

Rancho Seco
Final Status Survey Summary Report
October 22, 2007
Microwave Building - Exterior
Survey Unit F8310002

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Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8310002, Microwave Building - Exterior

Survey Unit Description:

Operating History: This concrete structure is currently being used to house the site microwave system. Operating records and the HSA document no occurrences of a radioactive material release within this survey area.

Site Characterization: Direct measurements were made of the interior and exterior surfaces of the structure which confirmed the absence of plant-derived radionuclides. Direct measurements of the interior showed a mean gross activity level of 1,568 dpm/100 cm² and a maximum value of 6,344 dpm/100 cm². Direct measurements exterior showed a mean gross activity level of 2,875 dpm/100 cm² and a maximum value of 13,253 dpm/100 cm². Survey results were adjusted to account for elevated background due to the handling and storage of radioactive material and components in the vicinity. Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the area was determined to be a Class 2 area.

HSA Events: None

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 randomly determined and 66.4 m² were scanned for approximately 45% 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:	F831	Microwave Building - Exterior
Survey Unit:	0002	Structure Surface
Class:	2	LTP Table 5-4
SU Area (m ²):	146.25	
Evaluator:	D. Anderson	
DCGL (dpm/100 cm ²):	43,000	Gross Activity DCGL
Area Factor:	N/A	Class 2
Design DCGL _{emc} (dpm/100 cm ²):	N/A	Class 2
LBGR (dpm/100 cm ²):	27,370	Adjusted
Design Sigma (dpm/100 cm ²):	5,210	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m ²):	10.45	Class 2
Scan Area (m ²):	66.4	
Scan Coverage (%):	45%	Class 2
Z _{1-α} :	1.645	
Z _{1-β} :	1.645	
Sign P:	0.99865	
Calculated Relative Shift:	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:	3.2	Class 2

Survey Results:

A total of 21 direct measurements were made in F8310002. 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 3,068 dpm/100 cm² to 8,414 dpm/100 cm² for exterior surfaces, based on a surveyor efficiency of 0.5 with 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 cm ²)
F8310002-C0001BD	3,408
F8310002-C0002BD	2,848
F8310002-C0003BD	2,744
F8310002-K0004BD	3,501
F8310002-K0005BD	2,915
F8310002-K0006BD	3,211
F8310002-K0007BD	3,392
F8310002-K0008BD	3,278
F8310002-C0009BD	1,738
F8310002-C0010BD	2,044
F8310002-C0011BD	2,096
F8310002-C0012BD	1,956
F8310002-C0013BD	1,940
F8310002-K0014BD	2,365
F8310002-K0015BD	2,371
F8310002-Q0016BD	1,421
F8310002-Q0017BD	1,468
F8310002-Q0018BD	1,468
F8310002-Q0019BD	1,841
F8310002-Q0020BD	1,406
F8310002-Q0021BD	1,691
Mean:	2,338
Median:	2,096
Standard Deviation:	732
Range:	1,406 – 3,501

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8310002C0001SM	4.86
F8310002C0002SM	6.14
F8310002C0003SM	9.98
F8310002K0004SM	3.58
F8310002K0005SM	1.01
F8310002K0006SM	2.29
F8310002K0007SM	4.86
F8310002K0008SM	6.14
F8310002C0009SM	4.86
F8310002C0010SM	6.14
F8310002C0011SM	11.27
F8310002C0012SM	7.42
F8310002C0013SM	7.42
F8310002K0014SM	3.58
F8310002K0015SM	2.29
F8310002Q0016SM	8.7
F8310002Q0017SM	6.14
F8310002Q0018SM	4.86
F8310002Q0019SM	8.7
F8310002Q0020SM	2.29
F8310002Q0021SM	3.58
Mean:	5.53
Median:	4.86
Standard Deviation:	2.71
Range:	1.01 to 11.27

Survey Unit Data Assessment:

The survey design required 21 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):	21	
Median (dpm/100 cm ²):	2,096	
Mean (dpm/100 cm ²):	2,338	
Direct Measurement Standard Deviation	732	
(dpm/100 cm ²):		
Total Standard Deviation (dpm/100 cm ²):	732	
Maximum (dpm/100 cm ²):	3,501	
Material Type:	N/A	
Sign Test Final N Value:	21	Background Subtract Not Applied
S+ Value:	21	
Critical Value:	14	
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	Class 2
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 (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 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 43,000 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.

