

Rancho Seco

Final Status Survey Summary Report

March 19, 2008

Clean Drain System - Turbine Building Drains and Oily Water Separator

Survey Unit F8991073

Prepared By: S. Anderson Date: 3/19/2008

FSS Engineer

Reviewed By: [Signature] Date: 3/19/08

Lead FSS Engineer

Approved By: [Signature] Date: 5-12-08

Dismantlement Superintendent, Radiological

## FINAL STATUS SURVEY SUMMARY REPORT

### Survey Unit:

F8991073, Clean Drain System - Turbine Building Drains and Oily Water Separator, Transformer Yard trench to remove drain piping

### Survey Unit Description:

Operating History: This system provided a pathway to route various Turbine Building drains through the storm water drain pipe into the oily water separator. Operating records and the HSA document occurrences of radioactive contamination associated with this system piping.

Site Characterization: Direct measurements were made of the interior surfaces of the system piping. Direct measurements of the interior showed a mean gross activity level of 368 dpm/100 cm<sup>2</sup> and a maximum value of 634 dpm/100 cm<sup>2</sup>. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the system was determined to be a Class 3 system.

The Transformer Yard drain line, which drained to Manhole 17 and subsequently to the Oily Water Separator, was excavated and removed in September 2006. A 4-ft. portion of the drain line pipe was allowed to remain in place due to the installation of a concrete electrical duct bank around the line.

HSA Events: HSA Report pg. 63.

### 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 based on an approximate size of 5 m<sup>2</sup> and 55 m<sup>2</sup> were scanned for 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>	F899	Clean Drain System - Turbine Building Drains and Oily Water Separator
<b>Survey Unit:</b>	1073	Open Land Area
<b>Class:</b>	3	LTP Table 5-4
<b>SU Area (m<sup>2</sup>):</b>	55	
<b>Evaluator:</b>	D. Anderson	
<b>DCGL Cs137 surrogate (pCi/g):</b>	51.2	
<b>Area Factor:</b>	N/A	Class 3
<b>Design DCGL<sub>mc</sub> (pCi/g):</b>	N/A	Class 3
<b>LBGR (pCi/g):</b>	50.93	Adjusted
<b>Design Sigma (pCi/g):</b>	0.09	DTBD-06-001, Table 5-4E
<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>	N/A	Class 3
<b>Total Area Scanned (m<sup>2</sup>):</b>	55	
<b>Scan Coverage (%):</b>	100%	Class 3
<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>	3.1	
<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>	N/A	Class 3

## Survey Results:

A total of 15 direct measurements were made in F8991073. The results including mean, median, standard deviation and range are shown in Table 2. All of the direct measurements were less than the DCGL. None of the scan measurements indicated areas of elevated activity. Soil samples were counted to the MDC shown in Table 2-1 of Attachment 2.

All drain line piping was removed from the Transformer Yard area, with the exception of 4 feet of 6-inch pipe embedded in a concrete duct bank. Direct measurements were performed with an M2350 and 44-157 pipe detector. One minute scaler counts were taken every 15 cm along the 4-ft. pipe segment for a 100% survey. The mean gross activity level of the piping was 2,724 dpm/100 cm<sup>2</sup> with a maximum value of 2,926 dpm/100 cm<sup>2</sup>. The instrumentation used for the survey along with the MDC value is listed in Table 2-1 in Attachment 2.

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

Measurement ID	Cs137 MDA	Cs137 Activity	Uncertainty
<b>Mean:</b>		4.91E-02	
<b>Median:</b>		4.97E-02	
<b>Standard Deviation:</b>		6.24E-03	
<b>Range:</b>	4.00E-02 to 6.37E-02		
F8991073S0001SS	4.84E-02	< 4.84E-02	
F8991073S0002SS	5.41E-02	< 5.41E-02	
F8991073S0003SS	5.07E-02	< 5.07E-02	
F8991073S0004SS	5.22E-02	< 5.22E-02	
F8991073S0005SS	4.95E-02	< 4.95E-02	
F8991073S0006SS	6.37E-02	< 6.37E-02	
F8991073S0007SS	4.01E-02	< 4.01E-02	
F8991073S0008SS	4.58E-02	< 4.58E-02	
F8991073S0009SS	5.09E-02	< 5.09E-02	
F8991073S0010SS	4.21E-02	< 4.21E-02	
F8991073S0011SS	4.35E-02	< 4.35E-02	
F8991073S0012SS	5.48E-02	< 5.48E-02	
F8991073S0013SS	5.12E-02	< 5.12E-02	
F8991073S0014SS	4.00E-02	< 4.00E-02	
F8991073S0015SS	4.97E-02	< 4.97E-02	

