyl ether	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
4-Methylphenol	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
4-Nitroaniline	µg/kg	--	--	--	--	<0.83	--	<0.83	<0.83	--	--	--
4-Nitrophenol	µg/kg	--	--	--	--	<0.83	--	<0.83	<0.83	--	--	--
Acenaphthene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Acenaphthylene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Aniline	µg/kg	--	--	--	--	<0.42	--	<0.42	<0.42	--	--	--
Anthracene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Benzidine	µg/kg	--	--	--	--	<0.66	--	<0.66	<0.66	--	--	--
Benzo(a)anthracene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Benzo(a)pyrene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Benzo(b)fluoranthene	µg/kg	--	--	--	--	0.39	--	<0.33	<0.33	--	--	--
Benzo(g,h,i)perylene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Benzo(k)fluoranthene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Benzoic acid	µg/kg	--	--	--	--	<0.83	--	<0.83	<0.83	--	--	--
Benzyl alcohol	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Bis(2-chloroethoxy)methane	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Bis(2-chloroethyl)ether	µg/kg	--	--	--	--	<0.17	--	<0.17	<0.17	--	--	--

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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

			Object Name:		ISWC0058	ISWC0058	ISWC0059	ISWC0060	ISWC0096	ISWC0097	ISWC0098	
			Sample Name:		ISWC0058S001	ISWC0058AS001	ISWC0059S001	ISWC0060S001	ISWC0096S001	ISWC0097S001	ISWC0098S001	
			Collection Date:		7/28/2009	8/28/2009	7/28/2009	7/28/2009	8/24/2009	8/24/2009	8/24/2009	
			Sample Depth (feet):		0.3 - 0.7	0.3 - 0.7	0.1 - 0.6	0.3 - 0.8	0.0 - 0.5	0.0 - 0.5	0.6 - 1.1	
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	STLC	RESULT	RESULT	RESULT	RESULT	RESULT	RESULT	
Bis(2-chloroisopropyl)ether	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Bis(2-ethylhexyl)phthalate	µg/kg	--	--	--	--	<0.33	--	0.19 J	<0.33	--	--	--
Butyl benzyl phthalate	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Chrysene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Dibenz(a,h)anthracene	µg/kg	--	--	--	--	<0.42	--	<0.42	<0.42	--	--	--
Dibenzofuran	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Diethyl phthalate	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Dimethyl phthalate	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Di-n-butyl phthalate	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Di-n-octyl phthalate	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Fluoranthene	µg/kg	--	--	--	--	0.097 J	--	<0.33	<0.33	--	--	--
Fluorene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Hexachlorobenzene	µg/kg	--	--	2,600	--	<0.33	--	<0.33	<0.33	--	--	--
Hexachlorobutadiene	µg/kg	--	--	10,000	--	<0.33	--	<0.33	<0.33	--	--	--
Hexachlorocyclopentadiene	µg/kg	--	--	--	--	<0.83 C-2	--	<0.83 C-2	<0.83 C-2	--	--	--
Hexachloroethane	µg/kg	--	--	60,000	--	<0.33	--	<0.33	<0.33	--	--	--
Indeno(1,2,3-cd)pyrene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Isophorone	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Naphthalene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Nitrobenzene	µg/kg	--	--	40,000	--	<0.33	--	<0.33	<0.33	--	--	--
N-Nitrosodimethylamine	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
N-Nitroso-di-n-propylamine	µg/kg	--	--	--	--	<0.25	--	<0.25	<0.25	--	--	--
N-Nitrosodiphenylamine	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Pentachlorophenol	µg/kg	17,000	17,000	2,000,000	--	<0.83	--	<0.83	<0.83	--	--	--
Phenanthrene	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Phenol	µg/kg	--	--	--	--	<0.33	--	<0.33	<0.33	--	--	--
Pyrene	µg/kg	--	--	--	--	0.082 J	--	<0.33	<0.33	--	--	--
RADIONUCLIDES	--	--	--	--	--	R	R-G	R	R	R	R	R

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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

