

**Rancho Seco**  
**Final Status Survey Summary Report**  
**February 26, 2008**  
**Nuclear Service Cooling Water Piping**  
**Survey Unit F8990351**

Prepared By: Erin L. Brown Date: 2/26/08  
FSS Engineer

Reviewed By: [Signature] Date: 2/26/08  
Lead FSS Engineer

Approved By: [Signature] Date: 4-8-08  
Dismantlement Superintendent, Radiological

## FINAL STATUS SURVEY SUMMARY REPORT

### Survey Unit:

F8990351,

### Survey Unit Description:

**Operating History:** This system was a two-train, redundant system which provided dematerialized cooling water to heat exchangers and coolers associated with components critical to nuclear safety and transferred the heat to the NRW system. This system was designed to be clean. However, the system piping became contaminated due to various primary to secondary system leaks. Operating records and the HSA document several occurrences of minor radioactive contamination associated with this system piping.

**Site Characterization:** Direct measurements were made of the interior surfaces of the system piping which confirmed the absence of plant-derived radionuclides. Direct measurements of the interior showed a mean gross activity level of -59 dpm/100 cm<sup>2</sup> and a maximum value of 174 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.

HSA Events: ODR-870582.

### 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 spaced at 15cm intervals and 2.6 m<sup>2</sup> were scanned for approximately 7% coverage. 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	Nuclear Service Cooling
<b>Survey Unit:</b>	0351	Water Piping
<b>Class:</b>	3	Pipe Internal Surface
<b>SU Area (m<sup>2</sup>):</b>	35.4	LTP Table 5-4
<b>Evaluator:</b>	Erin L. Brown	
<b>DCGL (dpm/100 cm<sup>2</sup>):</b>	100000	Gross Activity DCGL
<b>Area Factor:</b>	N/A	Class 3
<b>Design DCGL<sub>mc</sub> (dpm/100 cm<sup>2</sup>):</b>	N/A	Class 3
<b>LBGR (dpm/100 cm<sup>2</sup>):</b>	50000	Default = 50% DCGL
<b>Design Sigma (dpm/100 cm<sup>2</sup>):</b>	125	
<b>Type I Error:</b>	0.05	
<b>Type II Error:</b>	0.05	
<b>Predominant Nuclide:</b>	Cs-137	
<b>Sample Area (m<sup>2</sup>):</b>	N/A	Class 3
<b>Scan Area (m<sup>2</sup>):</b>	2.6	
<b>Scan Coverage (%):</b>	7%	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>	628	
<b>Relative Shift Used:</b>	3	Uses 3.0 if Relative Shift is >3
<b>N-Value:</b>	11	
<b>Design N-Value + 20%:</b>	14	NUREG-1575 Table 5-5
<b>Design Min Samples N:</b>	14	Class 3
<b>Grid Spacing L:</b>	N/A	Class 3

### Survey Results:

A total of 14 direct measurements were made in F8990351. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL. None of the scan measurements indicated areas of elevated activity. Scan activity ranged from 6,101 to 10,249 dpm/100 cm<sup>2</sup>, based on the pipe detector efficiency.

**Table 2. Direct Measurement Results**

Measurement ID	Gross Activity (dpm/100 cm <sup>2</sup> )
F8990351-M0001GI	6964
F8990351-M0002GI	6101
F8990351-M0003GI	6114
F8990351-M0004GI	6570
F8990351-M0005GI	7452
F8990351-M0006GI	8566
F8990351-M0007GI	8934
F8990351-M0008GI	8966
F8990351-M0009GI	9065
F8990351-M0010GI	9049
F8990351-M0011GI	8967
F8990351-M0012GI	9086
F8990351-M0013GI	9526
F8990351-M0014GI	10249
Mean:	8258
Median:	8950
Standard Deviation:	1345
Range:	6101 - 10249

**Survey Unit Data Assessment:**

The survey design required 14 direct measurements for the Sign Test. The critical value and the results of the Sign Test are presented in Table 4. The sample mean and median values were less than the DCGL. The sample standard deviation was greater than the design standard deviation. Since both values of sigma resulted in a relative shift greater than three (3), no additional samples were required.

**Table 4. Data Assessment Results**

<b>Survey Results Parameter</b>	<b>Value</b>	<b>Comment</b>	
<b>Material Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A	Average Ambient BKG = 0	
<b>Ambient Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A		
<b>Actual Direct Measurements (N):</b>	14		
<b>Median</b> (dpm/100 cm <sup>2</sup> ):	8950		
<b>Mean</b> (dpm/100 cm <sup>2</sup> ):	8258		
<b>Direct Measurement Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	1345		
<b>Total Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	1345		Based on samples and backgrounds.
<b>Maximum</b> (dpm/100 cm <sup>2</sup> ):	10249		Background Subtract Not Applied
<b>Material Type:</b>	N/A		
<b>Sign Test Final N Value:</b>	14		Class 3 No additional samples required
<b>S+ Value:</b>	14		
<b>Critical Value:</b>	10		
<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		
<b>Total Standard Deviation &lt;= Sigma:</b>	Investigate		
<b>Pass the Sign Test?</b>	Yes		
<b>Reject the Null Hypothesis?</b>	Yes	The SU passes	
<b>Does the Survey Unit Pass All Criteria?</b>	Investigate		

### **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 structure survey and the sample results are consistent with that classification. The variability of the survey results was greater than the characterization data used for survey design. However, no additional samples were required. 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. No direct measurements exceeded the DCGL of 100000 dpm/100 cm<sup>2</sup> or the grout limit of 21,000 dpm/100 cm<sup>2</sup>. 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 F8990351 meets the release criteria of 10CFR20.1402.

