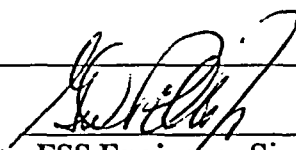
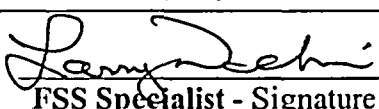

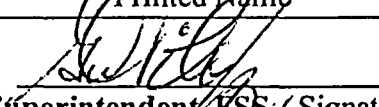



MAINE YANKEE
FINAL STATUS SURVEY RELEASE RECORD
FB-2600 WAREHOUSE 5 FOOTPRINT
SURVEY UNIT 1

Prepared By:	 FSS Engineer - Signature <u>George P. Pillsbury</u> Printed Name	Date: <u>10/13/04</u>
Reviewed By:	 FSS Specialist - Signature <u>Larry Dockins</u> Printed Name	Date: <u>10/27/04</u>
Reviewed By:	 Independent Reviewer - Signature <u>WJ Cooper</u> Printed Name	Date: <u>11/3/04</u>
Approved By:	 Superintendent, FSS - Signature <u>George P. Pillsbury</u> Printed Name	Date: <u>11/3/04</u>
Approved By:	 FSS, MOP - Signature <u>James R. Parker</u> Printed Name	Date: <u>11/17/04</u>

**MAINE YANKEE
FINAL STATUS SURVEY RELEASE RECORD
FB-2600 WAREHOUSE 5 FOOTPRINT
SURVEY UNIT 1**

A. SURVEY UNIT DESCRIPTION

Survey Unit FB-2600-01 consists of soil media, which lay below the now demolished Warehouse 5 (location shown on Map FB2600-01, Attachment 1).

Warehouse 5 was a steel walled, concrete floored building. It was used during plant operation as an additional storage area to supplement the main site warehouse. The single story, slab run building sat atop a rectangular footprint of approximately 27.4 m by 7.6 m. The warehouse was located just south of the main warehouse at grid coordinates 407800 N by 623400 E. The structure was located outside the Industrial Area of the site.

B. SURVEY UNIT DESIGN INFORMATION

The area was designated a Class 3 land survey unit per the LTP (Table 5-1C¹). Since the building covered the area prior to initial fuel load and for the duration of plant power operations, it had a very low probability to contain any plant derived residual contamination. No plant-derived radioactive materials were used in the building however, some outage equipment was stored in the building inside clean, sealed storage containers.

The survey unit design parameters are shown in Table 1. Given a relative shift of 3.0, it was determined that 14 direct measurements were required for the Sign Test. Measurement locations were randomly determined and are illustrated on the map FB2600-02 (Attachment 1). All direct measurements consisted of soil samples obtained at the required locations. The samples are analyzed with laboratory gamma spectroscopy.

Scan grids of 1 m by 10 m were established, as indicated on survey map FB2600-03. A 1% to 10% scan coverage of the area was required. To meet this requirement, four 1-meter wide "scan lanes" were made at regularly spaced intervals across the rectangular survey unit. This produced 40 m² of scan area, exceeding the 10% requirement. The survey instruments used, their MDCs, and alarm setpoints are provided in Attachment 2.

Background values were established for the scan measurements, based on local scaler values in the survey unit. These background values were used to establish scan alarm setpoints.

¹ The classification of the sub-slab building footprint is the same as the surrounding land area (R0900, Balance of Plant Areas)

TABLE 1**SURVEY UNIT DESIGN PARAMETERS**

Survey Unit	Design Criteria	Basis
Area	209 m ²	No limit for Class 3 Area
Number of Direct Measurements Required	14	Based on an adjusted LBGR of 2.76 pCi/g, sigma ² of 0.48 pCi/g, and a relative shift of 3.0. Type I = Type II = 0.05
Sample Area	N/A	Class 3 Area
Sample Grid Spacing	N/A	Class 3 Area
Scan Grid Area	1 m x 10 m	Class 3 Area
Area Factor	N/A	Class 3 Area
Scan Survey Area	40 m ²	Class 3 Area > 10%
Background		
SPA-3 (scan)	Average background \pm 1000 c/m	DI 6-150, EC-009-01, LTP Section 5
Scan Investigation Level	3 sigma of background See Table 2-2	EC-009-01 (MY) (Reference 2)
DCGL	4.2 pCi/g	LTP, Rev 3 (Reference 5), LTP Section 6.7
Design DCGL _{EMC}	N/A	Class 3 Area

C. SURVEY UNIT RESULTS

As required, 14 direct soil measurements were made and the results are presented in Table 2. All direct measurements were below the DCGL. No scan alarms occurred within the survey unit scan locations; thus no investigations were required.

