

Rancho Seco
Final Status Survey Summary Report
August 20, 2008
Turbine Building High Pressure Pedestal
Survey Unit F8261005

Prepared By: CARY FRANK Date: 8-20-2008
FSS Engineer

Reviewed By: R. H. Decker Date: 11/17/08
Lead FSS Engineer

Approved By: E. J. [Signature] Date: 2-27-09
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8261005, Turbine Building High Pressure Pedestal

Survey Unit Description:

Operating History: The reinforced concrete and steel structure contained the turbine-generator and supporting systems. The building contained five main elevations. Residual radioactive material was known to be present on all levels of the interior of the building. Operating records and the HSA document several events with the potential for a release of radioactivity inside this structure.

Site Characterization: Direct measurements were made of each of the interior elevation surfaces as well as the exterior surfaces of the structure. These measurements confirmed the presence of plant-derived radionuclides. Direct measurements in the condenser pit elevation showed a mean gross activity level of 3077 dpm/100 cm² and a maximum value of 24,900 dpm/100 cm². Direct measurements on the grade elevation showed a mean gross activity level of 2,035 dpm/100 cm² and a maximum value of 6,980 dpm/100 cm². Direct measurements on the mezzanine elevation showed a mean gross activity level of 1,566 dpm/100 cm² and a maximum value of 2,626 dpm/100 cm². Direct measurements on the +40' elevation showed a mean gross activity level of 2,843 dpm/100 cm² and a maximum value of 3,615 dpm/100 cm². Direct measurements on the building exterior showed a mean gross activity level of 1,984 dpm/100 cm² and a maximum value of 10,312 dpm/100 cm². Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the interior of the turbine building was determined to be Class 1, 2, & 3 areas and the exterior was a Class 3.

HSA Events: None

Survey Area Classification

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 73 m² were scanned for approximately 31% coverage. Samples of removable contamination were collected at each direct measurement location. 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:	F826	Turbine Building High Pressure Pedestal
Survey Unit:	1005	Structure Surface
Class:	2	LTP Table 5-4
SU Area (m²):	236.5	
Evaluator:	Gary Frank	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	N/A	Class 2
Design DCGL_{emc} (dpm/100 cm²):	N/A	Class 2
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	1316	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	16.9	Class 2
Scan Area (m²):	73	
Scan Coverage (%):	31%	Class 2
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	16.3	
Relative Shift Used:	3	Uses 3.0 if Relative Shift is >3
N-Value:	11	
Design N-Value + 20%:	14	NUREG-1575 Table 5-5
Design Min Samples N:	14	Class 2
Grid Spacing L:	4.1	Class 2

Survey Results:

A total of 15 direct measurements were made in F8261005. 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 2347 to 7827 dpm/100 cm², based on a surveyor efficiency of 0.5 and no background subtracted. Samples for removable surface activity were all less than 10% of the DCGL as shown in Table 3. Removable surface activity samples were counted for alpha activity and none was detected at the MDC shown in Table 2-1 of Attachment 2.

Table 2. Direct Measurement Results

Measurement ID	Gross Activity (dpm/100 cm²)
F8261005-C0001BD	1598
F8261005-C0002BD	1416
F8261005-C0003BD	1463
F8261005-C0004BD	1525
F8261005-C0005BD	1509
F8261005-C0006BD	1411
F8261005-C0007BD	1618
F8261005-C0008BD	1530
F8261005-C0009BD	1675
F8261005-C0010BD	1437
F8261005-C0011BD	1603
F8261005-C0012BD	1458
F8261005-C0013BD	1416
F8261005-C0014BD	1598
F8261005-C0015BD	1535
Mean:	1520
Median:	1525
Standard Deviation:	85
Range:	1411 - 1675

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8261005C0001SM	0.34
F8261005C0002SM	-2.24
F8261005C0003SM	-3.53
F8261005C0004SM	-0.95
F8261005C0005SM	-0.95
F8261005C0006SM	-2.24
F8261005C0007SM	-0.95
F8261005C0008SM	-0.95
F8261005C0009SM	-0.95
F8261005C0010SM	-3.53
F8261005C0011SM	1.64
F8261005C0012SM	0.34
F8261005C0013SM	-0.95
F8261005C0014SM	-2.24
F8261005C0015SM	4.22
Mean:	-0.86
Median:	-0.95
Standard Deviation:	1.98
Range:	-3.53 to 4.22