**Survey Unit Data Assessment:**

The survey design required 15 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>	15	
<b>Median (pCi/g):</b>	4.97E-02	
<b>Mean (pCi/g):</b>	4.91E-02	
<b>Standard Deviation (pCi/g):</b>	6.24E-03	
<b>Maximum (pCi/g):</b>	6.37E-02	
<b>Sign Test Final N Value:</b>	15	
<b>S+ Value:</b>	15	
<b>Critical Value:</b>	11	
<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>emc</sub>:</b>	N/A	Class 3
<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 (i.e. the survey unit average activity 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 3 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 3 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 F8991073 meets the release criteria of 10CFR20.1402.

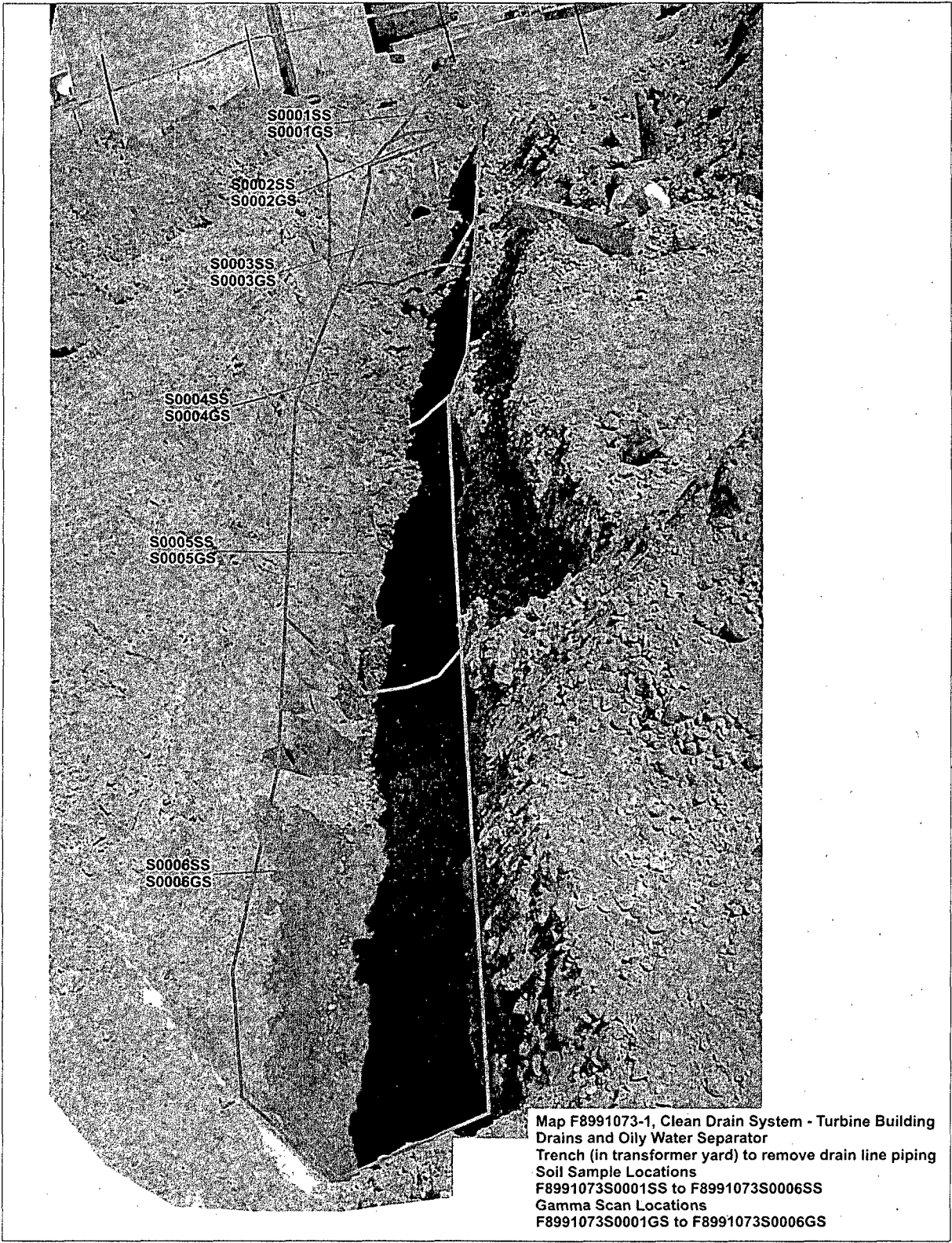