² Design sigma based on characterization data from Balance of Plant Areas, R0900, LTP Table 5-1C.

TABLE 2
SOIL SAMPLE RESULTS

Soil Sample Number	Cs-137 (pCi/g)
FB2600-1-S001	< 2.62E-02
FB2600-1-S002	< 4.20E-02
FB2600-1-S003	< 2.51E-02
FB2600-1-S004	2.45E-02 + 6.78E-03
FB2600-1-S005	< 2.37E-02
FB2600-1-S006	< 2.37E-02
FB2600-1-S007	< 2.26E-02
FB2600-1-S008	< 2.49E-02
FB2600-1-S009	< 2.22E-02
FB2600-1-S010	2.45E-02 + 1.52E-02
FB2600-1-S011	< 4.85E-02
FB2600-1-S012	< 2.24E-02
FB2600-1-S013	< 2.51E-02
FB2600-1-S014	< 2.49E-02
Mean	2.72E-02
Median	2.47E-02
Standard Deviation	7.90E-03
Range	2.22E-02 to 4.85E-02

NOTES

1. Co-60 values were all less than an MDA of 0.10 pCi/g.
2. "<" indicates MDA value.

D. SURVEY UNIT INVESTIGATIONS PERFORMED AND RESULTS

No investigations were required.

E. SURVEY UNIT DATA ASSESSMENT

An analysis of the direct sample measurement results, including the mean, median, standard deviation, and sample result range, are provided in Table 2. The soil sampling results yielded two positive Cs-137 values, both consistent with fallout Cs-137 levels for disturbed soil. The sample Minimum Detectable Activities are listed in Table 2. The mean and median activities were less than the DCGL. The highest reported value for Cesium-137 was less than 1.0% of the DCGL.

For illustrative purposes, as indicated in LTP Section 5.9.3, a simplified general retrospective dose estimate can be calculated from the average residual contamination level by subtracting the established mean fallout Cs-137 value³ (0.19 pCi/g) for disturbed soil from the survey unit sample mean activity (0.027 pCi/g). The result is a net value of -0.163 pCi/g. This would equate to an annual dose rate of 0.0 mrem/y. However, for the purposes of demonstrating compliance with the radiological criteria for license termination and the enhanced State Criteria, background activity is not subtracted from the soil sample analysis activity values.

F. ADDITIONAL DATA EVALUATION

Attachment 4 provides additional data evaluation associated with this Survey Unit, including relevant statistical information. Based on survey unit direct measurement data, this attachment provides the Sign Test Summary, Quantile Plot, Histogram, and Retrospective Power Curve.

1. The Sign Test Summary provides an overall summary of design input (Table 1) and resulting calculated values used to determine the required number (N) of direct measurements (per LTP Section 5.4.2). The Sign Test Summary is a separate statistical analysis that also calculates the mean, median, and standard deviation of the direct measurements.

The critical value and the result of the Sign Test are provided in the Sign Test Summary table, as well as a listing of the key release criteria. As is shown in the table, all of the key release criteria were clearly satisfied for the FSS of this survey unit.

2. The Quantile Plot was generated from direct measurement data listed in Table 2. The data set and plot are consistent with expectations for a Class 3 survey unit. All of the measurements are well below the DCGL of 4.2 pCi/g.
3. A Histogram Plot was also developed based on the direct measurement values. This plot shows that the direct data were essentially a normal distribution with two outliers due to recounting samples to resolve the MDA.
4. A Retrospective Power Curve was constructed, based on FSS results. The curve shows that this survey unit having a mean residual activity at a small fraction of the DCGL, has a high probability ("power") of meeting the release criteria. Thus, it can be concluded that 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.

G. CHANGES IN INITIAL SURVEY UNIT ASSUMPTIONS ON EXTENT OF RESIDUAL ACTIVITY

The survey was designed as a Class 3 area; the FSS results were consistent with that classification. The direct measurement sample standard deviation was less than the design sigma. Thus, no additional measurements were required.

³ See Attachment E to Maine Yankee Procedure PMP 6.7.8 (Reference 4).

