

**Rancho Seco**  
**Final Status Survey Summary Report**  
**October 27, 2008**  
**Turbine Sumps Piping**  
**Survey Unit F8260031**

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## FINAL STATUS SURVEY SUMMARY REPORT

### Survey Unit:

F8260031, Turbine Sumps Piping

### Survey Unit Description:

Operating History: This system collected clean water leakage and condensate from the turbine and routed it to the drain tank. This system was contaminated by radioactive system leakage into steam, feed and cooling water systems. 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 which confirmed the presence of plant-derived radionuclides. Direct measurements of the interior showed a mean gross activity level of 56,208 dpm/100 cm<sup>2</sup> and a maximum value of 680,000 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 1 system.

HSA Events: ODR-800111, 871122.

**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 m<sup>2</sup> were scanned for 100% 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>	F826	Turbine Sumps Piping
<b>Survey Unit:</b>	0031	Structure Surface
<b>Class:</b>	1	LTP Table 5-4
<b>SU Area (m<sup>2</sup>):</b>	2	
<b>Evaluator:</b>	Erin L. Brown	
<b>DCGL (dpm/100 cm<sup>2</sup>):</b>	100000	Gross Activity DCGL
<b>Area Factor:</b>	1	Class 1
<b>Design DCGL<sub>emc</sub> (dpm/100 cm<sup>2</sup>):</b>	100000	Class 1
<b>LBGR (dpm/100 cm<sup>2</sup>):</b>	50000	Default = 50% DCGL
<b>Design Sigma (dpm/100 cm<sup>2</sup>):</b>	23464	
<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 1
<b>Scan Area (m<sup>2</sup>):</b>	2	
<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>	0.97725	
<b>Calculated Relative Shift:</b>	2.2	
<b>Relative Shift Used:</b>	2.2	Uses 3.0 if Relative Shift is >3
<b>N-Value:</b>	12	
<b>Design N-Value + 20%:</b>	15	NUREG-1575 Table 5-5
<b>Design Min Samples N:</b>	15	Class 1
<b>Grid Spacing L:</b>	0.3	Class 1

## Survey Results:

A total of 30 direct measurements were made in F8260031. 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 measurements indicated areas of elevated activity. Scan activity ranged from 1660 to 2208 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> )
F8260031-M0001GI	2117
F8260031-M0002GI	2091
F8260031-M0003GI	2096
F8260031-M0004GI	2190
F8260031-M0005GI	1897
F8260031-M0006GI	1786
F8260031-M0007GI	1752
F8260031-M0008GI	1876
F8260031-M0009GI	1846
F8260031-M0010GI	1713
F8260031-M0011GI	1660
F8260031-M0012GI	1784
F8260031-M0013GI	2053
F8260031-M0014GI	2058
F8260031-M0015GI	2130
F8260031-M0016GI	2208
F8260031-M0017GI	2087
F8260031-M0018GI	2051
F8260031-M0019GI	2112
F8260031-M0020GI	2018
F8260031-M0021GI	2035
F8260031-M0022GI	2082
F8260031-M0023GI	2067
F8260031-M0024GI	2088
F8260031-M0025GI	2095
F8260031-M0026GI	2103
F8260031-M0027GI	2006
F8260031-M0028GI	2033
F8260031-M0029GI	2025
F8260031-M0030GI	2158
Mean:	2007
Median:	2056
Standard Deviation:	147
Range:	1660 - 2208

### Survey Unit Data Assessment:

The survey design required 30 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 less than the design standard deviation so no additional samples were required.

