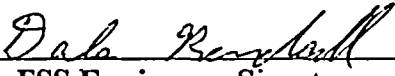
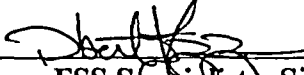

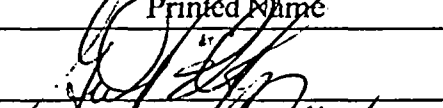



**MAINE YANKEE  
FINAL STATUS SURVEY RELEASE RECORD  
FB-0800 FUEL OIL STORAGE BUILDING  
SURVEY UNIT 1**

Prepared By:	<div style="text-align: center;"> FSS Engineer – Signature <div style="border-bottom: 1px solid black; display: inline-block; width: 100%; text-align: center;">Dale Randall</div> Printed Name</div>	Date: <u>12-7-09</u>
Reviewed By:	<div style="text-align: center;"> FSS Specialist – Signature <div style="border-bottom: 1px solid black; display: inline-block; width: 100%; text-align: center;">R. Tozzi</div> Printed Name</div>	Date: <u>12/7/04</u>
Reviewed By:	<div style="text-align: center;"> Independent Review – Signature <div style="border-bottom: 1px solid black; display: inline-block; width: 100%; text-align: center;">W.S. Cooper</div> Printed Name</div>	Date: <u>12/2/04</u>
Approved By:	<div style="text-align: center;"> Superintendent, FSS – Signature <div style="border-bottom: 1px solid black; display: inline-block; width: 100%; text-align: center;">George Pillsbury</div> Printed Name</div>	Date: <u>12/2/04</u>
Approved By:	<div style="text-align: center;"> FSS, MOP – Signature <div style="border-bottom: 1px solid black; display: inline-block; width: 100%; text-align: center;">JAMES R. PARKER</div> Printed Name</div>	Date: <u>12/2/04</u>

**MAINE YANKEE  
FINAL STATUS SURVEY RELEASE RECORD  
FB-0800 FUEL OIL STORAGE BUILDING  
SURVEY UNIT 1**

**A. SURVEY UNIT DESCRIPTION**

FB-0800, Fuel Oil Storage Building, is the post demolition structural remnant of a concrete structure. The survey area is comprised of one survey unit and consists of the remaining concrete floor slab of the building. The rectangular slab was located inside a 3-foot deep excavation. The outer dimensions of the rectangular area of the slab measures approximately 250 m<sup>2</sup>, however, some portions of the slab were removed during demolition, leaving approximately 126 m<sup>2</sup> that were inappropriate for beta survey. This part of the building footprint will be surveyed as part of the FR0200 survey package.

The survey unit is located at 407,285 N and 624,090 E using the Maine State Coordinate System (West Zone) NAD 1927 as shown on map FB0800-01 (Attachment 1). While the survey area was located inside the Industrial Area of the site, it was outside of the plant's radiologically Restricted Area (RA). The Survey Unit area is shown in relation to other major site structures in map FB0800-01. All maps referenced in this release record are provided in Attachment 1, unless otherwise noted. The survey unit's total area is approximately 124 m<sup>2</sup>.

**B. SURVEY UNIT DESIGN INFORMATION**

FB-0800 Survey Unit 1 was designated a Class 3 survey unit per the LTP (Table 5-1B). Since the building was constructed just prior to decommissioning and only held clean fuel oil, it had a very low probability to contain any plant-derived residual contamination. No plant-derived radioactive materials were stored or used in the building.

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 FB0800-02 (Attachment 1). All direct measurements consisted of 1-minute 43-68 gas-flow proportional counter scaler counts, obtained at the required locations.

A 1% to 10% scan coverage of the area was required.<sup>1</sup> Scan areas were typically 1 m<sup>2</sup> square grids, as shown on survey maps FB0800-03 (Attachment 1). The total scan area was approximately 16 m<sup>2</sup> (13% area coverage).