H. LTP CHANGES SUBSEQUENT TO SURVEY UNIT FSS

The FSS of Survey Unit 1 was designed and performed per the criteria of LTP Rev. 3 including Addenda (References 5 and 6). The only LTP changes with potential impact to this FSS requiring evaluations were:

- (1) LTP changes related to the activated concrete license amendment (proposed in Reference 7; approved by the NRC in Reference 8).

These changes were evaluated and found to have no impact on the FSS results or conclusions for this survey unit.

I. CONCLUSION

The FSS of this survey unit was designed based on the LTP designation as a Class 3 area. The survey design parameters are presented in Table 1. The required number of direct measurements was determined for the Sign Test in accordance with the LTP. As presented in Table 2, all direct measurements were less than the DCGL of 4.2 pCi/g.

A Sign Test Summary analysis demonstrated that the Sign Test criteria were satisfied. The direct measurement sigma was determined to be less than that used for design, thus indicating that a sufficient number of samples was taken.

The Retrospective Power Curve shown in Attachment 4 confirmed that sufficient samples were taken to support rejection of the null hypothesis, providing high confidence that the survey unit satisfied the release criteria and the data quality objectives were met. Attachment 4 also revealed that direct measurement data represented essentially a normal distribution with two outliers.

The scan survey design for this survey unit was developed in accordance with the LTP with significant aspects of the design discussed in Section B and Table 1. Scanning resulted in no verified alarms; therefore, no investigations were required.

It is concluded that FB2600 Survey Unit 1 meets the release criteria of 10CFR20.1402 and the State of Maine enhanced criteria.

J. REFERENCES

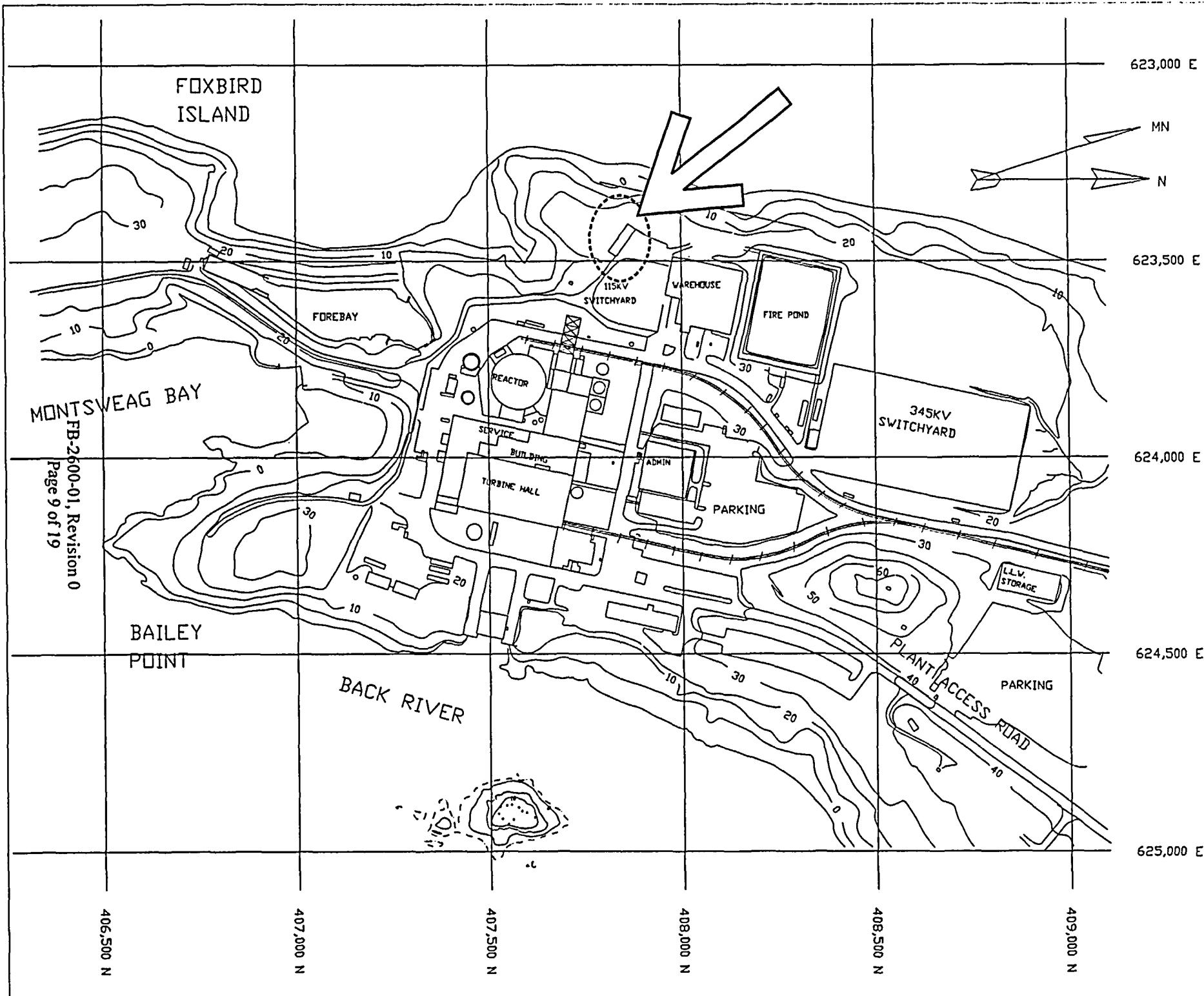
1. Initial Characterization Survey and Historical Site Assessment, Maine Yankee letter to the NRC, MN-01-038, dated October 1, 2001
2. Maine Yankee Engineering Calculation, EC 009-01
3. Maine Yankee License Termination Plan, Revision 2, Maine Yankee letter to the NRC, MN-01-032, August 13, 2001
4. Approach for Dealing with Background Radioactivity for Maine Yankee Final Status Surveys, Attachment E to Maine Yankee Procedure, FSS Data Processing and Reporting, PMP 6.7.8
5. Maine Yankee License Termination Plan, Revision 3, Maine Yankee letter to the NRC, MN-02-048, dated October 15, 2002
6. Maine Yankee License Termination Plan, Revision 3 Addenda, Maine Yankee letter to the NRC, MN-02-061, dated November 26, 2002
7. Proposed License Amendment Related to Changes in the Activated Concrete Remediation Plans, Maine Yankee letter to the NRC, MN-03-049, dated September 11, 2003
8. Issuance of License Amendment No. 170, NRC letter to Maine Yankee, dated February 28, 2003