**Table 4. Data Assessment Results**

Survey Results Parameter	Value	Comment
<b>Material Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A	
<b>Ambient Background Used</b> (dpm/100 cm <sup>2</sup> ):	N/A	Average Ambient BKG = 0
<b>Actual Direct Measurements (N):</b>	30	
<b>Median</b> (dpm/100 cm <sup>2</sup> ):	2056	
<b>Mean</b> (dpm/100 cm <sup>2</sup> ):	2007	
<b>Direct Measurement Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	147	
<b>Total Standard Deviation</b> (dpm/100 cm <sup>2</sup> ):	147	Based on samples and backgrounds.
<b>Maximum</b> (dpm/100 cm <sup>2</sup> ):	2208	
<b>Material Type:</b>	N/A	Background Subtract Not Applied
<b>Sign Test Final N Value:</b>	30	
<b>S+ Value:</b>	30	
<b>Critical Value:</b>	20	
<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>	Yes	Class 1
<b>Total Standard Deviation &lt;= Sigma:</b>	Yes	
<b>Pass the Sign Test?</b>	Yes	
<b>Reject the Null Hypothesis?</b>	Yes	
<b>Does the Survey Unit Pass All Criteria?</b>	Yes	

**Survey Unit Investigations and Results:**

No investigations were required 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 and the EMC criterion has been met), the ALARA criterion has been met.

**Changes in Initial Survey Unit Assumptions:**

The survey unit was designed as a Class 1 structure 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 the LTP for pipe surveys. No direct measurements exceeded the DCGL of 100000 dpm/100 cm<sup>2</sup> or the grout limit of 21000 dpm/100cm<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.

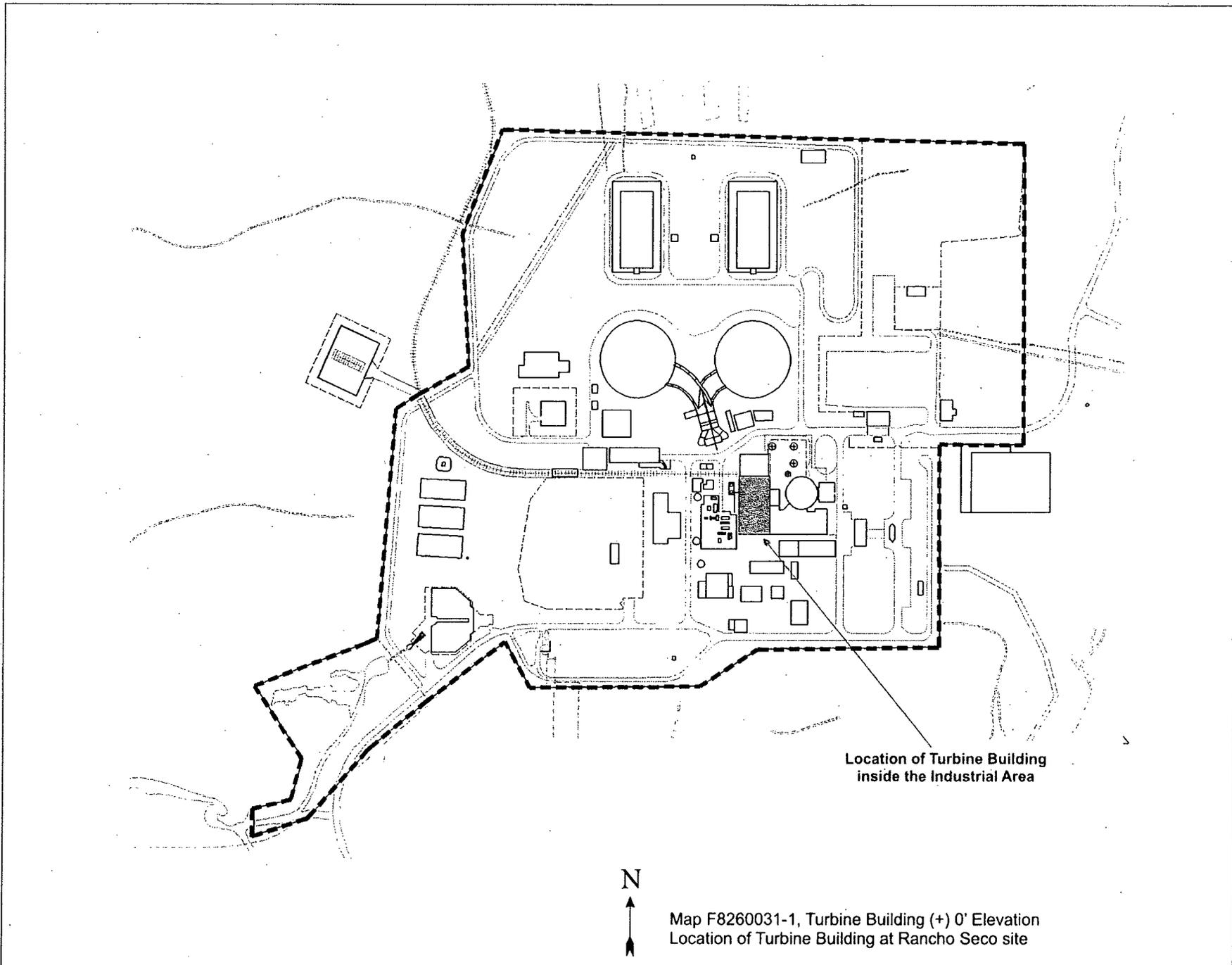
It is concluded that survey unit F8260031 meets the release criteria of 10CFR20.1402.

