

**Rancho Seco**  
**Final Status Survey Summary Report**  
**February 24, 2009**  
**Trench 1 Surface**  
**Survey Unit F8100052**

Prepared By:  Date: 2-24-2009  
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Approved By:  Date: 2-27-09  
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## FINAL STATUS SURVEY SUMMARY REPORT

### Survey Unit:

F8100052, Trench 1 Surface

### Survey Unit Description:

Operating History: The area surrounded the tanks used to store radioactive liquids. This area was used for the storage of radioactive material. Operating records and the HSA document several events with the potential for a release of radioactivity associated with this survey area. The HSA documented the storage of radioactive material within the area that may have had the potential to contaminate the area.

Records of soil samples taken near the BWST showed soil contamination levels as high as 230 pCi/g prior to remediation.

Site Characterization: Soil samples were collected and analyzed for the presence of plant-derived radionuclides. Cs-137 was the primary nuclide of plant origin detected with a mean activity level of 379 pCi/g and a maximum value of 1,040 pCi/g. Based on the classification procedure (DSIP-0020) and levels of Cs-137 reported, the area was determined to be a Class 1 land area.

### Survey Unit Design Information:

The Survey Unit Design Parameters are presented in Table 1 below. The survey unit and measurement locations are depicted on the maps in Attachment 1. Direct measurement locations were determined using a random-start, fixed grid pattern and 660 m<sup>2</sup> were scanned for approximately 100% coverage. Soil samples were collected at each direct measurement location and analyzed by HPGe detector. The instrumentation used for the survey along with the MDC values are listed in Tables 2-1 and 2-2 in Attachment 2.

**Table 1. Survey Unit Design Parameters**

<b>Survey Design Parameter</b>	<b>Value</b>	<b>Comment</b>
<b>Survey Area:</b>	F810	Trench 1 Surface
<b>Survey Unit:</b>	0052	Open Land Area
<b>Class:</b>	1	LTP Table 5-4
<b>SU Area (m<sup>2</sup>):</b>	660	
<b>Evaluator:</b>	G. Frank	
<b>DCGL Cs137 surrogate (pCi/g):</b>	51.2	
<b>Area Factor:</b>	1.5	Class 1
<b>Design DCGL<sub>mc</sub> (pCi/g):</b>	79	Class 1
<b>LBGR (pCi/g):</b>	25.6	Default = 50% DCGL
<b>Design Sigma (pCi/g):</b>	0.1	DTBD-06-001, Table 5-4D
<b>Type I Error:</b>	0.05	
<b>Type II Error:</b>	0.05	
<b>Nuclide:</b>	Cs137	
<b>Sample Area (m<sup>2</sup>):</b>	38.8	Class 1
<b>Total Area Scanned (m<sup>2</sup>):</b>	660	
<b>Scan Coverage (%):</b>	100%	Class 1
<b>Z<sub>1-α</sub>:</b>	1.645	
<b>Z<sub>1-β</sub>:</b>	1.645	
<b>Sign P:</b>	0.99865	
<b>Calculated Relative Shift:</b>	256	
<b>Relative Shift Used:</b>	3	Uses 3.0 if Rel Shift >3
<b>N-Value:</b>	11	
<b>Design N-Value + 20%:</b>	14	NUREG-1575 Table 5-5
<b>Grid Spacing L:</b>	6.9	Class 1

## Survey Results:

A total of 38 direct measurements were made in F8100052. The results including mean, median, standard deviation and range are shown in Table 2. All of the direct measurements were less than the DCGL. ISOCs measurements resulted in no Co-60 activity greater than the MDA from Attachment 2, Table 2-1 the range of Co-60 is 0.168 to 0.277 pCi/g. Particle scans of the entire survey area were performed using a 2350-1 w/ 44-10 with no readings above the investigation criteria in Attachment 2, Table 2-2 the range is 3201 to 4751 cpm. None of the scan measurements indicated areas of elevated activity.