Attachment 1
Survey Unit Maps

Final Status Survey

Survey Area Name: WAREHOUSE #5

Prepared By: Larry N. Dockins Date: 4/6/04

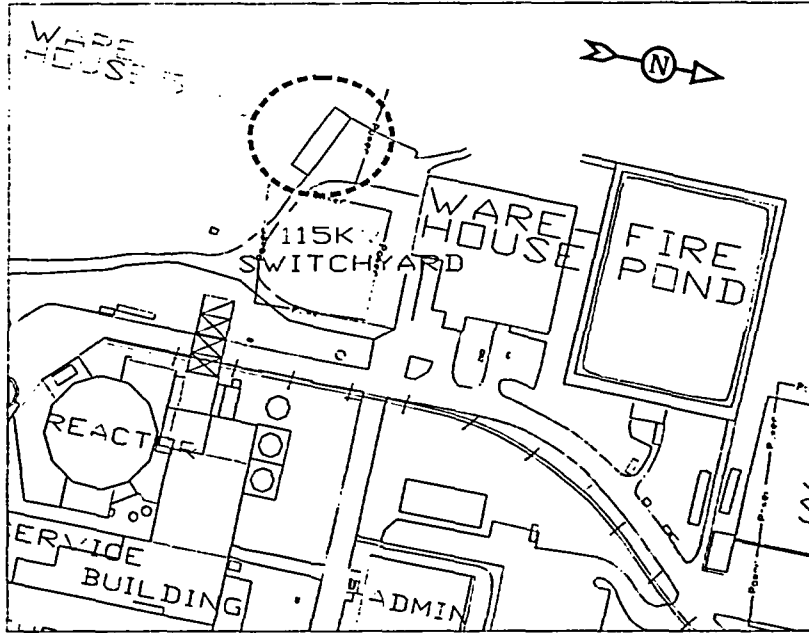


Survey Type: ☐ Characterization