**Attachment 1**

**Maps**

**October 27, 2008**

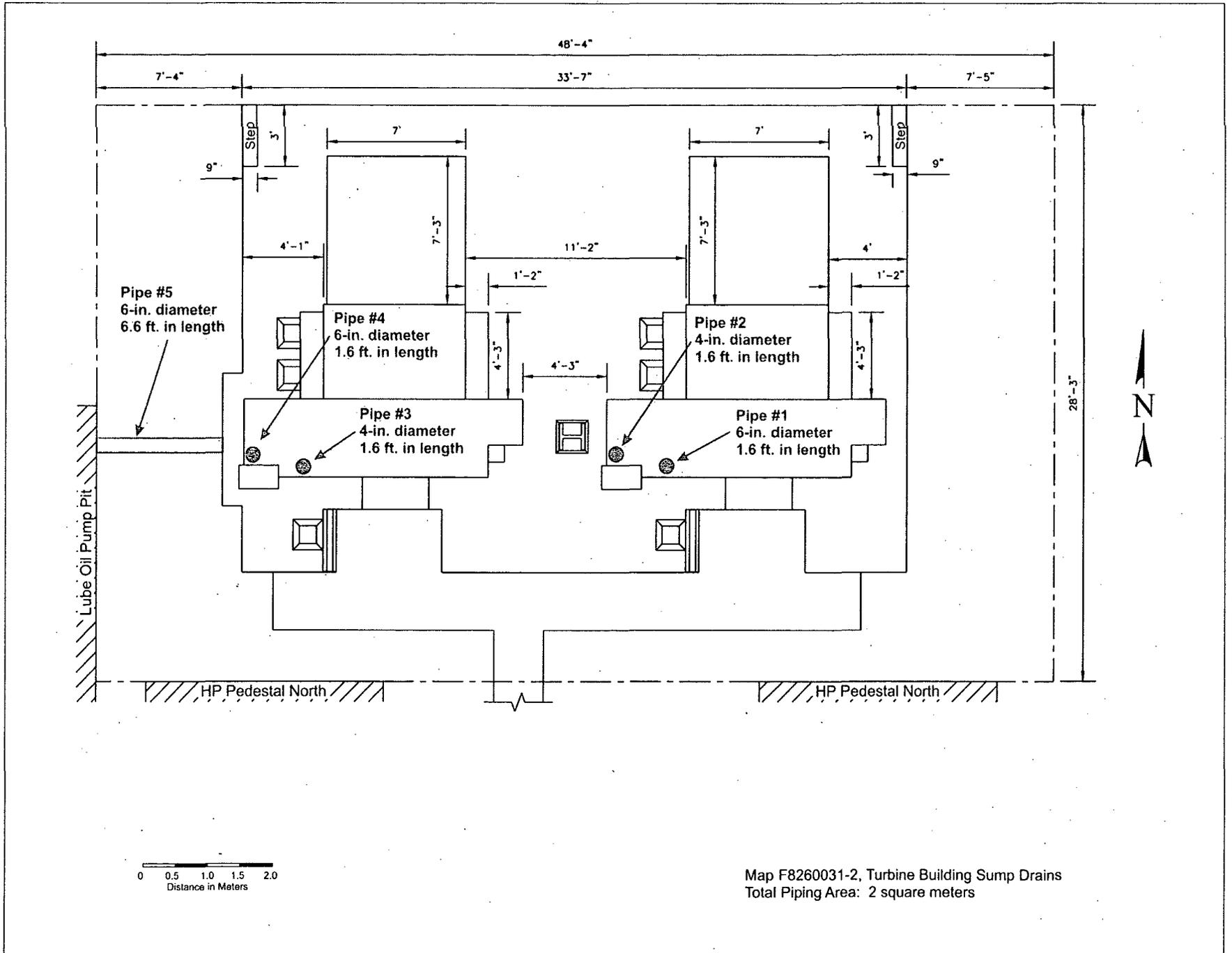
**Survey Unit