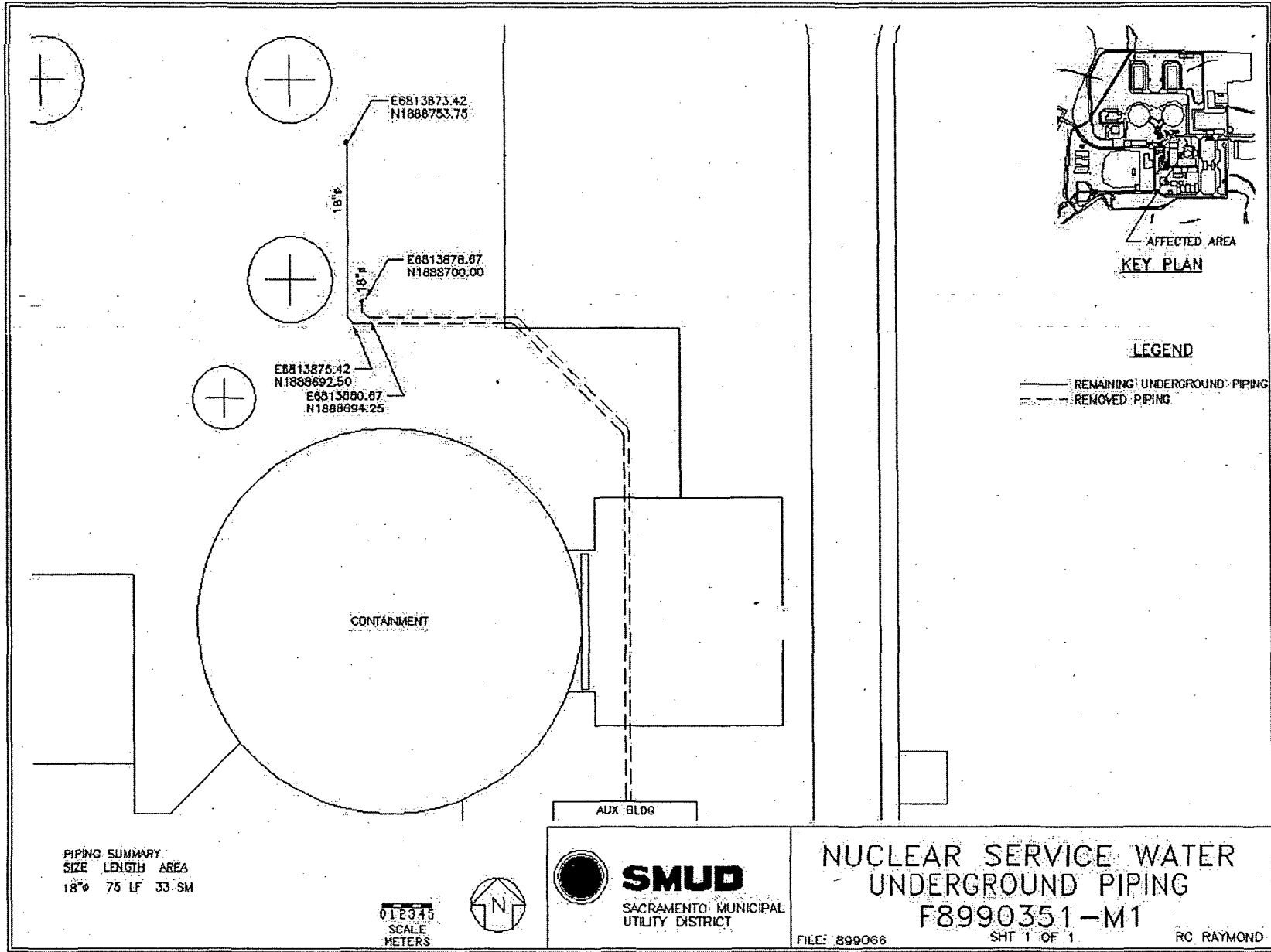
**Attachment 1**

**Maps**

**February 26, 2008**

**Survey Unit F8990351**





**Attachment 2**  
**Instrumentation**  
**February 26, 2008**  
**Survey Unit F8990351**

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

<b>Instrument Model; Serial No.</b>	<b>Detector Model; Serial No.</b>	<b>MDC Static (dpm/100 cm<sup>2</sup>)</b>	<b>MDC Scan (dpm/100 cm<sup>2</sup>)</b>
M2350; 189081	44-162; 206935	2590	N/A

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

<b>Parameter</b>	<b>Value (dpm/100 cm<sup>2</sup>)</b>
Investigation Criteria - Direct	50000
Investigation Criteria - Scan	N/A
DCGL <sub>W</sub>	100000
DCGL <sub>EMC</sub>	N/A

**Attachment 3**

**Investigation**

**February 26, 2008**

**Survey Unit F8990351**

**(none required)**

**Attachment 4**

**Data Assessment**

**February 26, 2008**

**Survey Unit F8990351**