---

<sup>1</sup> LTP Table 5-3

Background values were established for the instrument probe based on ambient background values in the survey unit and previously established material backgrounds. The background value, list in Table 1, was used to establish net activity for direct measurements, scan alarm setpoints, and to confirm the scan MDCs used were appropriate.

The instruments used in this survey are listed by model and serial number in Attachment 2 (Table 2-1). Scan MDCs are also listed in Attachment 2 (Table 2-2) and are compared to the DCGL and the investigation level. As shown in this table, the scan MDC is less than the scan investigation level in all cases, thus providing high confidence (95% or higher) that an elevated area would be detected in the scanning process.

**TABLE 1**  
**SURVEY UNIT DESIGN PARAMETERS**

Survey Unit	Design Criteria	Basis
Area	124 m <sup>2</sup>	Based on area dimensions less the portions to be surveyed as part of FR0200.
Number of Direct Measurements Required	Minimum of 14	Based on an adjusted LBGR of 17,106 dpm/100 cm <sup>2</sup> , sigma <sup>2</sup> of 298 dpm/100 cm <sup>2</sup> and 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 <sup>2</sup> grids used	Class 3 Area
Area Factor	N/A	Class 3 Area
Scan Survey Area	16 m <sup>2</sup>	Class 3 area-13%
Background		
43-68 Direct and Scan (flat surfaces)	2607 dpm/100 cm <sup>2</sup>	Ambient and Material
Scan Investigation Level	Background plus DCGL.	EC 009-01(Reference 1)
DCGL	18,000 dpm/100 cm <sup>2</sup>	LTP Revision 3 (Reference 2)
Design DCGL <sub>EMC</sub>	N/A	Class 3 Area

### C. SURVEY RESULTS

As required, 14 direct measurements were made in Survey Unit 1. All direct measurements were less than the DCGL. The results are presented in Table 2 below.

No verified alarms occurred while scanning the concrete surface. Therefore, no investigations were required.

<sup>2</sup> Design sigma from LTP Rev. 3, Table 5-1B, B0800 Fuel Oil Storage Building

**TABLE 2**  
**DIRECT MEASUREMENTS**

Sample Number	Gross Activity (dpm/100 cm <sup>2</sup> )	Net Activity (dpm/100 cm <sup>2</sup> )
FB-0800-1-C001	2,717	110
FB-0800-1-C002	2,955	348
FB-0800-1-C003	2,875	269
FB-0800-1-C004	3,101	495
FB-0800-1-C005	3,065	458
FB-0800-1-C006	2,882	275
FB-0800-1-C007	3,150	543
FB-0800-1-C008	2,814	208
FB-0800-1-C009	3,059	452
FB-0800-1-C010	2,717	110
FB-0800-1-C011	2,845	238
FB-0800-1-C012	3,010	403
FB-0800-1-C013	3,028	421
FB-0800-1-C014	2,943	336
Mean	2,940	333
Median	2,949	342
Standard Deviation	137	137
Range	2,717 – 3,150	110 - 543

#### D. SURVEY UNIT INVESTIGATIONS PERFORMED AND RESULTS

No verified alarms were received during scanning; therefore, no investigations were required.

#### E. SURVEY UNIT DATA ASSESSMENT

An analysis of the direct sample results, including the mean, median, standard deviation, and sample result range are provided in Table 2. Both the mean and the median activities were less than the DCGL. The maximum direct measurement result, without subtracting background, was 543 dpm/100 cm<sup>2</sup>.

When the background value is subtracted from the sample results for the survey unit, the result is a net mean value of 333 dpm/100 cm<sup>2</sup>. This would be equivalent to an annual dose rate of 0.0056 mrem/y<sup>3</sup>.

<sup>3</sup> This annual dose equivalent is based on LTP Table 6-11, which shows the contaminated concrete dose contribution (for surfaces contaminated at the DCGL) to be 0.301 mrem/y.

