
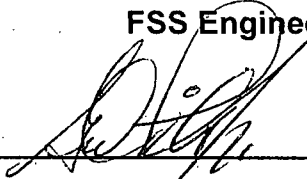


Rancho Seco
Final Status Survey Summary Report
March 25, 2008
Retention Basin Concrete Storage
Survey Unit F8480018

Prepared By:  Date: 3-25-2008
FSS Engineer

Reviewed By:  Date: 3/31/08
Lead FSS Engineer

Approved By:  Date: 5-12-08
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8480018, Retention Basin Concrete Storage

Survey Unit Description:

Operating History: This area is located at the southwest corner of the site. The area surrounds the structures that were used for containment and final treatment of liquid effluents prior to their release from the site. Contaminated resin was reported to have been found in the basins. Operating records and the HSA document occurrences of radioactive material with the potential for a release of radioactivity associated with this survey area. Records confirmed the presence of radioactive material within the area and basin sediment/soil contamination levels up to ~290 pCi/g. In addition, soil contamination levels up to ~5 pCi/g prior to some decontamination activities.

Site Characterization: Soil samples were collected and showed Cs-137 at mean activity levels of 0.086 pCi/g and a maximum activity of 0.196 pCi/g. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the soil area around the asphalt was determined to be Class 3.

HSA Events: LER-8812.

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 283 m² were scanned for approximately 27% 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

| Survey Design Parameter | Value | Comment |
|--|--------------|----------------------------------|
| Survey Area: | F848 | Retention Basin Concrete Storage |
| Survey Unit: | 0018 | Open Land Area |
| Class: | 2 | LTP Table 5-4 |
| SU Area (m²): | 1059 | |
| Evaluator: | Gary Frank | |
| DCGL for Cs-137 surrogate (pCi/g): | 52.6 | |
| DCGL for Co-60 (pCi/g): | 12.6 | |
| Area Factor: | N/A | Class 2 |
| Design DCGL_{emc} (pCi/g): | N/A | Class 2 |
| LBGR (pCi/g): | 25.6 | Adjusted |
| Design Sigma (pCi/g): | 0.49 | DTBD-06-001, Table 5-4A or B |
| Type I Error: | 0.05 | |
| Type II Error: | 0.05 | |
| Sample Area (m²): | 117.7 | Class 2 |
| Total Area Scanned (m²): | 283 | |
| Scan Coverage (%): | 26.7% | Class 2 |
| Z_{1-α}: | 1.645 | |
| Z_{1-β}: | 1.645 | |
| Sign P: | 0.99865 | |
| Calculated Relative Shift: | 55.1 | |
| Relative Shift Used: | 3 | Uses 3.0 if Rel Shift >3 |
| N-Value: | 11 | |
| Design N-Value + 20%: | 14 | NUREG-1575 Table 5-5 |
| Grid Spacing L: | 10.8 | Class 2 |

Survey Results:

A total of 16 direct measurements were made in F8480018. The results are shown in Table 2-1. Statistical data including the mean, median, and standard deviation are shown in Table 2-2. All of the direct measurements were less than Unity. None of the scan measurements indicated areas of elevated activity. Soil samples were counted to the MDCs shown in Table 2-1 of Attachment 2.

Table 2-1. Direct Measurement Results
(all activity values in pCi/g)