☐ Turnover

☒ Final Status Survey

Survey Area Name: Warehouse #5 Soil Samples

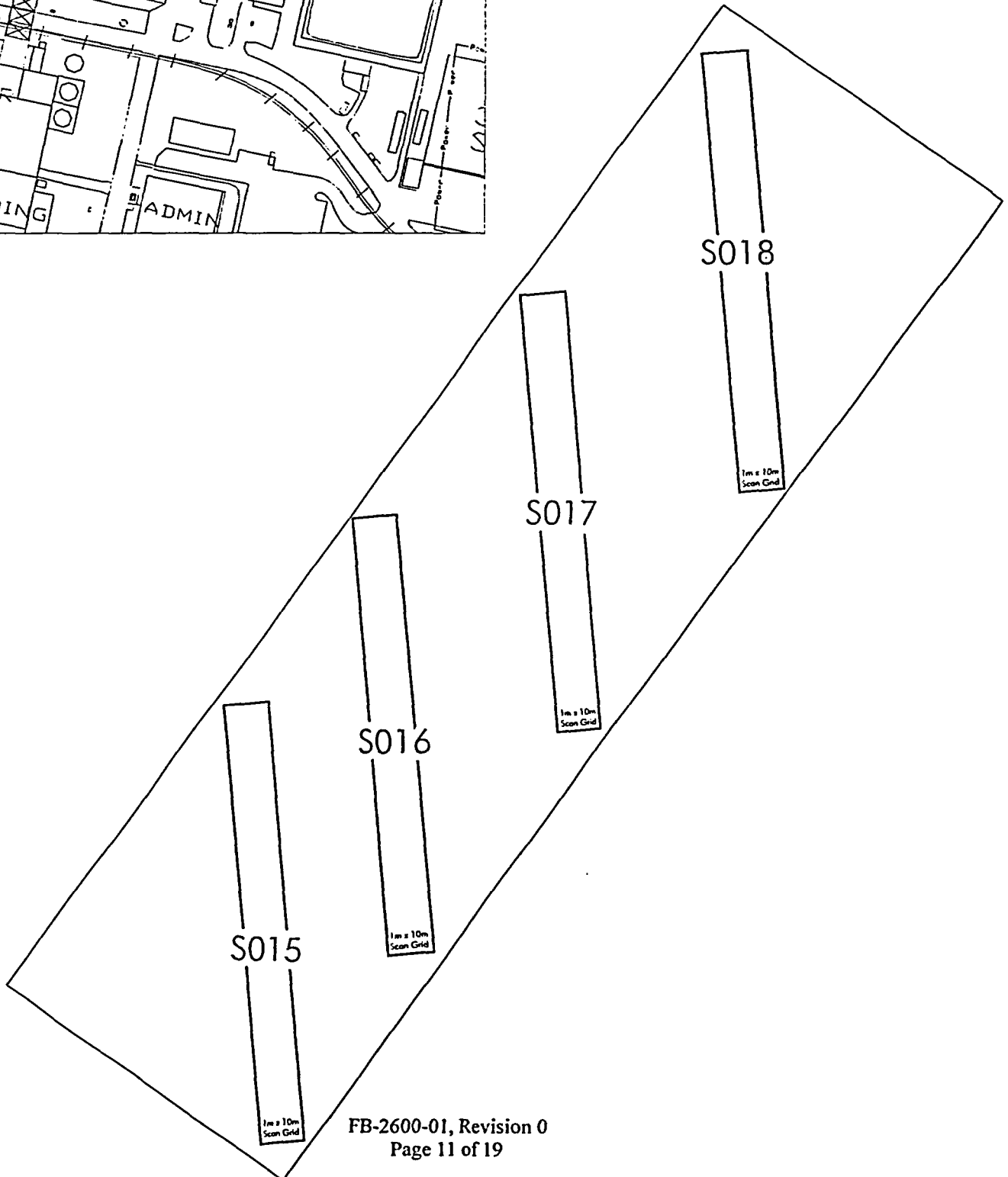
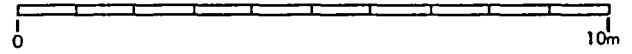
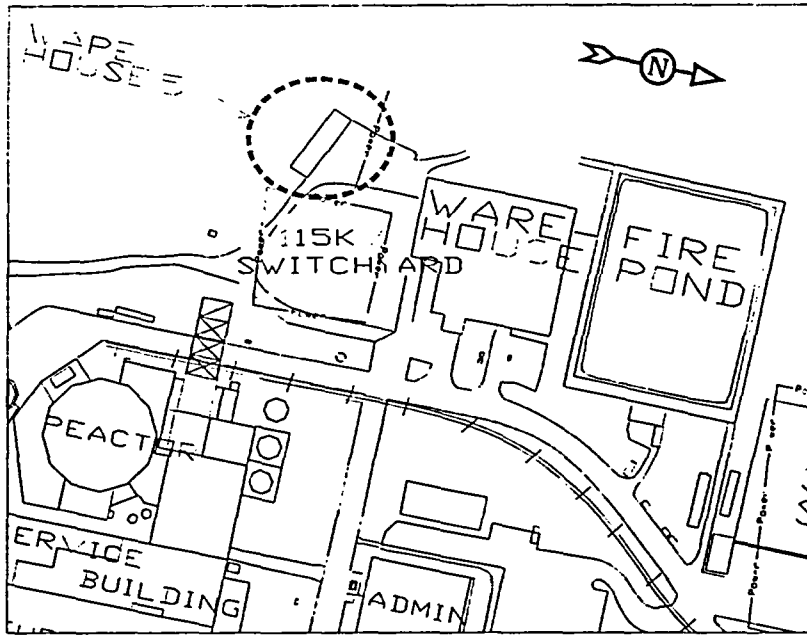