**Table 2. Direct Measurement Results**  
(all activity values in pCi/g)

Measurement ID	Cs137 MDA	Cs137 Activity	Uncertainty
<b>Mean:</b>		3.87E-01	
<b>Median:</b>		3.91E-01	
<b>Standard Deviation:</b>		9.37E-02	
<b>Range:</b>	1.97E-01 to 6.71E-01		
F8100052A0001GS	2.21E-01	2.87E-01	1.59E-01
F8100052A0002GS	4.39E-01	< 4.39E-01	
F8100052A0003GS	4.01E-01	< 4.01E-01	
F8100052A0004GS	4.17E-01	< 4.17E-01	
F8100052A0005GS	4.09E-01	< 4.09E-01	
F8100052A0006GS	4.05E-01	< 4.05E-01	
F8100052A0007GS	2.04E-01	4.01E-01	1.68E-01
F8100052A0008GS	2.40E-01	6.71E-01	2.17E-01
F8100052A0009GS	4.39E-01	< 4.39E-01	
F8100052A0010GS	3.90E-01	< 3.90E-01	
F8100052A0011GS	2.64E-01	3.91E-01	1.92E-01
F8100052A0012GS	2.20E-01	3.09E-01	1.62E-01
F8100052S0013GS	1.94E-01	3.18E-01	1.51E-01
F8100052S0014GS	4.68E-01	< 4.68E-01	
F8100052S0015GS	2.07E-01	4.79E-01	1.78E-01
F8100052S0016GS	2.19E-01	4.75E-01	1.82E-01
F8100052S0017GS	2.10E-01	2.82E-01	1.53E-01
F8100052S0018GS	1.97E-01	< 1.97E-01	1.25E-01
F8100052S0019GS	2.03E-01	6.45E-01	1.98E-01
F8100052S0020GS	4.18E-01	< 4.18E-01	
F8100052S0021GS	2.15E-01	4.81E-01	1.81E-01
F8100052S0022GS	4.64E-01	< 4.64E-01	
F8100052S0023GS	3.40E-01	< 3.40E-01	
F8100052S0024GS	2.91E-01	< 2.91E-01	
F8100052S0025GS	2.06E-01	4.13E-01	1.68E-01

F8100052S0026GS	3.70E-01	< 3.70E-01	
F8100052S0027GS	1.83E-01	2.59E-01	1.37E-01
F8100052S0028GS	3.70E-01	< 3.70E-01	
F8100052S0029GS	3.40E-01	< 3.40E-01	
F8100052S0030GS	3.92E-01	< 3.92E-01	
F8100052S0031GS	3.97E-01	< 3.97E-01	
F8100052S0032GS	1.95E-01	2.59E-01	1.43E-01
F8100052S0033GS	1.86E-01	2.97E-01	1.44E-01
F8100052S0034GS	1.60E-01	3.11E-01	1.36E-01
F8100052S0035GS	3.57E-01	< 3.57E-01	
F8100052S0036GS	3.70E-01	< 3.70E-01	
F8100052S0037GS	3.66E-01	< 3.66E-01	
F8100052A0038GS	3.92E-01	< 3.92E-01	

**Survey Unit Data Assessment:**

The survey design required 38 direct measurements for the Sign Test. The critical value and the results of the Sign Test are presented in Table 3. The sample mean and median values were less than the DCGL. The sample standard deviation was less than the design standard deviation so no additional samples were required.

**Table 3. Data Assessment Results**

<b>Survey Results Parameter</b>	<b>Value</b>	<b>Comment</b>
<b>Actual Direct Measurements (N):</b>	38	
<b>Median (pCi/g):</b>	3.91E-01	
<b>Mean (pCi/g):</b>	3.87E-01	
<b>Standard Deviation (pCi/g):</b>	9.37E-02	
<b>Maximum (pCi/g):</b>	6.71E-01	
<b>Sign Test Final N Value:</b>	38	
<b>S+ Value:</b>	38	
<b>Critical Value:</b>	24	
<b>Sufficient Samples Collected:</b>	Yes	
<b>Maximum Value &lt; DCGL:</b>	Yes	
<b>Median Value &lt; DCGL:</b>	Yes	
<b>Mean Value &lt; DCGL:</b>	Yes	
<b>Maximum Value &lt; DCGL<sub>mc</sub>:</b>	Yes	Class 1
<b>Standard Deviation &lt;= Sigma:</b>	Yes	
<b>Pass the Sign Test?</b>	Yes	
<b>Reject the Null Hypothesis?</b>	Yes	
<b>The survey unit passes all conditions?</b>	Yes	

### **Survey Unit Investigations and Results:**

No investigations were required for either direct or scan measurements and no investigation results are reported.

### **ALARA Statement:**

As stated in Chapter 4 of the LTP, as long as the residual activity within the survey unit is less than the DCGL, the ALARA criterion has been met.

### **Changes in Initial Survey Unit Assumptions:**

The survey unit was designed as a Class 1 land survey and the sample results are consistent with that classification. The variability of the survey results was less than the characterization data used for survey design. No potential areas of elevated activity were detected. Therefore the EMC criterion was met.