## F. ADDITIONAL DATA EVALUATION

Attachment 4 provides additional data evaluation associated with Survey Unit 1, 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.

Table 2 presents the direct measurement results with the survey unit specific background subtracted (i.e., the “Net Activity” column). The Sign Test Summary table calculated the total standard deviation by propagating the individual standard deviation values used in the subtracted background survey design (using the square root of the sum of the squares method).

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 and indicates general symmetry about the median. The data set and plot are consistent with expectations for a Class 3 survey unit. There is no reason to conclude that the data set represents other than random variations in a Class 3 survey unit. It also should be noted that the maximum net activity (543 dpm/100 cm<sup>2</sup> at location C007) is well below the DCGL of 18,000 dpm/100 cm<sup>2</sup>.
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.
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 THE 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.

## **H. LTP CHANGES SUBSEQUENT TO SURVEY UNIT FSS**

The FSS of Survey Unit 1 was designed, performed and evaluated in late 2004. The design was performed to the criteria of the LTP, Revision 3, as amended (Reference 2, 3, 4 and 5). There were no subsequent LTP changes with potential impact to 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 18,000-dpm/100 cm<sup>2</sup>.

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 no 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 FB0800 Survey Unit 1 meets the release criteria of 10CFR20.1402 and the State of Maine enhanced criteria.

## **J. REFERENCES**

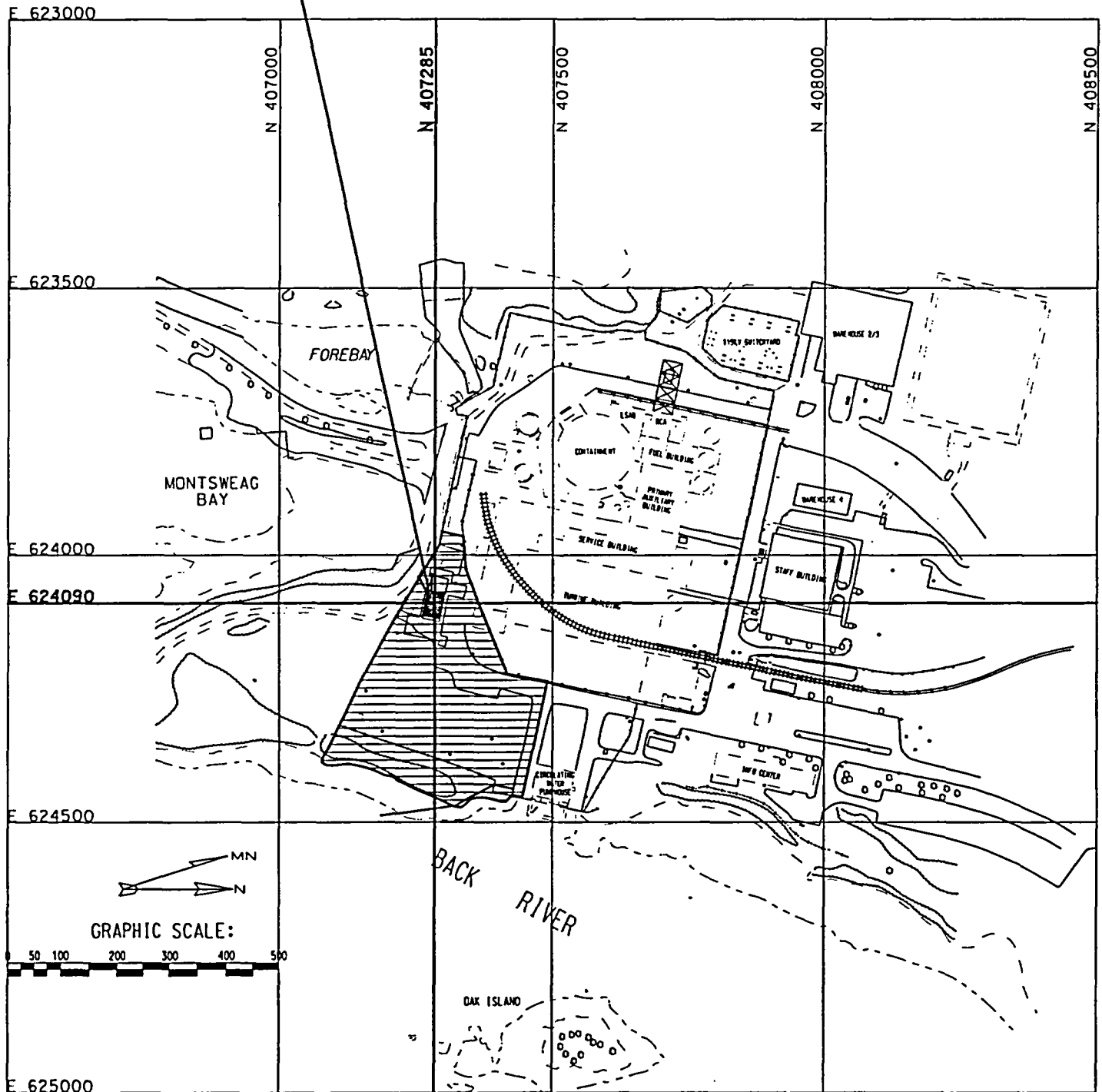
1. Maine Yankee Engineering Calculation, EC-009-01
2. Maine Yankee License Termination Plan, Revision 3, Maine Yankee letter to the NRC, MN-02-048, dated October 15, 2002
3. Maine Yankee License Termination Plan, Revision 3 Addenda, Maine Yankee letter to the NRC, MN-02-061, dated November 26, 2002
4. NRC letter to Maine Yankee, dated February 28, 2003, Approval of LTP Rev. 3 and Addenda
5. Issuance of License Amendment No. 170, (Related to Activated Concrete Submittal), NRC letter to Maine Yankee, dated February 18, 2004