0 10m



Survey Type: ☐ Characterization ☐ Turnover ☒ Final Status Survey

Survey Area Name: Warehouse #5 Scan Grids



Attachment 2

Survey Unit Instrumentation

TABLE 2-1

INSTRUMENT INFORMATION

E-600 S/N	Probe S/N (type)
1933	2255 (SPA-3)
2621	726560 (SPA-3)

HPGe Detectors for Lab Analysis of Volumetric Samples

Detector Number	MDC (pCi/g)
FSS-1	0.02 – 0.11
FSS-2	0.02 – 0.11

TABLE 2-2

INSTRUMENT SCAN MDC, DCGL, AND INVESTIGATION LEVEL

Detector	SPA-3	Comments
DCGL (pCi/g)	4.2	Approved DCGL for land areas outside the Restricted Area, LTP Section 6.7 (Reference 6)
Scan MDC (pCi/g)	5.9	Design Scan MDC, LTP Table 5-6 (Reference 6)
Investigation Level (Alarm Setpoint) (cpm)	13,690	3 sigma of background, EC-009-01 (Reference 2)

Attachment 3

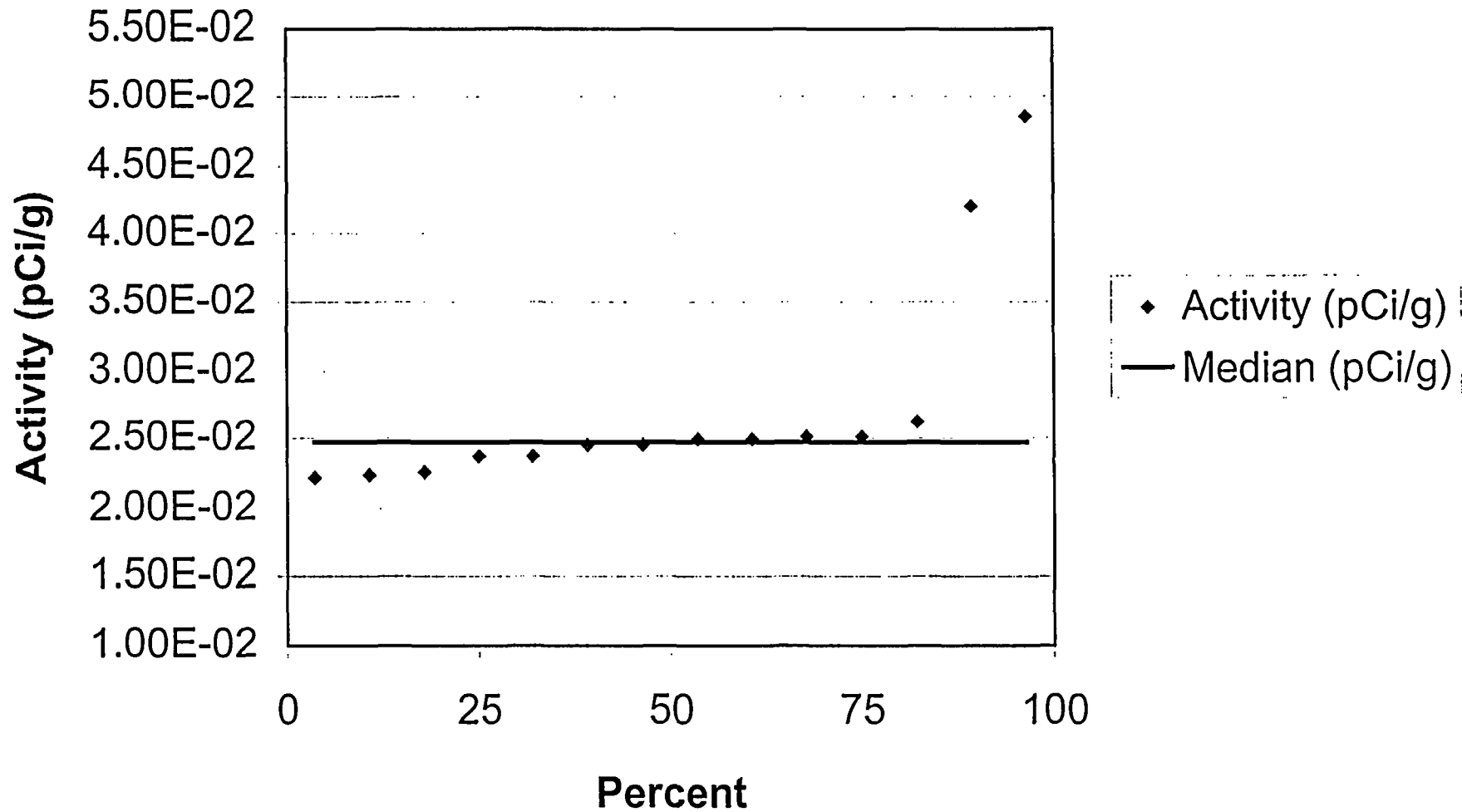
Investigation Table (None Required)