### **Conclusion:**

The FSS of this survey unit was properly designed as a Class 1 survey based on Table 5-4 of the LTP. The required number of direct measurements was made and the scan coverage met the requirement of Table 5-6 of the LTP. All of the direct measurements were less than the DCGL. No investigations were required.

The direct measurement data support rejection of the null hypothesis, providing high confidence that the survey unit satisfied the release criteria and that the data quality objectives were met.

It is concluded that survey unit F8100052 meets the release criteria of 10CFR20.1402.

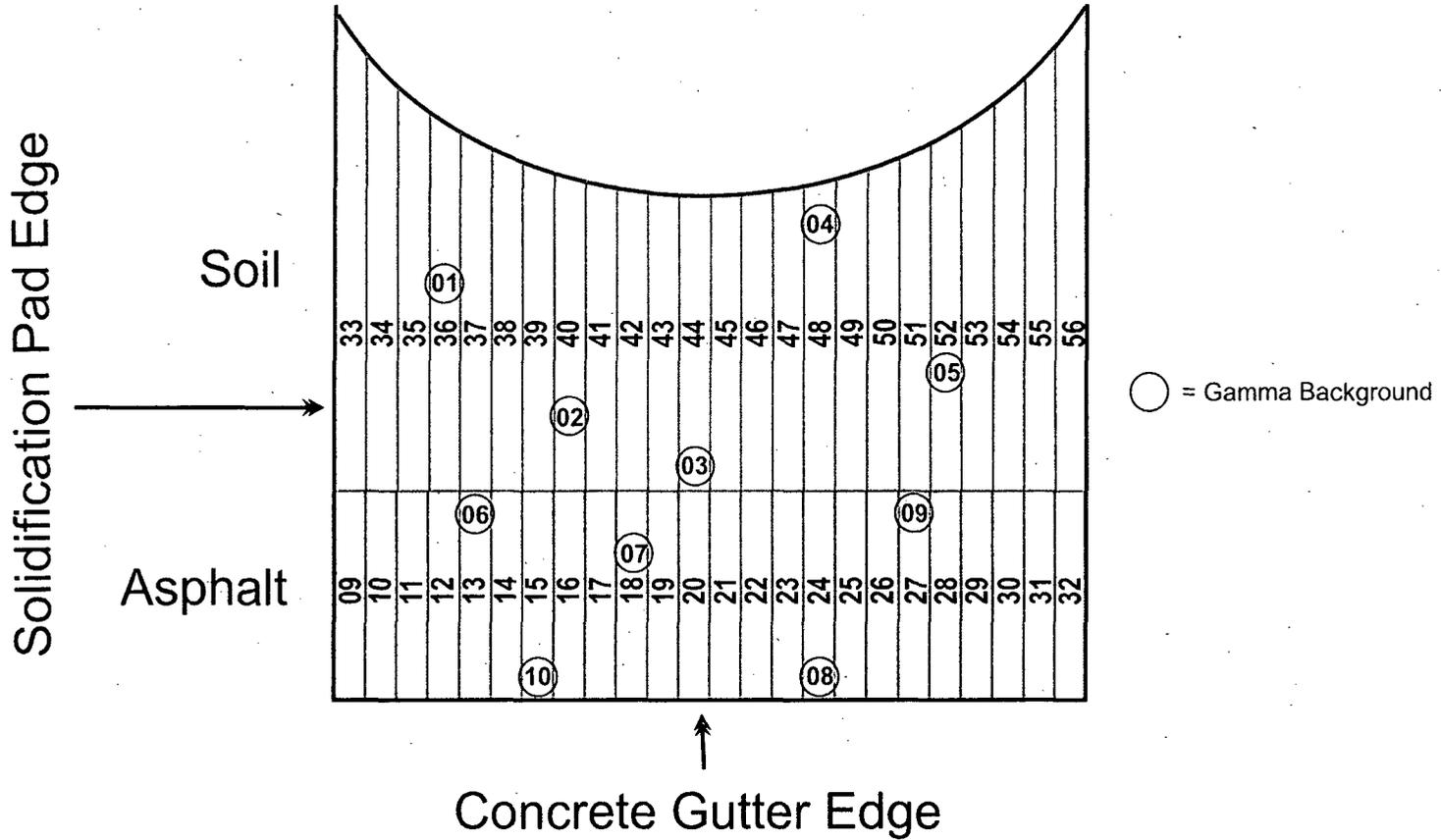
**Attachment 1**

**Maps**

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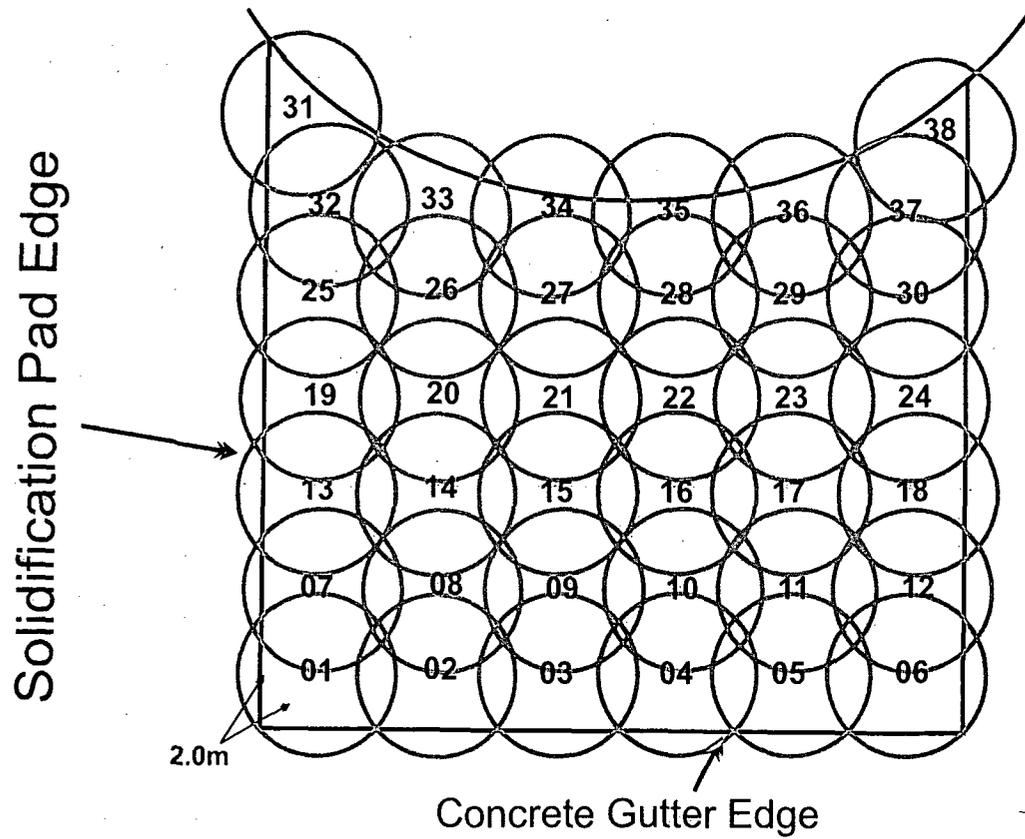
**Survey Unit F8100052**

### Trench 1 East Portion - Surface Scan w/44-10 for Discrete Particles



F8100052-M1

# Trench 1 Eastern Portion ISOCS Scans



Measurements are center to center, unless noted by an arrow

F8100052-M2