| Sample ID | Cs137 | | | | Co60 | | | | Unity Total |
|-----------------|----------|-----------|-------------|-------------|----------|-----------|-------------|-------------|-------------|
| | MDA | Activity | Uncertainty | Unity Value | MDA | Activity | Uncertainty | Unity Value | |
| F8480018S0001SS | 6.16E-02 | 6.51E-01 | 7.82E-02 | 0.0124 | 7.49E-02 | <7.49E-02 | | 0.0059 | 0.0183 |
| F8480018S0002SS | 6.04E-02 | 7.31E-01 | 8.18E-02 | 0.0139 | 7.37E-02 | <7.37E-02 | | 0.0058 | 0.0198 |
| F8480018S0003SS | 8.72E-02 | <8.72E-02 | | 0.0017 | 7.59E-02 | <7.59E-02 | | 0.006 | 0.0077 |
| F8480018S0004SS | 5.97E-02 | 1.36E-01 | 4.73E-02 | 0.0026 | 6.77E-02 | <6.77E-02 | | 0.0054 | 0.008 |
| F8480018S0005SS | 5.95E-02 | 1.18E00 | 1.01E-01 | 0.0224 | 3.44E-02 | 1.67E-01 | 3.59E-02 | 0.0132 | 0.0356 |
| F8480018S0006SS | 6.57E-02 | <6.57E-02 | | 0.0012 | 4.78E-02 | <4.78E-02 | | 0.0038 | 0.005 |
| F8480018S0007SS | 6.86E-02 | <6.86E-02 | | 0.0013 | 4.10E-02 | <4.10E-02 | | 0.0033 | 0.0046 |
| F8480018S0008SS | 5.04E-02 | 5.68E-02 | 3.45E-02 | 0.0011 | 5.00E-02 | <5.00E-02 | | 0.004 | 0.005 |
| F8480018S0009SS | 5.82E-02 | 6.88E-01 | 7.90E-02 | 0.0131 | 9.21E-02 | <9.21E-02 | | 0.0073 | 0.0204 |
| F8480018S0010SS | 5.84E-02 | <5.84E-02 | | 0.0011 | 5.27E-02 | <5.27E-02 | | 0.0042 | 0.0053 |
| F8480018S0011SS | 5.31E-02 | <5.31E-02 | | 0.001 | 5.21E-02 | <5.21E-02 | | 0.0041 | 0.0051 |
| F8480018S0012SS | 6.83E-02 | 2.08E-01 | 5.57E-02 | 0.004 | 6.58E-02 | 5.09E-01 | 6.00E-02 | 0.0404 | 0.0444 |
| F8480018S0013SS | 4.41E-02 | 2.94E-01 | 5.33E-02 | 0.0056 | 5.14E-02 | <5.14E-02 | | 0.0041 | 0.0097 |
| F8480018S0014SS | 4.55E-02 | 1.27E-01 | 4.03E-02 | 0.0024 | 6.18E-02 | <6.18E-02 | | 0.0049 | 0.0073 |
| F8480018S0015SS | 7.85E-02 | <7.85E-02 | | 0.0015 | 5.69E-02 | <5.69E-02 | | 0.0045 | 0.006 |
| F8480018S0016SS | 6.19E-02 | <6.19E-02 | | 0.0012 | 5.18E-02 | <5.18E-02 | | 0.0041 | 0.0053 |

Table 2-2. Direct Measurements Results Summary

| | Cs137 Activity (pCi/g) | Co60 Activity (pCi/g) | Cs137 Unity | Co60 Unity | Unity Total |
|-------------------------------------|----------------------------------|---------------------------------|--------------------|-------------------|--------------------|
| DCGLw | 52.6 | 12.6 | | | |
| Mean | 2.84E-01 | 9.54E-02 | 0.0054 | 0.0076 | 0.013 |
| Median | 1.07E-01 | 5.94E-02 | 0.002 | 0.0047 | 0.0075 |
| Standard Deviation | 3.39E-01 | 1.14E-01 | 0.0065 | 0.0091 | 0.012 |
| Cs137 Activity Range (pCi/g) | 5.31E-02 to 1.18E00 | | | | |
| Co60 Activity Range (pCi/g) | 4.10E-02 to 5.09E-01 | | | | |
| Cs137 Unity Range | 0.001 to 0.0224 | | | | |
| Co60 Unity Range | 0.0033 to 0.0404 | | | | |
| Total Unity Range | 0.0046 to 0.0444 | | | | |
| Sample Count | 16 | | | | |

Survey Unit Data Assessment:

The survey design required 16 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

| Survey Results Parameter | Value | Comment |
|--|--------------|-------------------------------------|
| Actual Direct Measurements (N): | 16 | |
| Median (Unity): | 0.008 | |
| Mean (Unity): | 0.013 | |
| Direct Measurement Std Deviation (Unity): | 0.012 | |
| Maximum (Unity): | 0.044 | |
| Sign Test Final N Value: | 16 | |
| S+ Value: | 16 | |
| Critical Value: | 11 | |
| Sufficient Samples Collected: | Yes | |
| Maximum Value < Unitized DCGL: | Yes | |
| Median Value < Unitized DCGL: | Yes | |
| Mean Value < Unitized DCGL: | Yes | |
| Maximum Value < DCGL_{mc} (Unity): | N/A | Class 2 |
| Standard Deviation <= Sigma: | Investigate | <0.5 DCGL for both Cs-137 and Co-60 |
| Pass the Sign Test? | Yes | |
| Reject the Null Hypothesis? | Yes | |
| Does the Survey Unit Pass All Criteria? | Investigate | Survey Passes |

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 2 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

Conclusion:

The FSS of this survey unit was properly designed as a Class 2 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 Unity. 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.