						Object Name:	ISWC0099	ISWC0100	ISWC0101	ISWC0102	ISWC0103
						Sample Name:	ISWC0099S001	ISWC0100S001	ISWC0101S001	ISWC0102S001	ISWC0103S001
						Collection Date:	8/24/2009	8/24/2009	8/24/2009	8/24/2009	8/24/2009
						Sample Depth (feet):	0.7 - 1.3	0.7 - 1.2	0.2 - 0.8	0.0 - 0.5	0.0 - 0.5
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger^a	TCLP Leachate Testing Trigger^b	STLC	RESULT	RESULT	RESULT	RESULT	RESULT	
METALS											
Antimony	mg/kg	500	150	--	--	<10	<10	<10	<10	<10	
Arsenic	mg/kg	500	50	100	--	7.5	7.6	7.8	6.9	4.9	
Barium	mg/kg	10,000	1,000	2,000	--	85	82	95	86	85	
Beryllium	mg/kg	75	7.5	--	--	0.67	0.73	0.76	0.72	0.65	
Cadmium	mg/kg	100	10	20	--	<0.5	0.41 J	1.7	<0.5	<0.5	
Chromium	mg/kg	500	50	100	--	25	39	32	28	20	
Cobalt	mg/kg	8,000	800	--	--	7.7	7.3	8.2	7.5	5.7	
Copper	mg/kg	2,500	250	--	--	17	21	29	18	12	
Lead	mg/kg	1,000	50	100	--	9.2	18	32	16	13	
Lead, WET	mg/L	--	--	--	5	--	--	--	--	--	
Mercury	mg/kg	20	2	4	--	0.0079 J	0.019 J	0.022 J	0.0089 J	0.009 J	
Molybdenum	mg/kg	3,500	3,500	--	--	<2	<2	<2	<2	<2	
Nickel	mg/kg	2,000	200	--	--	19	18	21	19	13	
Selenium	mg/kg	100	10	20	--	<2	<2	<2	<2	<2	
Silver	mg/kg	500	50	100	--	<1	<1	<1	<1	<1	
Thallium	mg/kg	700	70	--	--	<10	<10	<10	<10	<10	
Vanadium	mg/kg	2,400	240	--	--	44	43	49	45	37	
Zinc	mg/kg	5,000	2,500	--	--	68	140	230	80	59	
PCBs											
Aroclor 1016	µg/kg	50,000	50,000	--	--	--	--	--	--	--	
Aroclor 1221	µg/kg	50,000	50,000	--	--	--	--	--	--	--	
Aroclor 1232	µg/kg	50,000	50,000	--	--	--	--	--	--	--	
Aroclor 1242	µg/kg	50,000	50,000	--	--	--	--	--	--	--	
Aroclor 1248	µg/kg	50,000	50,000	--	--	--	--	--	--	--	
Aroclor 1254	µg/kg	50,000	50,000	--	--	--	--	--	--	--	
Aroclor 1260	µg/kg	50,000	50,000	--	--	--	--	--	--	--	
SVOCs											
1,2,4-Trichlorobenzene	µg/kg	--	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	µg/kg	--	--	--	--	--	--	--	--	--	
1,2-Diphenylhydrazine/Azobenzene	µg/kg	--	--	--	--	--	--	--	--	--	
1,3-Dichlorobenzene	µg/kg	--	--	--	--	--	--	--	--	--	
1,4-Dichlorobenzene	µg/kg	--	--	150,000	--	--	--	--	--	--	
2,4,5-Trichlorophenol	µg/kg	--	--	8,000,000	--	--	--	--	--	--	
2,4,6-Trichlorophenol	µg/kg	--	--	40,000	--	--	--	--	--	--	

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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

						Object Name:	ISWC0099	ISWC0100	ISWC0101	ISWC0102	ISWC0103
						Sample Name:	ISWC0099S001	ISWC0100S001	ISWC0101S001	ISWC0102S001	ISWC0103S001
						Collection Date:	8/24/2009	8/24/2009	8/24/2009	8/24/2009	8/24/2009
						Sample Depth (feet):	0.7 - 1.3	0.7 - 1.2	0.2 - 0.8	0.0 - 0.5	0.0 - 0.5
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger ^a	TCLP Leachate Testing Trigger ^b	STLC	RESULT	RESULT	RESULT	RESULT	RESULT	
2,4-Dichlorophenol	µg/kg	--	--	--	--	--	--	--	--	--	
2,4-Dimethylphenol	µg/kg	--	--	--	--	--	--	--	--	--	
2,4-Dinitrophenol	µg/kg	--	--	--	--	--	--	--	--	--	
2,4-Dinitrotoluene	µg/kg	--	--	2,600	--	--	--	--	--	--	
2,6-Dinitrotoluene	µg/kg	--	--	--	--	--	--	--	--	--	
2-Chloronaphthalene	µg/kg	--	--	--	--	--	--	--	--	--	
2-Chlorophenol	µg/kg	--	--	--	--	--	--	--	--	--	
2-Methylnaphthalene	µg/kg	--	--	--	--	--	--	--	--	--	
2-Methylphenol	µg/kg	--	--	--	--	--	--	--	--	--	
2-Nitroaniline	µg/kg	--	--	--	--	--	--	--	--	--	
2-Nitrophenol	µg/kg	--	--	--	--	--	--	--	--	--	
3,3'-Dichlorobenzidine	µg/kg	--	--	--	--	--	--	--	--	--	
3-Nitroaniline	µg/kg	--	--	--	--	--	--	--	--	--	
4,6-Dinitro-2-methylphenol	µg/kg	--	--	--	--	--	--	--	--	--	
4-Bromophenyl phenyl ether	µg/kg	--	--	--	--	--	--	--	--	--	
4-Chloro-3-methylphenol	µg/kg	--	--	--	--	--	--	--	--	--	
4-Chloroaniline	µg/kg	--	--	--	--	--	--	--	--	--	
4-Chlorophenyl phenyl ether	µg/kg	--	--	--	--	--	--	--	--	--	
4-Methylphenol	µg/kg	--	--	--	--	--	--	--	--	--	
4-Nitroaniline	µg/kg	--	--	--	--	--	--	--	--	--	
4-Nitrophenol	µg/kg	--	--	--	--	--	--	--	--	--	
Acenaphthene	µg/kg	--	--	--	--	--	--	--	--	--	
Acenaphthylene	µg/kg	--	--	--	--	--	--	--	--	--	
Aniline	µg/kg	--	--	--	--	--	--	--	--	--	
Anthracene	µg/kg	--	--	--	--	--	--	--	--	--	
Benzidine	µg/kg	--	--	--	--	--	--	--	--	--	
Benzo(a)anthracene	µg/kg	--	--	--	--	--	--	--	--	--	
Benzo(a)pyrene	µg/kg	--	--	--	--	--	--	--	--	--	
Benzo(b)fluoranthene	µg/kg	--	--	--	--	--	--	--	--	--	
Benzo(g,h,i)perylene	µg/kg	--	--	--	--	--	--	--	--	--	
Benzo(k)fluoranthene	µg/kg	--	--	--	--	--	--	--	--	--	
Benzoic acid	µg/kg	--	--	--	--	--	--	--	--	--	
Benzyl alcohol	µg/kg	--	--	--	--	--	--	--	--	--	
Bis(2-chloroethoxy)methane	µg/kg	--	--	--	--	--	--	--	--	--	
Bis(2-chloroethyl)ether	µg/kg	--	--	--	--	--	--	--	--	--	