**Attachment 2**  
**Instrumentation**  
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**Table 2-1. Survey Unit Instrumentation**

<b>Instrument</b>	<b>Detector Model No.</b>	<b>Detector Serial No.</b>	<b>MDC</b>
ISOCS	N/A	2983947	Soil – 0.468 pCi/g Cs-137 Soil – 0.269 pCi/g Co-60 Asphalt – 0.439 pCi/g Cs-137 Asphalt – 0.277 pCi/g Co-60
2350-1	44-10	211672	5 pCi/g
2350-1	44-10	256101	5 pCi/g

**Table 2-2. Investigation Criteria and DCGL**

<b>Instrument</b>	<b>Parameter</b>	<b>Value</b>
ISOCS	Investigation Criteria - Scan	Soil – 51.2 pCi/g Cs-137 Soil – 12.6 pCi/g Co-60 Asphalt – 51.2 pCi/g Cs-137 Asphalt – 12.6 pCi/g
2350-1	44-10 Particle Scan	8850 cpm
All	DCGL <sub>w</sub>	51.2 Cs-137 12.6 Co-60
All	DCGL <sub>EMC</sub>	Design DCGL <sub>EMC</sub> from Table 1 of FSS Summary Report or from DQA Evaluation Summary

**Attachment 3**

**Investigation**

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**(none required)**

**Attachment 4**  
**Data Assessment**  
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