**Attachment 1**

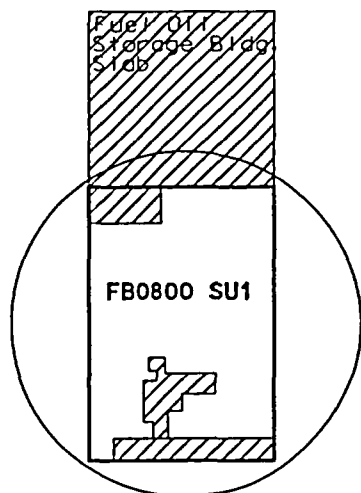
**Survey Unit Maps**



# FB0800 SU1 Site Fuel Oil Storage Building



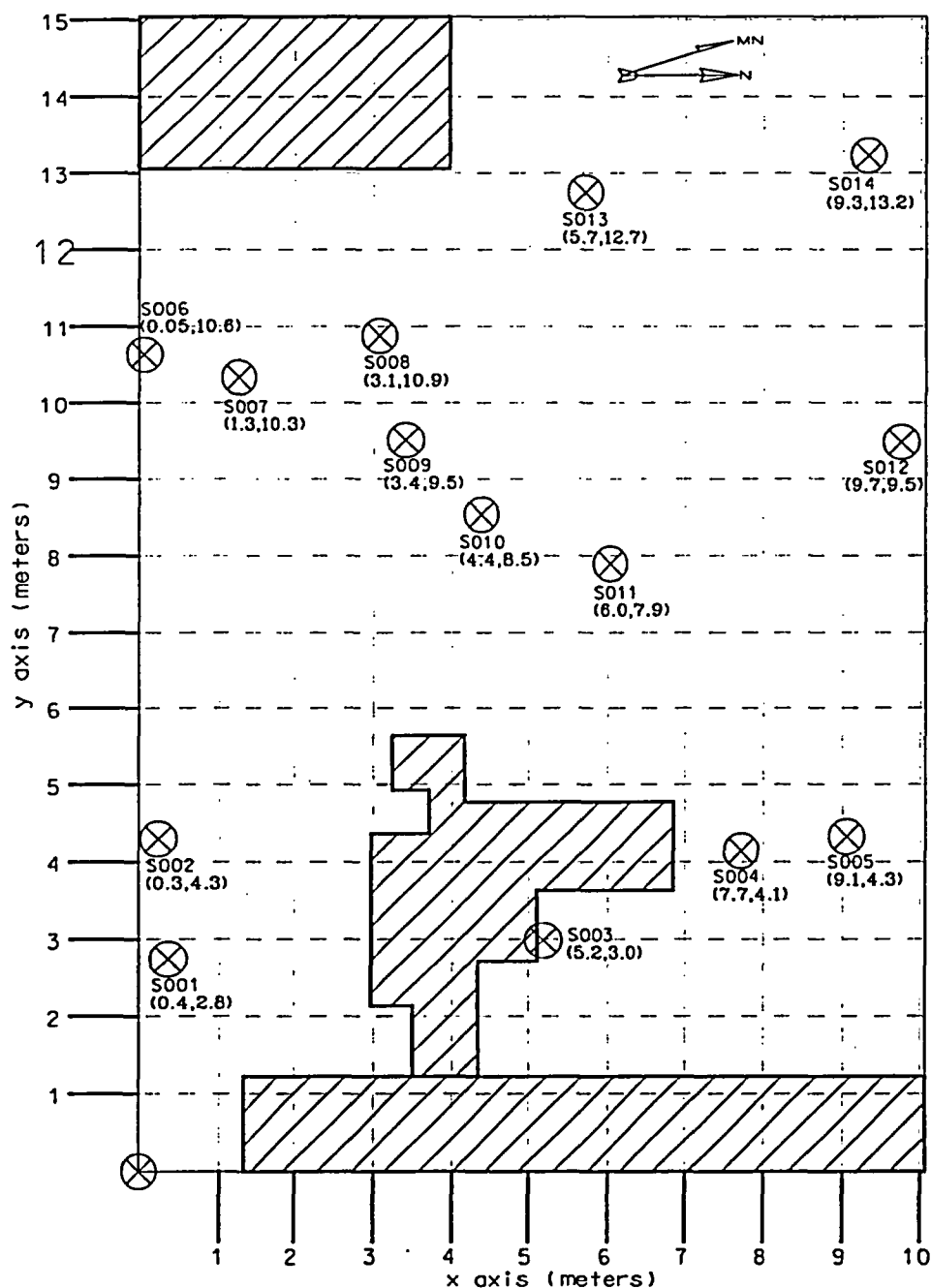