F8260031**



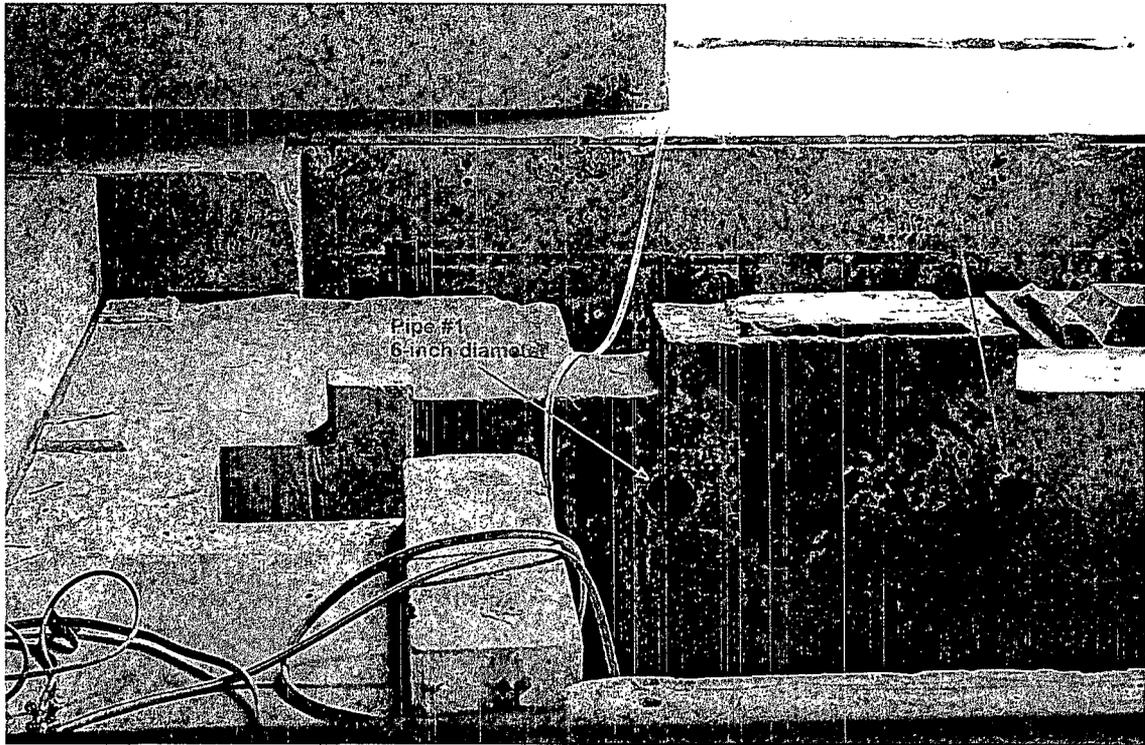
Location of Turbine Building  
inside the Industrial Area