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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

			Object Name:			ISWC0099	ISWC0100	ISWC0101	ISWC0102	ISWC0103
			Sample Name:			ISWC0099S001	ISWC0100S001	ISWC0101S001	ISWC0102S001	ISWC0103S001
			Collection Date:			8/24/2009	8/24/2009	8/24/2009	8/24/2009	8/24/2009
			Sample Depth (feet):			0.7 - 1.3	0.7 - 1.2	0.2 - 0.8	0.0 - 0.5	0.0 - 0.5
ANALYTE	UNITS	TTLIC	WET Leachate Testing Trigger^a	TCLP Leachate Testing Trigger^b	STLC	RESULT	RESULT	RESULT	RESULT	RESULT
Bis(2-chloroisopropyl)ether	µg/kg	--	--	--	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	µg/kg	--	--	--	--	--	--	--	--	--
Butyl benzyl phthalate	µg/kg	--	--	--	--	--	--	--	--	--
Chrysene	µg/kg	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/kg	--	--	--	--	--	--	--	--	--
Dibenzofuran	µg/kg	--	--	--	--	--	--	--	--	--
Diethyl phthalate	µg/kg	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	µg/kg	--	--	--	--	--	--	--	--	--
Di-n-butyl phthalate	µg/kg	--	--	--	--	--	--	--	--	--
Di-n-octyl phthalate	µg/kg	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/kg	--	--	--	--	--	--	--	--	--
Fluorene	µg/kg	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	µg/kg	--	--	2,600	--	--	--	--	--	--
Hexachlorobutadiene	µg/kg	--	--	10,000	--	--	--	--	--	--
Hexachlorocyclopentadiene	µg/kg	--	--	--	--	--	--	--	--	--
Hexachloroethane	µg/kg	--	--	60,000	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/kg	--	--	--	--	--	--	--	--	--
Isophorone	µg/kg	--	--	--	--	--	--	--	--	--
Naphthalene	µg/kg	--	--	--	--	--	--	--	--	--
Nitrobenzene	µg/kg	--	--	40,000	--	--	--	--	--	--
N-Nitrosodimethylamine	µg/kg	--	--	--	--	--	--	--	--	--
N-Nitroso-di-n-propylamine	µg/kg	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	µg/kg	--	--	--	--	--	--	--	--	--
Pentachlorophenol	µg/kg	17,000	17,000	2,000,000	--	--	--	--	--	--
Phenanthrene	µg/kg	--	--	--	--	--	--	--	--	--
Phenol	µg/kg	--	--	--	--	--	--	--	--	--
Pyrene	µg/kg	--	--	--	--	--	--	--	--	--
RADIONUCLIDES	--	--	--	--	--	R	R	R	R	R

INTERIM SOURCE REMOVAL ACTION (ISRA) - OUTFALL 009

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

Notes:

--" - not analyzed / not applicable

¹ - WET Leachate Testing Trigger = STLC limit * 10

² - 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)