FB0800 SU1 = 124.4 m<sup>2</sup>



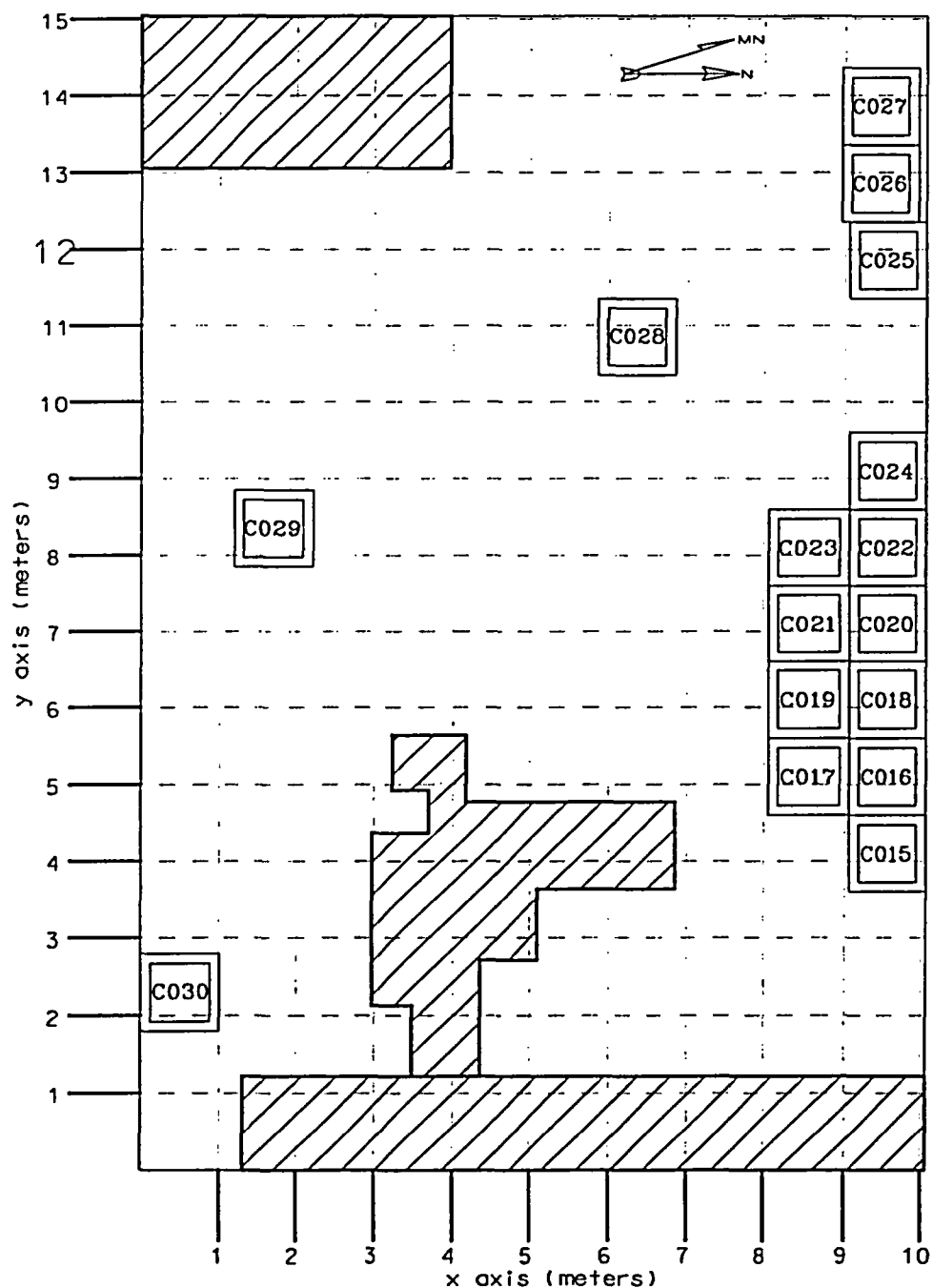
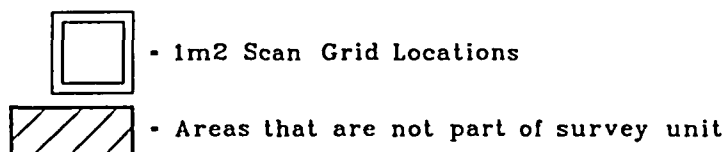
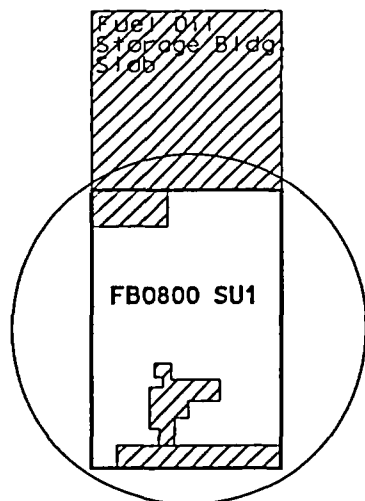
# FB0800 SU1 Direct Measurement Locations