**Attachment 1**

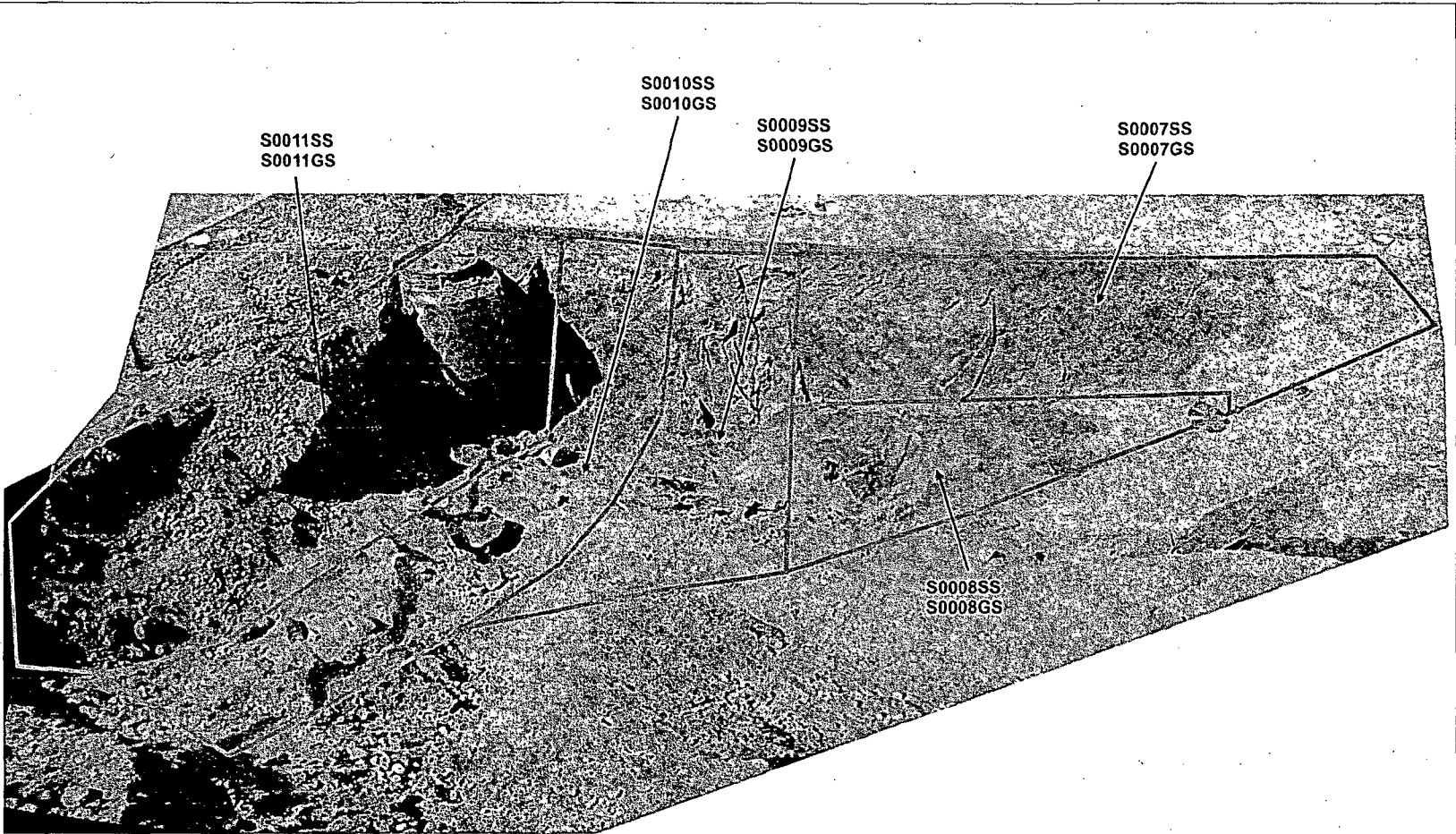
**Maps**

**March 19, 2008**

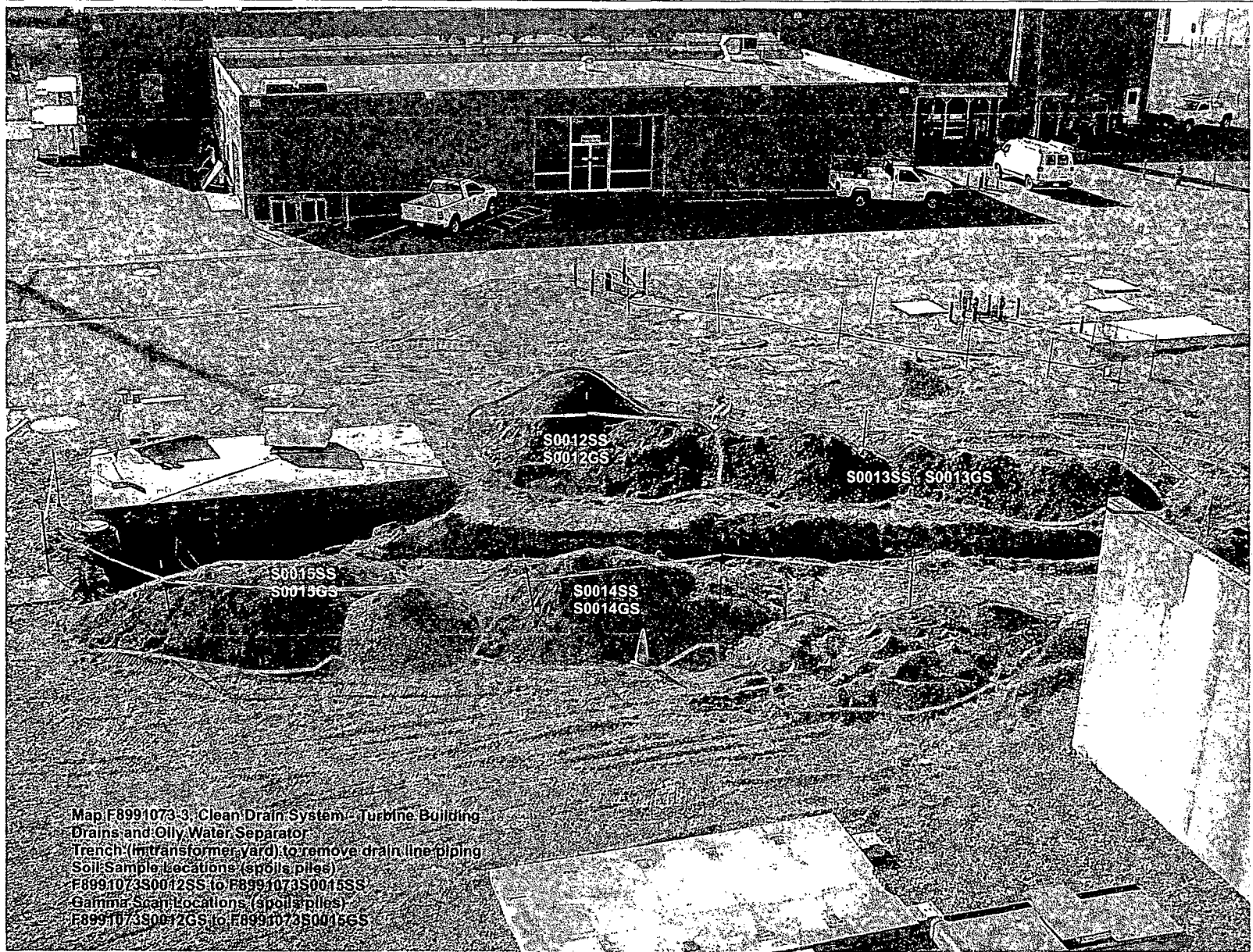
**Survey Unit F8991073**







Map F8991073-2, Clean Drain System - Turbine Building  
Drains and Oily Water Separator  
Trench (in transformer yard) to remove drain line piping  
Soil Sample Locations  
F8991073S0007SS to F8991073S0011SS  
Gamma Scan Locations  
F8991073S0007GS to F8991073S0011GS