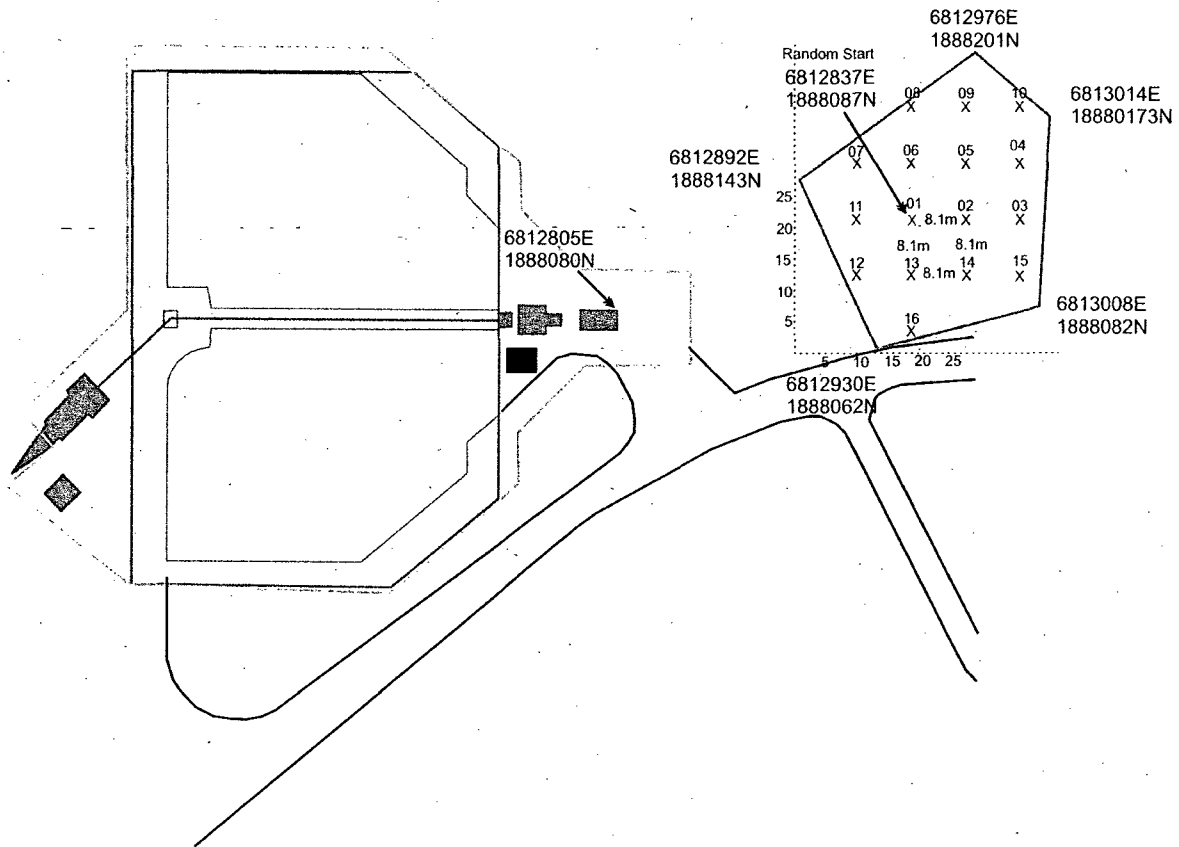
It is concluded that survey unit F8480018 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