⊗ = Direct Measurement Locations

▨ = Areas that are not part of survey unit



# FB0800 SU1 Scan Locations



**Attachment 2**

**Survey Unit Instrumentation**

**TABLE 2-1**

**INSTRUMENT INFORMATION**

<b>E-600 S/N</b>	<b>Probe S/N (type)</b>
2618	149073 (43-68)
2491	148939 (43-68)

**TABLE 2-2**

**INSTRUMENT SCAN MDC, DCGL,  
AND INVESTIGATION LEVEL**

<b>Detector</b>	<b>43-68 Flats</b>
<b>Scan MDC</b> (dpm/100 cm <sup>2</sup> )	1,832 LTP Table 5-6
<b>DCGL</b> (dpm/100 cm <sup>2</sup> )	18,000
<b>Investigation Level</b> (Alarm Setpoint) (dpm/100 cm <sup>2</sup> )	20,604 (~ DCGL plus BKG)

**Attachment 3**  
**Investigation Table**  
**(None Required)**

**Attachment 4**

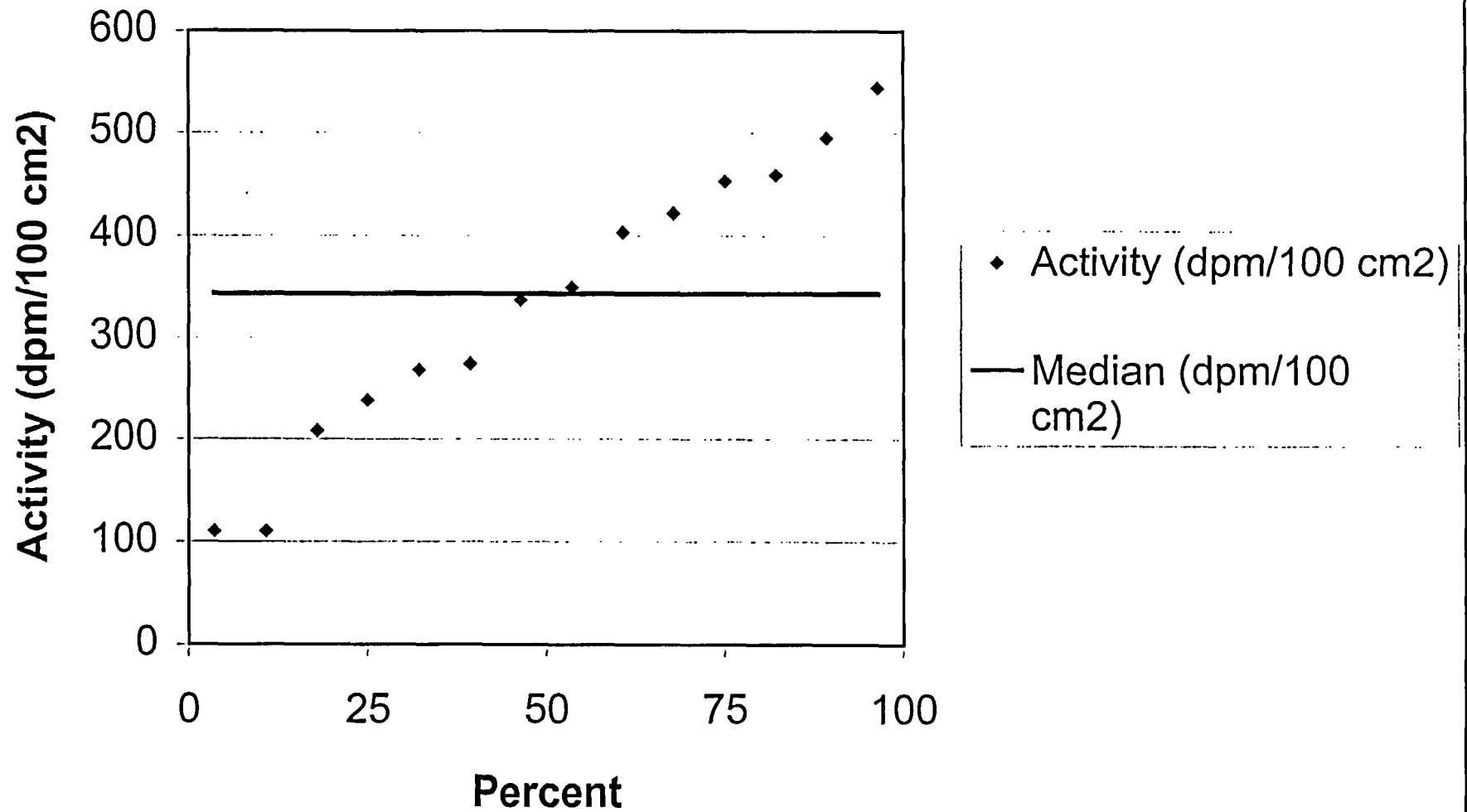
**Statistical Data**

## Survey Package FB0800 Unit 1 Surface Sign Test Summary

Evaluation Input Values		Comments
Survey Package:	FB0800	Fuel Oil Storage Building Slab
Survey Unit:	01	
Evaluator:	DR	
DCGL <sub>w</sub> :	18,000	
DCGL <sub>emc</sub> :	18,000	N/A -class 3 unit
LBGR:	17,106	
Sigma:	298	
Type I error:	0.05	
Type II error:	0.05	
Total Instrument Efficiency:	13.0%	
Detector Area (cm <sup>2</sup> ):	126	
Material Type:	Concrete Unpainted	Choosing 'N/A' sets material background to "0"