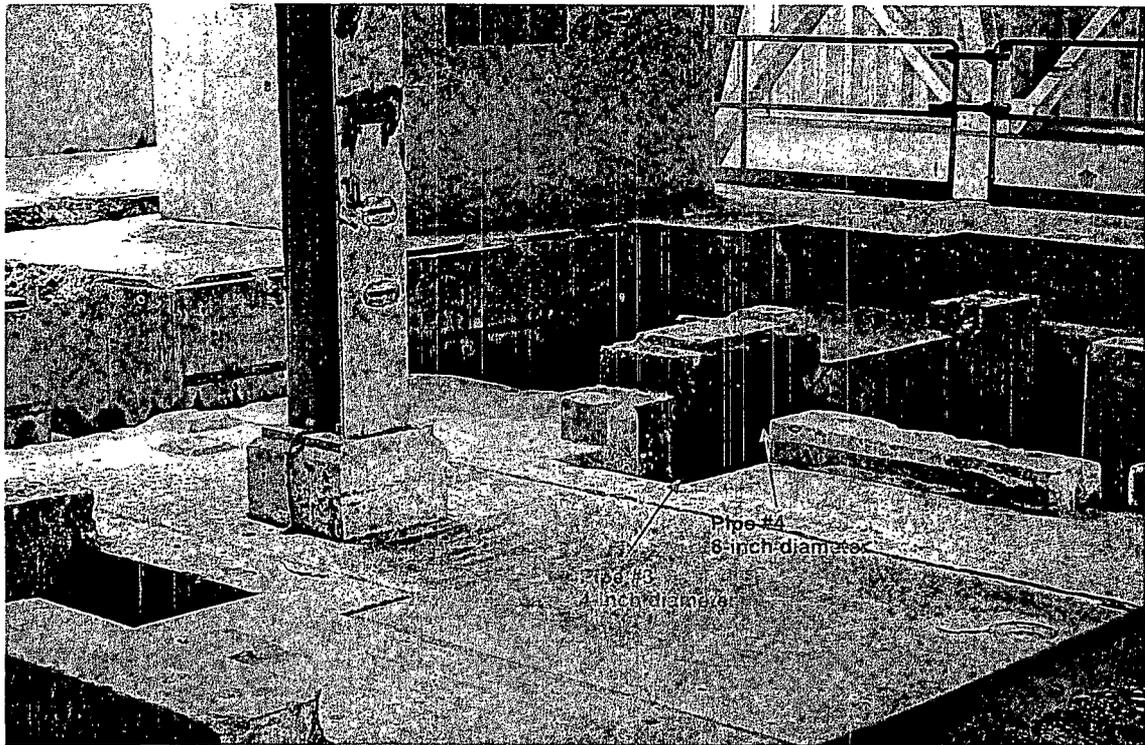
Map F8260031-1, Turbine Building (+) 0' Elevation  
Location of Turbine Building at Rancho Seco site



Map F8260031-2, Turbine Building Sump Drains  
Total Piping Area: 2 square meters