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 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
Material Background Used (dpm/100 cm ²):	N/A	Average Ambient BKG = 0
Ambient Background Used (dpm/100 cm ²):	N/A	
Actual Direct Measurements (N):	15	
Median (dpm/100 cm ²):	1525	
Mean (dpm/100 cm ²):	1520	
Direct Measurement Standard Deviation (dpm/100 cm ²):	85	Based on samples and backgrounds.
Total Standard Deviation (dpm/100 cm ²):	85	
Maximum (dpm/100 cm ²):	1675	
Material Type:	N/A	Background Subtract Not Applied
Sign Test Final N Value:	15	Class 2
S+ Value:	15	
Critical Value:	11	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{emc}:	N/A	
Total Standard Deviation <= Sigma:	Yes	
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
Does the Survey Unit Pass All Criteria?	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 2 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.

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. No direct measurements exceeded the DCGL of 43000 dpm/100 cm² and none of the removable surface activity measurements exceeded 10% of 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.

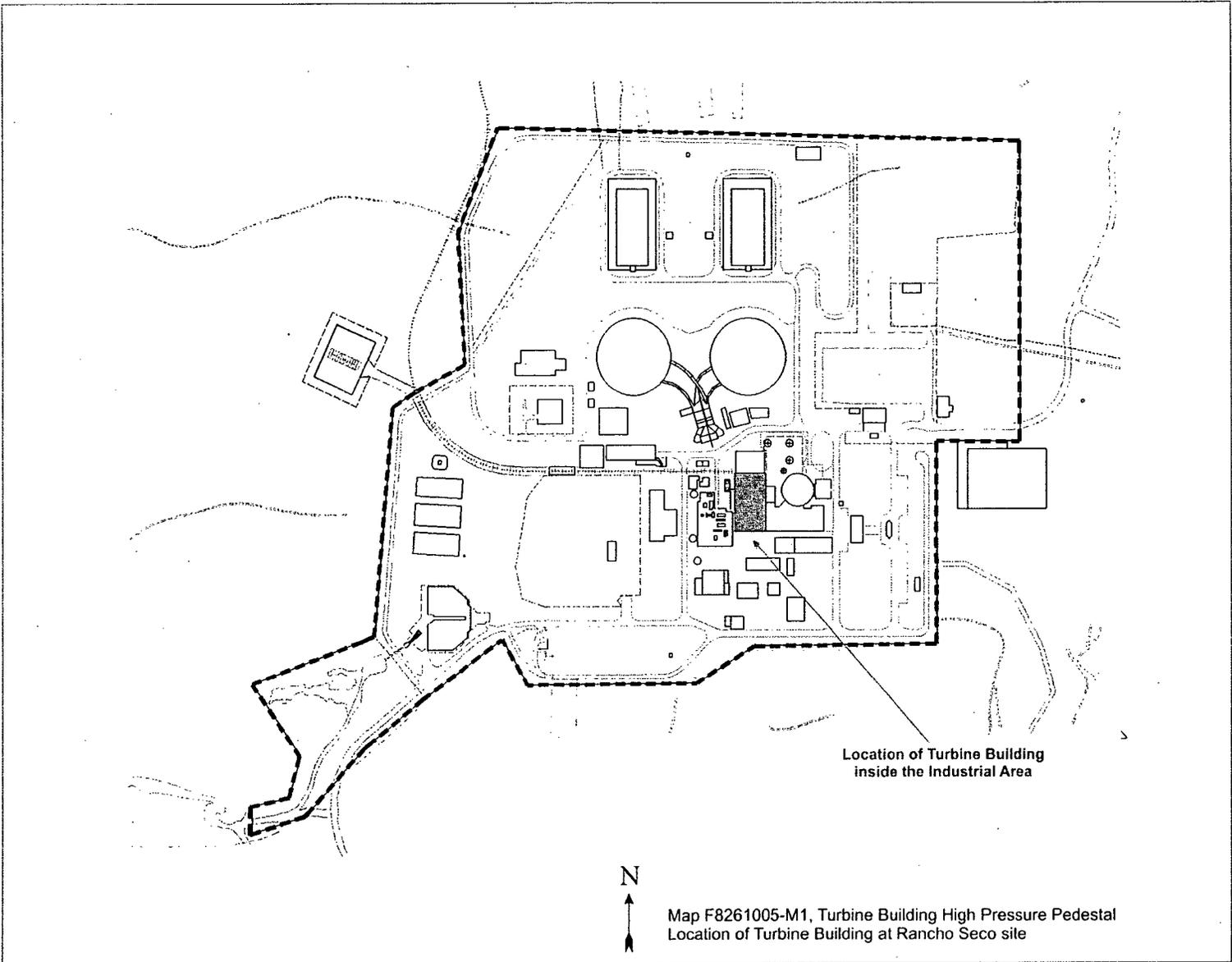
It is concluded that survey unit F8261005 meets the release criteria of 10CFR20.1402.