Calculated Values		Comments
Z <sub>1-<math>\alpha</math></sub> :	1.645	
Z <sub>1-<math>\beta</math></sub> :	1.645	
Sign p:	0.99865	
Calculated Relative Shift:	3.0	
Relative Shift Used:	3.0	Uses 3.0 if Relative Shift >3
N-Value:	11	
N-Value+20%:	14	
Static Data Values		Comments
Number of Samples:	14	
Median:	344	
Mean:	335	
Net Static Data Standard Deviation:	137	
Total Standard Deviation:	242	SRSS
Maximum:	546	
Sign Test Results		Comments
Adjusted N Value:	14	
S+ Value:	14	
Critical Value:	10	
Criteria Satisfaction		Comments
Sufficient samples collected:	Pass	
Maximum value <DCGL <sub>w</sub> :	Pass	
Median value <DCGL <sub>w</sub> :	Pass	
Mean value <DCGL <sub>w</sub> :	Pass	
Maximum value <DCGL <sub>emc</sub> :	Pass	
Total Standard Deviation <=Sigma:	Pass	
Sign test results:	Pass	
Final Status		Comments
The survey unit passes all conditions:	Pass	SU Passes



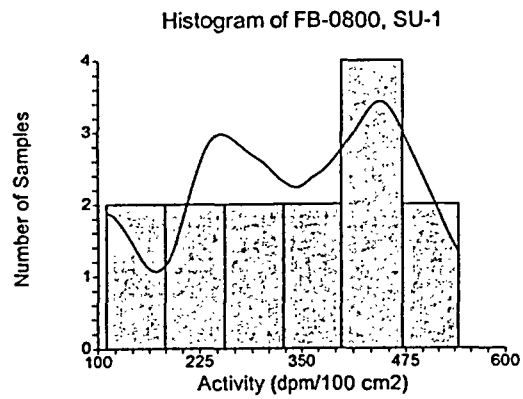
## FB-0800 SU-1 Quantile Plot



## One-Sample T-Test Report

Page/Date/Time 2 12/1/04 10:15:35 AM  
Database  
Variable C2

### Plots Section



# One-Sample T-Test Power Analysis

Page/Date/Time 2 12/1/04 10:16:16 AM

## Chart Section