**Attachment 2**

**Instrumentation**

**March 19, 2008**

**Survey Unit F8991073**

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

<b>Instrument</b>	<b>Detector Model No.</b>	<b>Detector Serial No.</b>	<b>MDC</b>
HPGe	N/A	9987008	Soil – 6.37E-02 pCi/g Cs-137 Soil – 6.23E-02 pCi/g Co-60
HPGe	N/A	05047773	Soil – 5.48E-02 pCi/g Cs-137 Soil – 5.62E-02 pCi/g Co-60
M2350; 193700		SPA-3; 404397	Soil – 5.2 pCi/g Cs-137
M2350; 142509		44-157; 201151	1,680 dpm/100 cm <sup>2</sup> (static MDC)

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

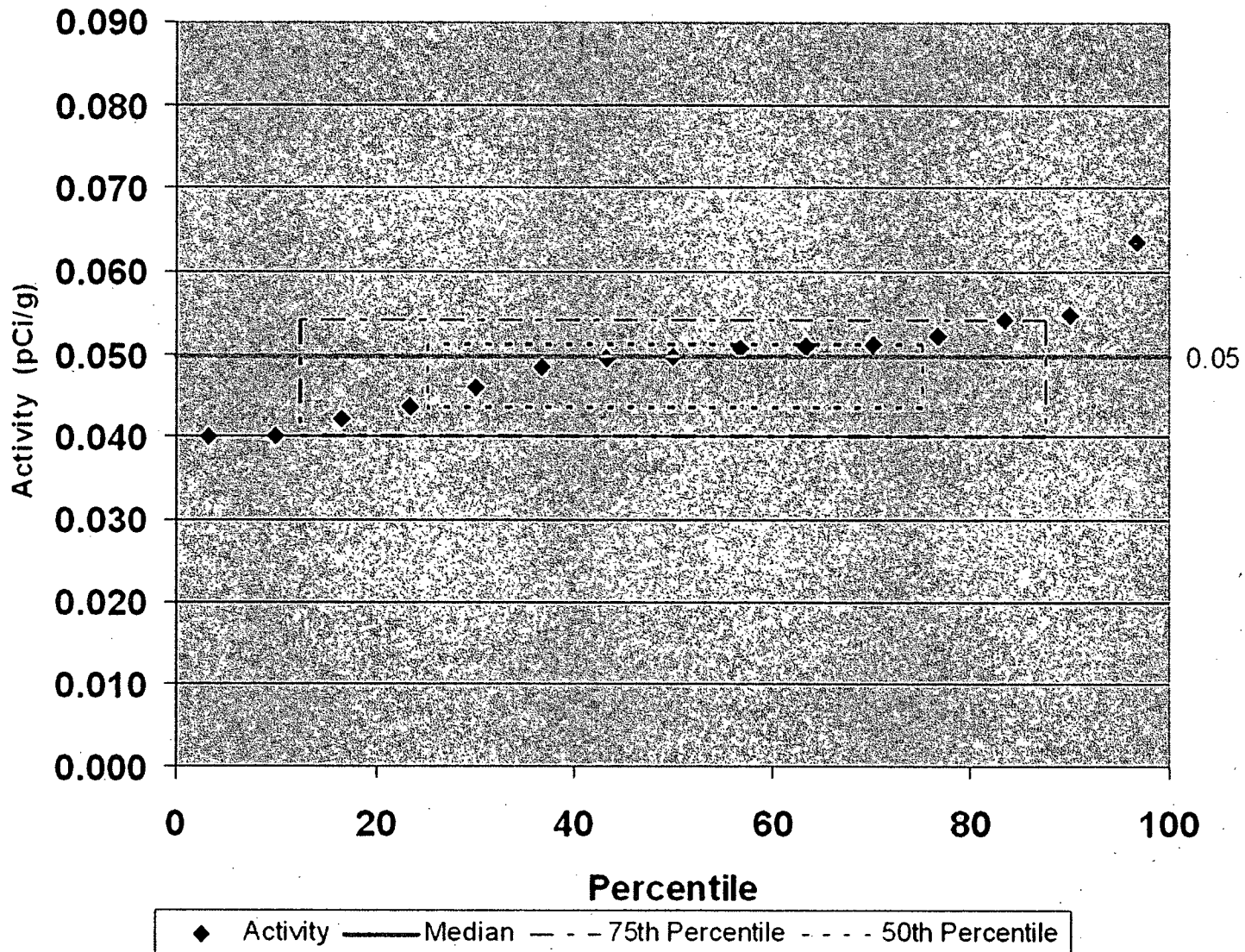
<b>Instrument</b>	<b>Parameter</b>	<b>Value</b>
SPA-3	Investigation Criteria - Scan	16,000 cpm
All	DCGL <sub>w</sub>	51.2 Cs-137 12.6 Co-60
All	DCGL <sub>EMC</sub>	N/A