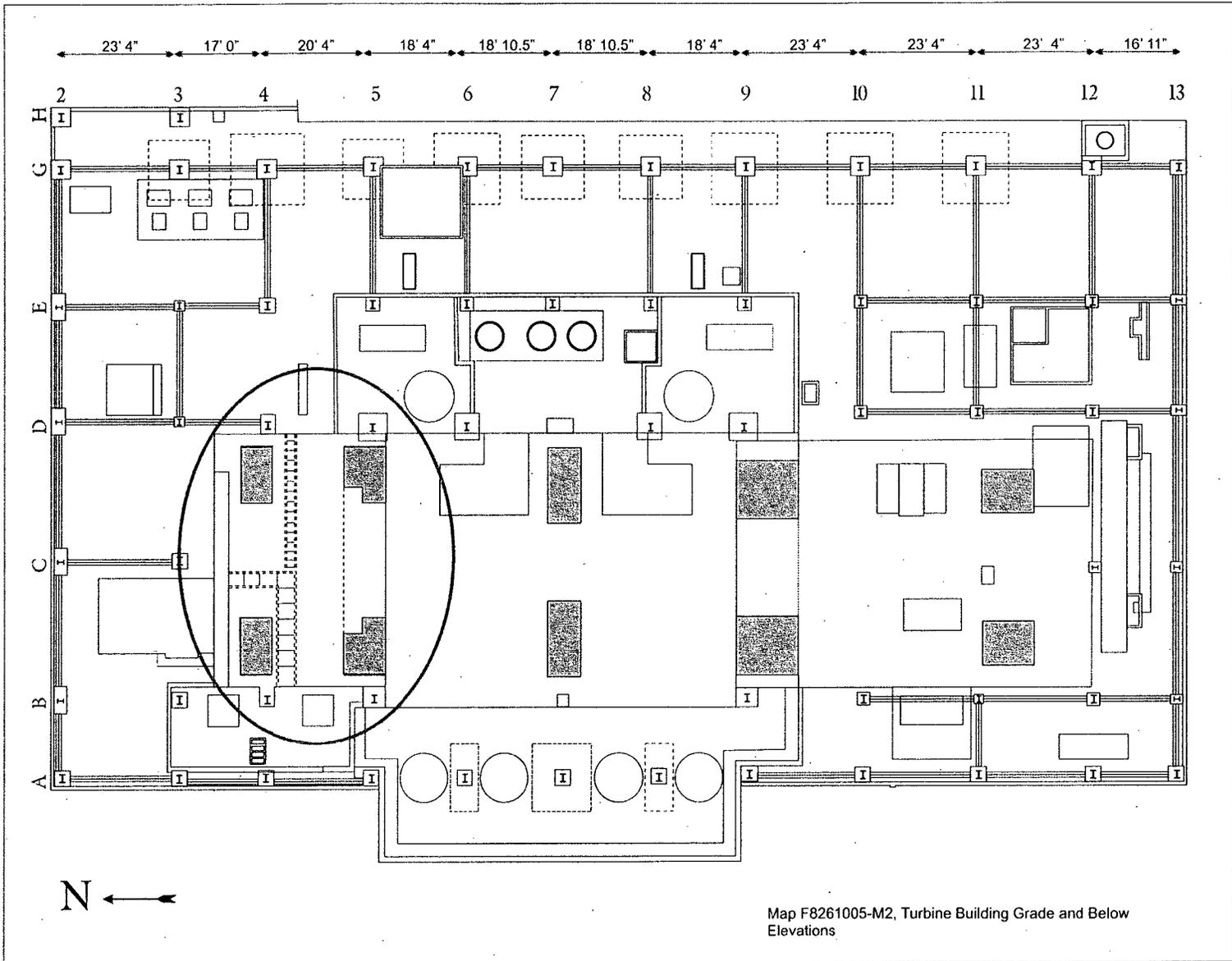
Attachment 1

Maps

August 20, 2008

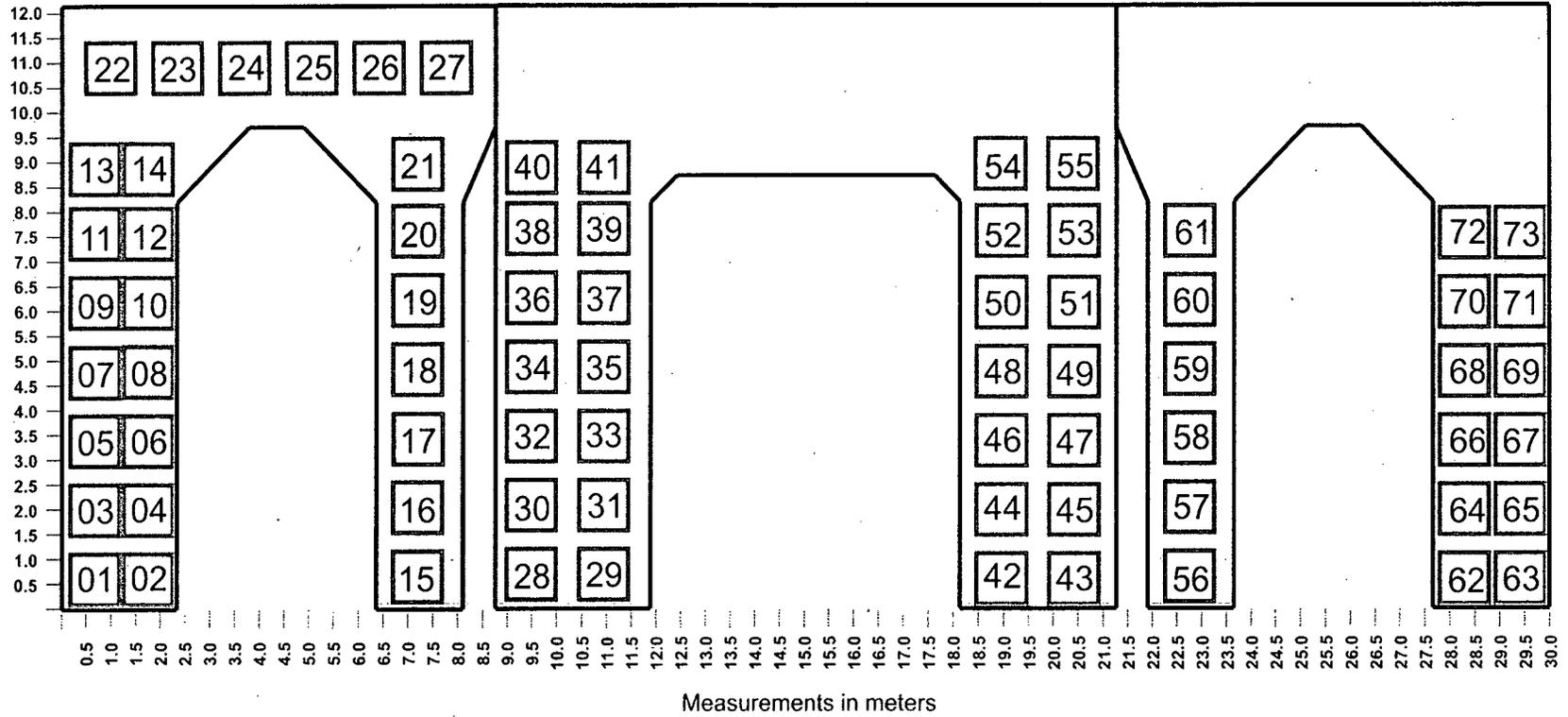
Survey Unit F8261005





Map F8261005-M2, Turbine Building Grade and Below Elevations

Turbine Building High Pressure Pedestals Scan Measurements



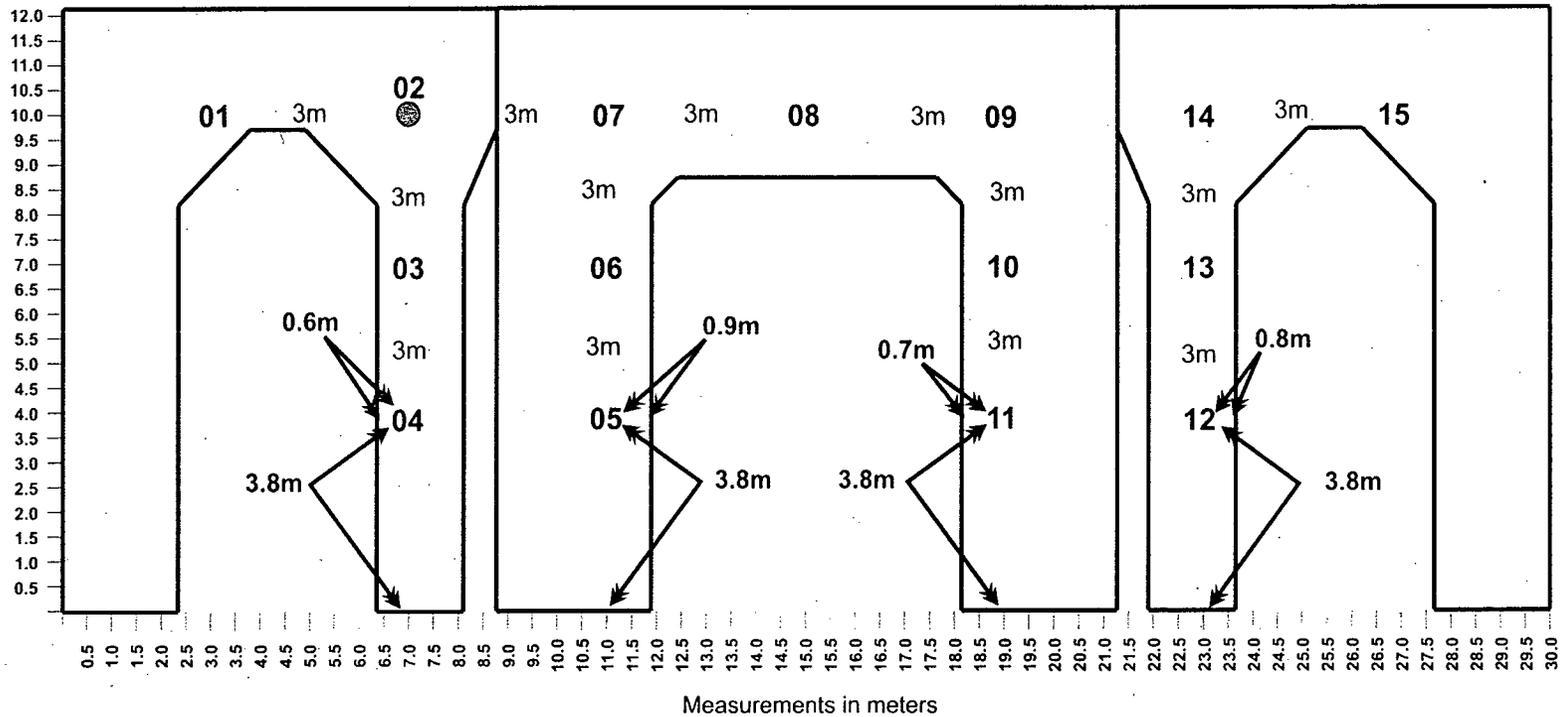
East Column
Looking West
720 ft²
66.9m²

North Column
Looking South
1105 ft²
102.7 m²

West Column
Looking East
720 ft²
66.9 m²

F8261005-M3

Turbine Building High Pressure Pedestals Beta Directs



● Random Start at 7 WE and 10 SN

East Column
Looking West
720 ft²
66.9m²

North Column
Looking South
1105 ft²
102.7 m²

West Column
Looking east
720 ft²
66.9 m²

Attachment 2
Instrumentation
August 20, 2008
Survey Unit F8261005

Table 2-1. Survey Unit Instrumentation

Instrument Model; Serial No.	Detector Model; Serial No.	MDC Static (dpm/100 cm²)	MDC Scan (dpm/100 cm²)
M2350; 203486	43-68B; 190476	433	1033
M2350; 149789	43-68B; 161415	433	1033
Tennelec; 0401171	N/A	6 dpm α , 12 dpm β	N/A

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	43000
Investigation Criteria - Scan	43000
DCGL _w	43000
DCGL _{EMC}	N/A

Attachment 3
Investigation
August 20, 2008
Survey Unit F8261005

(none required)

Attachment 4
Data Assessment
August 20, 2008
Survey Unit F8261005