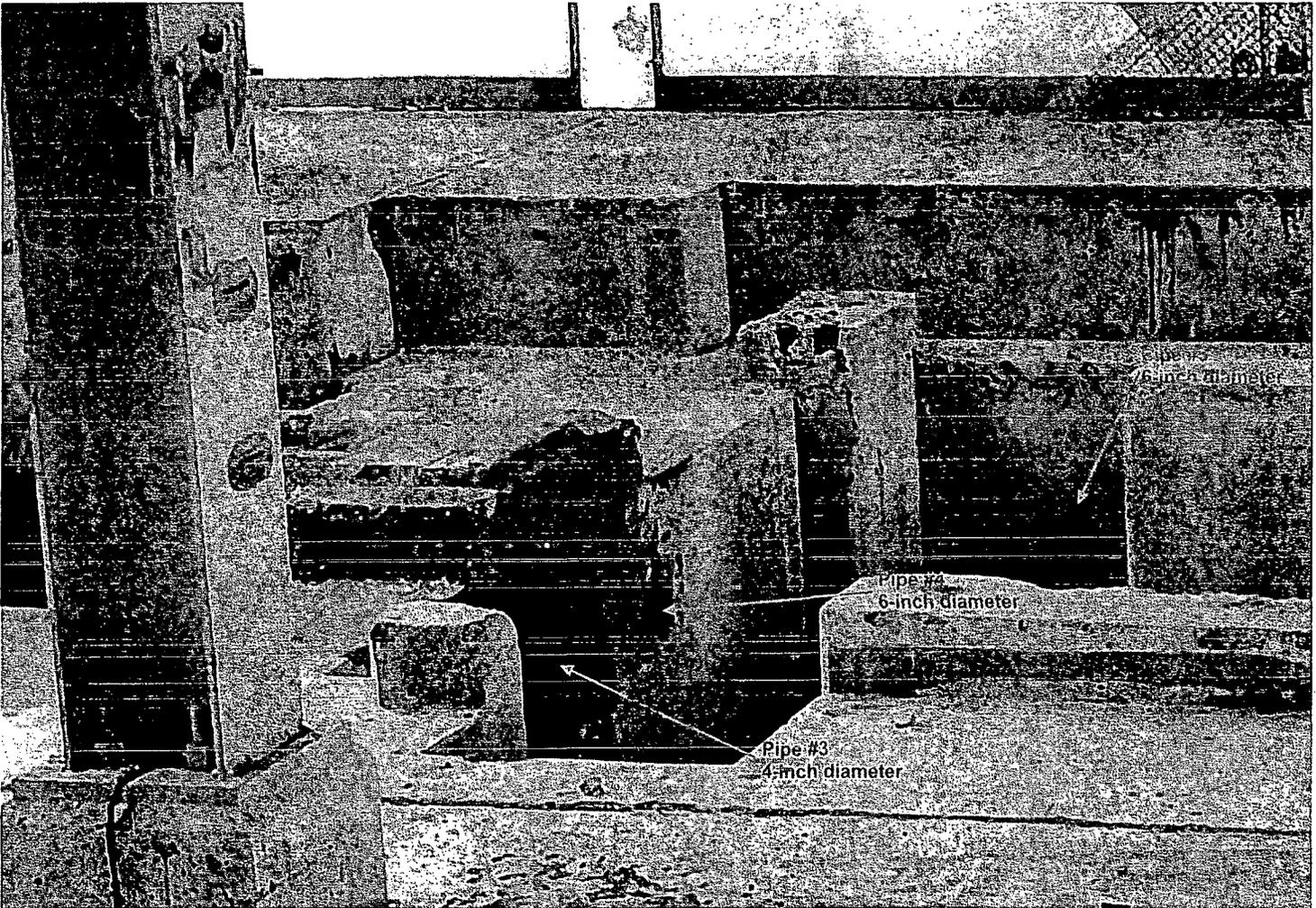


East End of Main Feed Pump Area



West End of Main Feed Pump Area

Map F8260031-3, Turbine Building Sump Drains  
Locations of Pipes 1 through 4



West End of Main Feed Pump Area

Map F8260031-4, Turbine Building Sump Drains  
Locations of Pipes 3 through 5

**Attachment 2**

**Instrumentation**

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**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	44-157; 201250	1750	N/A

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

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

**Attachment 3**  
**Investigation**  
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**(none required)**

**Attachment 4**

**Data Assessment**

**October 27, 2008**

**Survey Unit F8260031**