March 25, 2008

Survey Unit F8480018

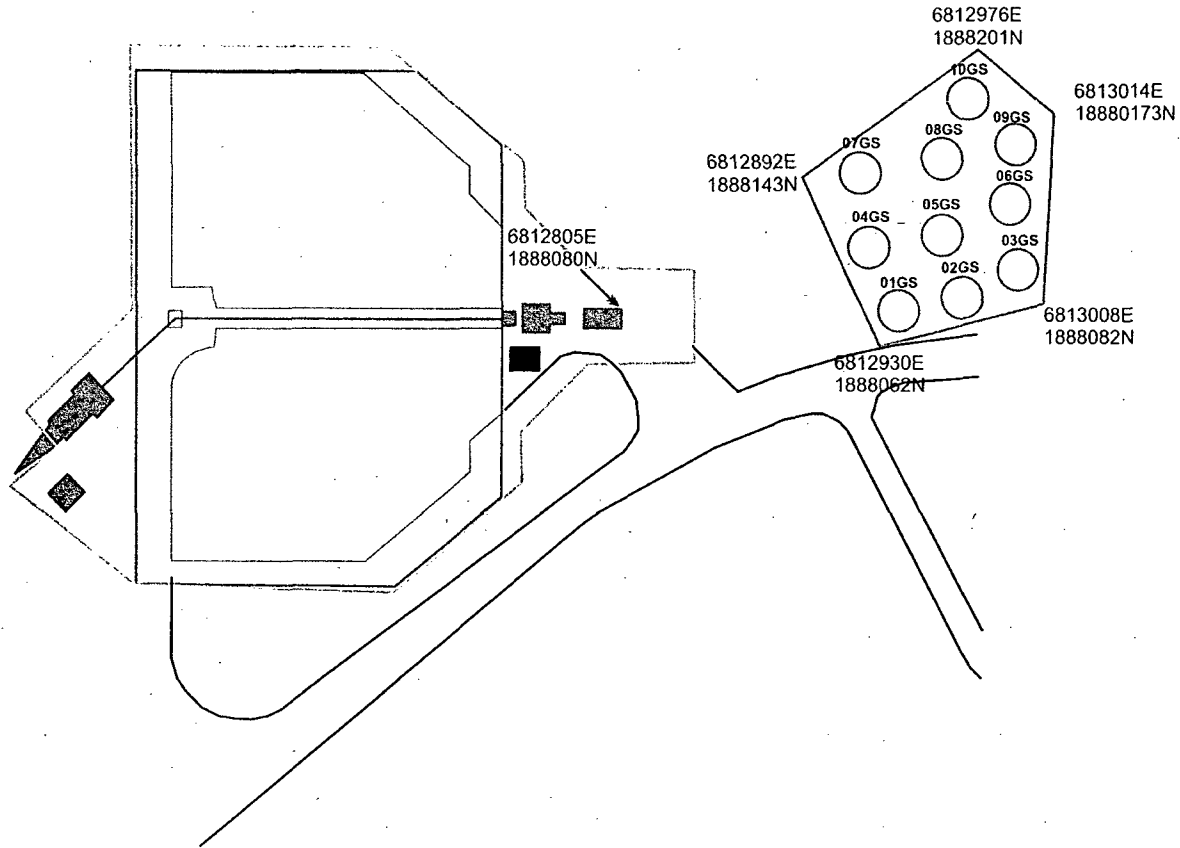


SMUD

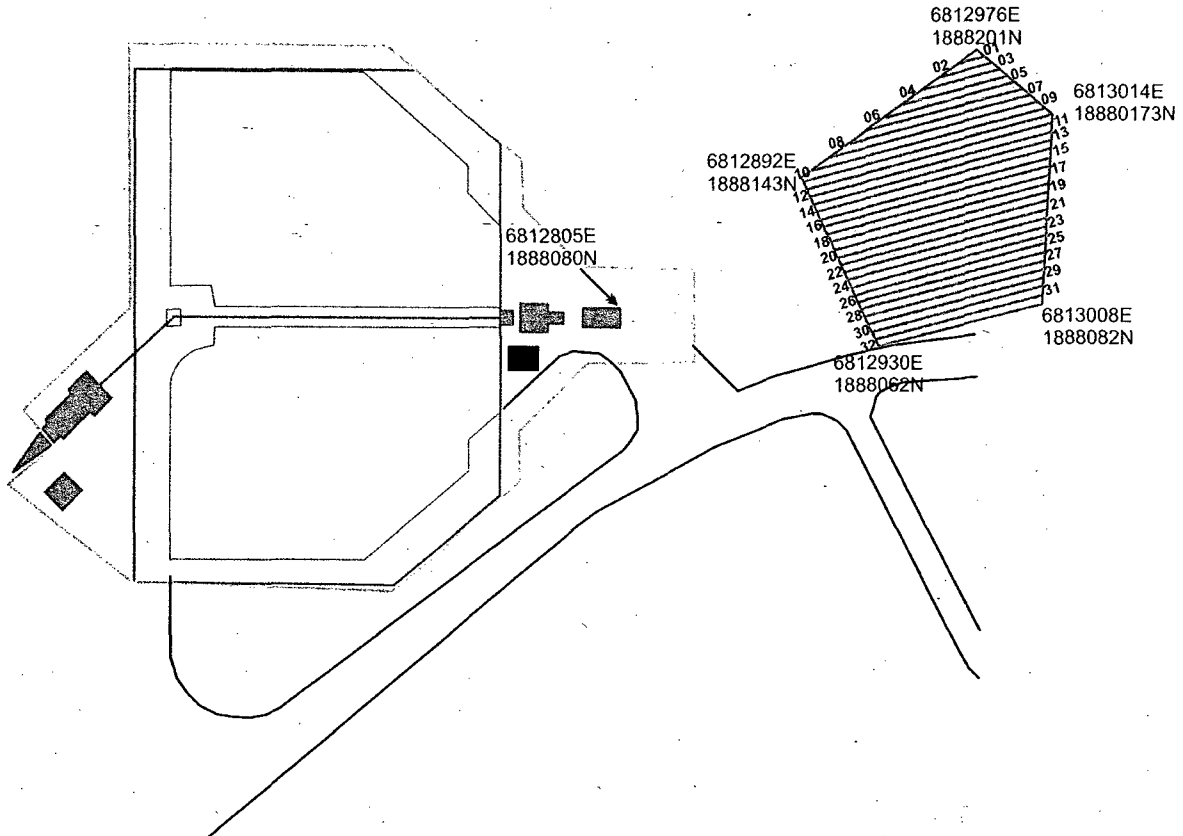
RETENTION BASIN CONCRETE STORAGE
SOIL SAMPLE/GAMMA DIRECT
F8480018 - M1



- 01GS 6812938E
1888081N
- 02GS 6812967E
1888087N
- 03GS 6812997E
1888100N
- 04GS 6812861E
1888111N
- 05GS 6812958E
1888117N
- 06GS 6812990E
1888131N
- 07GS 6812920E
1888146N
- 08GS 6812958E
1888153N
- 09GS 6812994E
1888159N
- 10GS 6812971E
1888182N



| | |
|-------------|--|
| SMUD | RETENTION BASIN CONCRETE STORAGE ISOCS GAMMA SCANS F8480018 - M2 |
|-------------|--|



SMUD

RETENTION BASIN CONCRETE STORAGE
44-10/SPA-3 SCANS
F8480018 - M3

Attachment 2

Instrumentation

March 25, 2008

Survey Unit F8480018

Table 2-1. Survey Unit Instrumentation

| Instrument | Detector Model No. | Detector Serial No. | MDC |
|-------------------|---------------------------|----------------------------|--|
| HPGe | N/A | 05069128 | Soil – 1.18 pCi/g Cs-137 Soil – 0.509 pCi/g Co-60 |
| ISOCS | N/A | 2983947 | Soil – 0.42 pCi/g Cs-137 Soil – 0.26 pCi/g Co-60 |
| NaI | 44-10 | 171992 | Soil – 5.2 pCi/g Cs-137 |

Table 2-2. Investigation Criteria and DCGL

| Instrument | Parameter | Value |
|-------------------|-------------------------------|--|
| ISOCS | Investigation Criteria - Scan | Soil – 26.3 pCi/g Cs-137 Soil – 6.3 pCi/g Co-60 |
| NaI | Investigative Criteria – Scan | 8212 cpm |
| All | DCGL _w | 52.6 Cs-137 12.6 Co-60 |
| All | DCGL _{EMC} | N/A |

Attachment 3

Investigation

March 25, 2008

Survey Unit F8480018

(none required)

Attachment 4

Data Assessment

March 25, 2008

Survey Unit F8480018