**Attachment 3**  
**Investigation**  
**March 19, 2008**  
**Survey Unit F8991073**

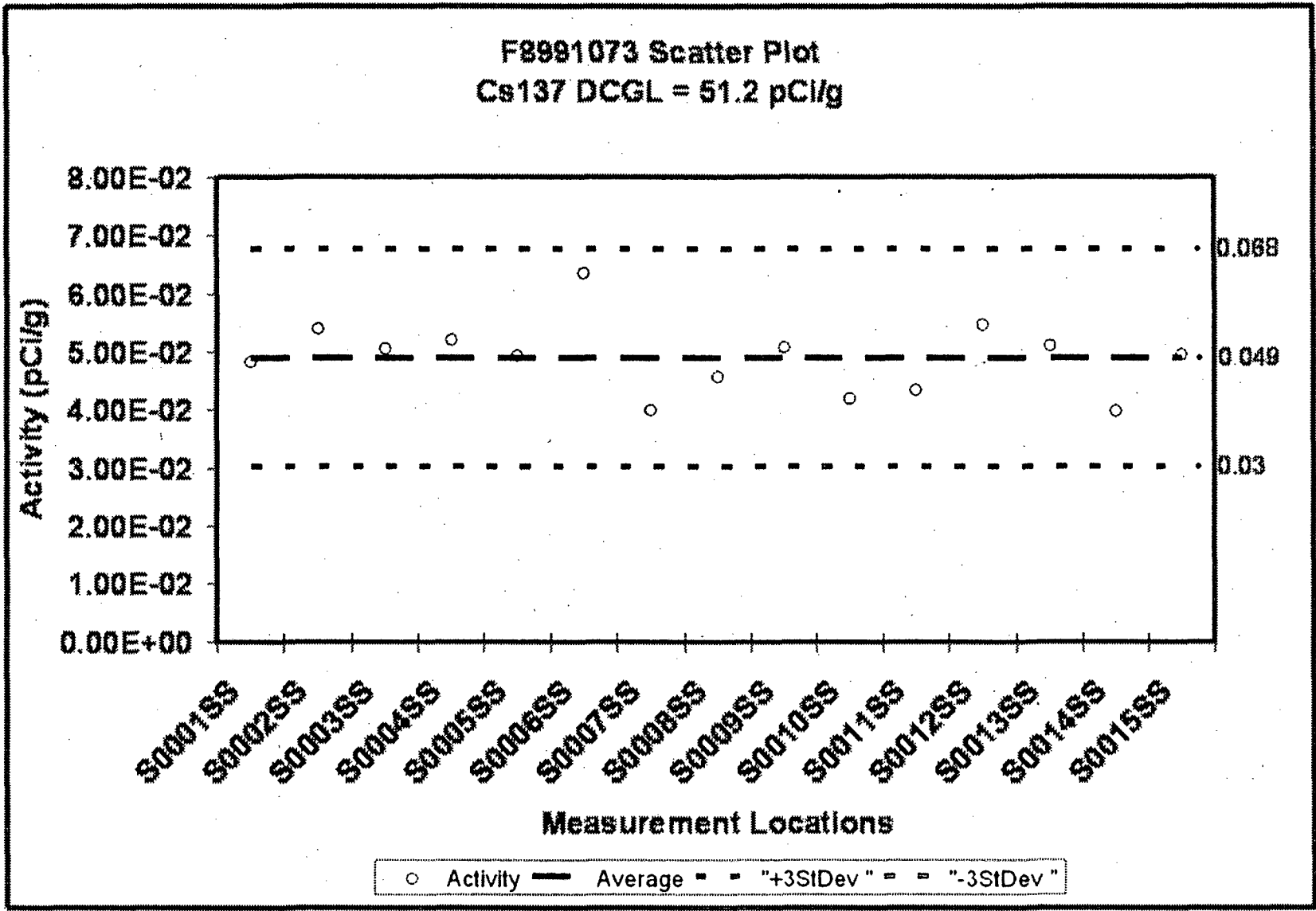
**(none required)**

**Attachment 4**  
**Data Assessment**  
**March 19, 2008**  
**Survey Unit F8991073**

F8991073 Quantile Plot  
Cs137 DCGL = 51.2 pCi/g







F8991073 Frequency Plot  
Cs137 DCGL = 51.2 pCi/g

