

**ISRA 009 – AP/STP-1E1.
Soil Sampling for Radionuclides.
Results and Statistical Analysis.
Waste Certification.**

This data package provides the laboratory results and statistical analysis of the 4 samples taken at the ISRA Outfall 009, AP/STP-1E1 area. This analysis and data interpretation complies with the procedure approved by the California Department of Public Health¹.

Samples taken for waste disposal characterization were analyzed for strontium-90, tritium and gamma emitting radionuclides by gamma spectroscopy, using an off-site laboratory. Minimum detectable activity (MDA) for cesium-137 and strontium-90 averaged ~0.041 pCi/g and ~0.046 pCi/g respectively. Minimum detectable activity for tritium averaged ~0.78 pCi/g. The gamma spectroscopy library also included the following contaminants-of-concern: 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.

Statistical evaluation of sample analytical results to determine whether or not the sampled waste contains Cs-137 or Sr-90 activity elevated above local background was conducted using the Wilcoxon Rank Sum Test using protocols described in NUREG-1505² and DTSC guidance³ (See Appendix 1). Appendix 2 shows the complete analytical results for all radionuclides. Complete laboratory data packages are available on request.

Local background data for cesium-137 and strontium-90 was taken from Table 20 of the 1995 McLaren/Hart report⁴. Background for tritium in soil is not well established, and is not reported in the 1995 McLaren/Hart report, therefore tritium background in soil is conservatively assumed to be zero. Tritium data is therefore compared to the MDA of the analysis and the EPA preliminary remediation goal (PRG)⁵ for residential 10⁻⁶ risk.

Conclusions

Cesium-137 - Based on the results of the statistical analysis of Appendix 1, soil to be excavated from AP/STP-1E1 does not exceed the local background for Cs-137. The incremental dose from Cs-137 above background is therefore zero mrem/y. All Cs-137 results are non-detect. The highest Cs-137 result is 0.008 pCi/g which is less than the highest background result of 0.213

¹ Boeing, "Northern Drainage Waste Sampling for Radionuclides." Revision 9, November 5, 2007. (Attachment 3 to Northern Drainage Work Plan) and "ISRA Waste Sampling for Radionuclides", Attachment A to the ISRA Soil Management Plan.

² NUREG-1505, Nuclear Regulatory Commission, "A Non-parametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys." January 1998.
http://www.philrutherford.com/Radiation_Cleanup_Standards/NUREG-1505.pdf

³ DTSC, "Selecting Inorganic Constituents as Chemicals of Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities." February 1997.

California Department of Public Health (CDPH) Radiologic Health Branch (RHB) are not required for the off-site disposal of decommissioned material or of the subject material¹⁰.



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¹⁰ The California Department of Public Health (CDPH) Radiologic Health Branch (RHB) has stated in a November 9, 2007 email to Phil Rutherford (Boeing) ... *"The Governor's Executive Order D-62-02, does not specifically require the Department of Health Services (now the Department of Public Health) to perform verification sampling of*

Santa Susana Field Laboratory
The Boeing Company

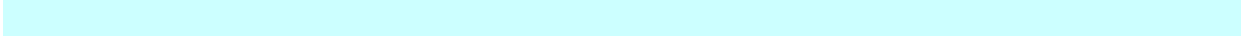


Soil Data from ISRA 009 - AP/STP-1E1

No.	Sample ID	Stockpile ID	Sampling Date	Laboratory Batch	Cesium-137 (pCi/g)				Strontium-90 (pCi/g)				Tritium (pCi/g)			
					Activity	+/- 2 Error	MDA	Non-detect?	Activity	+/- 2 Error	MDA	Non-detect?	Activity	+/- 2 Error	MDA	Non-detect?
1	APWC0401S001	N/A	7/29/2010	257560	-0.00615	0.026	0.0447	NDA	0.00544	0.0274	0.0476	NDA	0.768	0.505	0.786	NDA
2	APWC0402S001	N/A	7/29/2010	257560	-0.0117	0.0221	0.0369	NDA	0.0146	0.0267	0.0463	NDA	-0.205	0.4	0.794	NDA
3	APWC0403S001	N/A	7/29/2010	257560	-0.0122	0.0245	0.0416	NDA	0.0287	0.0282	0.0462	NDA	-0.0857	0.405	0.775	NDA
4	APWC0404S001	N/A	7/29/2010	257560	0.00834	0.0239	0.042	NDA	-0.00501	0.0215	0.0447	NDA	-0.323	0.367	0.762	NDA

	Cesium-137 (pCi/g)				Strontium-90 (pCi/g)				Tritium (pCi/g)			
	Activity	MDA	Non-detect?		Activity	MDA	Non-detect?		Activity	MDA	Non-detect?	
Average	-0.005	0.041			0.011	0.046			0.039	0.779		
Maximum	0.008	0.045			0.029	0.048			0.768	0.794		
Minimum	-0.012	0.037			-0.005	0.045			-0.323	0.762		
Count			4				4				4	
Number of Non-Detects			4				4				4	
% Non-Detects			100%				100%				100%	





No.	Soil ID	Sr-90	Adjusted Sr-90	Area	Ranks	Reference Ranks
18		0.100	0.100	R	52	52
19		0.069	0.069	R	44	44
20		0.097	0.097	R	50	50
21		0.084	0.084	R	47	47
22		0.098	0.098	R	51	51
23		0.045	0.045	R	30.5	30.5
24		0.045	0.045	R	30.5	30.5
25		0.020	0.020	R	9	9
26		0.045	0.045	R	30.5	30.5
27		0.089	0.089	R	49	49
28		0.050	0.050	R	40	40
29		0.045	0.045	R	30.5	30.5
30		0.050	0.050	R	40	40
31		0.045	0.045	R	30.5	30.5
32		0.040	0.040	R	22	22
33		0.045	0.045	R	30.5	30.5
34		0.045	0.045	R	30.5	30.5
35		0.045	0.045	R	30.5	30.5
36		0.025	0.025	R	12.5	12.5
37		0.082	0.082	R	46	46
38		0.045	0.045	R	30.5	30.5
39		0.040	0.040	R	22	22
40		0.035	0.035	R	18.5	18.5
41		0.025	0.025	R	12.5	12.5
42		0.005	0.005	R	2	2
43		0.020	0.020	R	9	9
44		0.010	0.010	R	4.5	4.5
45		0.020	0.020	R	9	9
46		0.020	0.020	R	9	9
47		0.050	0.050	R	40	40
48		0.030	0.030	R	16	16
49		0.030	0.030	R	16	16
50		0.020	0.020	R	9	9
51		0.040	0.040	R	22	22
52	APWC0401S001	0.005	0.005	S	3	0
53	APWC0402S001	0.015	0.015	S	6	0
54	APWC0403S001	0.029	0.029	S	14	0
55	APWC0404S001	-0.005	-0.005	S	1	0
Sum					1540.0	1516.0

Appendix 2
Radionuclide Results

ISRA Outfall 009 - AP/STP-1E1

Project Name	Sampling Organization	Sampling Date	Sampling Location (General)	Sampling Location (Specific)	Sample Serial Number	Media Type	Isotope	Value	Error (+/-)	MDA	Non-Detect?	Units	Error Type	Analysis Protocol	Analysis Organization	Document	Status
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