Attachment 4
Statistical Data

Survey Package FB2600 Unit 1 Soil Sign Test Summary

Evaluation Input Values		Comments
Survey Package:	FB2600	Warehouse 5
Survey Unit:	01	
Evaluator:	GP	
DCGL _w :	4.20E+00	
DCGL _{emc} :	N/A	Class 3
LBGR:	2.10E+00	
Sigma:	4.80E-01	
Type I error:	0.05	
Type II error:	0.05	
Nuclide:	CS-137	
Soil Type:	N/A	
Calculated Values		Comments
Z _{1-α} :	1.645	
Z _{1-β} :	1.645	
Sign p:	0.99865	
Calculated Relative Shift:	4.3	
Relative Shift Used:	3.0	Uses 3.0 if Relative Shift is >3
N-Value:	11	
N-Value+20%:	14	
Sample Data Values		Comments
Number of Samples:	14	
Median:	2.47E-02	
Mean:	2.72E-02	
Net Sample Standard Deviation:	7.85E-03	
Total Standard Deviation:	7.85E-03	SRSS
Maximum:	4.85E-02	
Sign Test Results		Comments
Adjusted N Value:	14	
S+ Value:	14	
Critical Value:	10	
Sign test results:	Pass	
Criteria Satisfaction		Comments
Sufficient samples collected:	Pass	
Maximum value <DCGL _w :	Pass	
Median value <DCGL _w :	Pass	
Mean value <DCGL _w :	Pass	
Maximum value <DCGL _{emc} :	Pass	
Total Standard Deviation <=Sigma:	Pass	
Criteria comparison results:	Pass	
Final Status		Comments
The survey unit passes all conditions:	Pass	

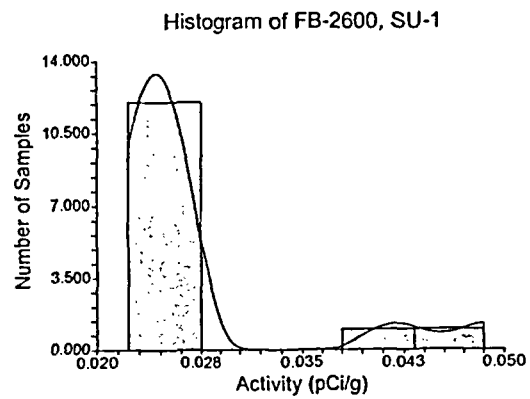
FB-2600 SU-1 Quantile Plot



One-Sample T-Test Report

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Database C:\Program Files\NCSS97\FB2600SU-1.S0
Variable C2

Plots Section



One-Sample T-Test Power Analysis

Page/Date/Time 2 8/23/04 5:38:01 AM

Chart Section