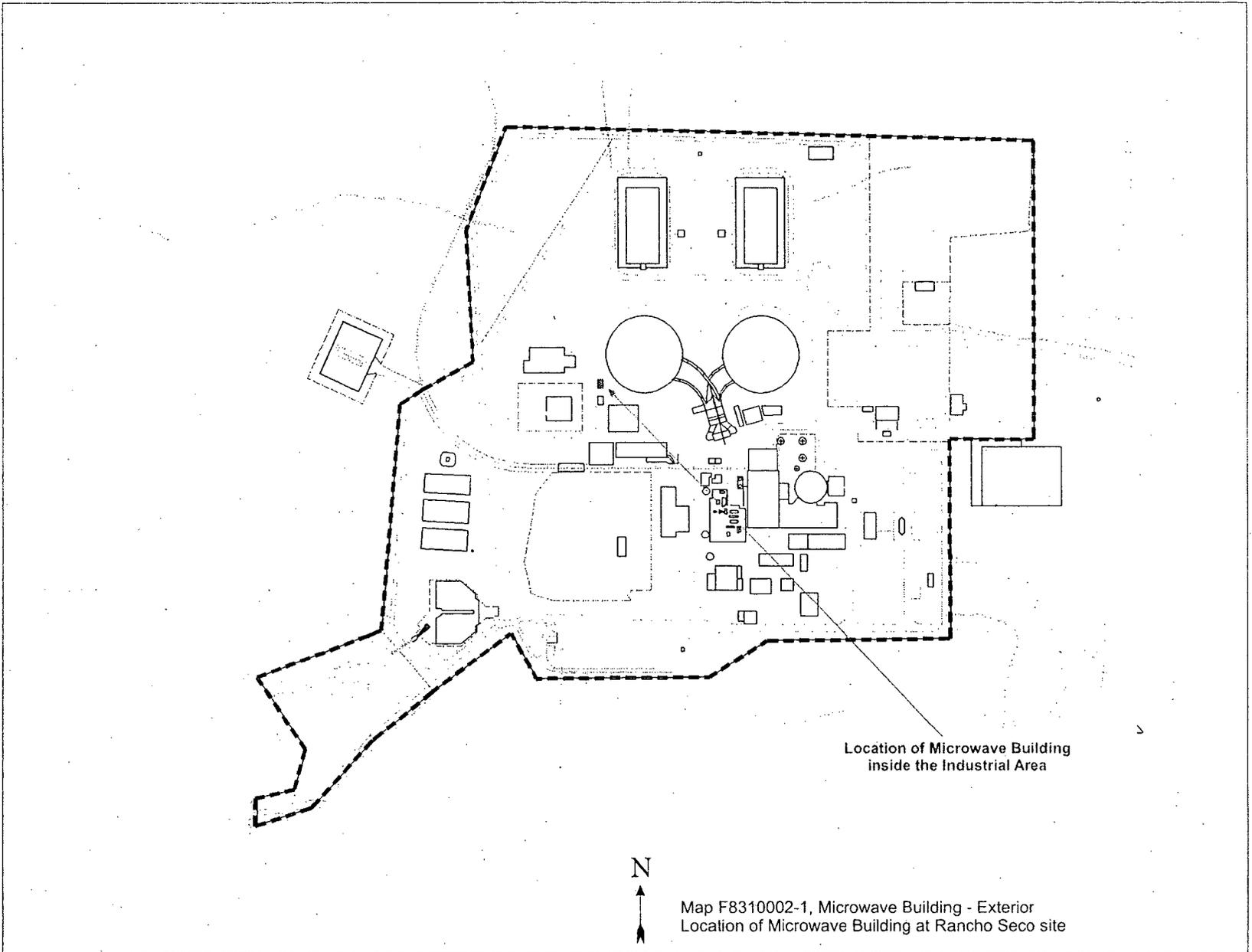
It is concluded that survey unit F8310002 meets the release criteria of 10CFR20.1402.

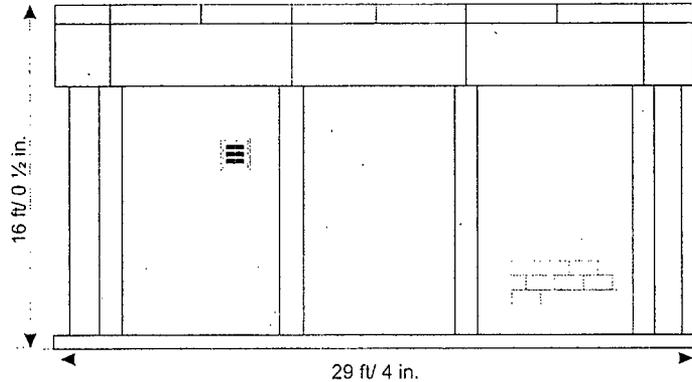
Attachment 1

Maps

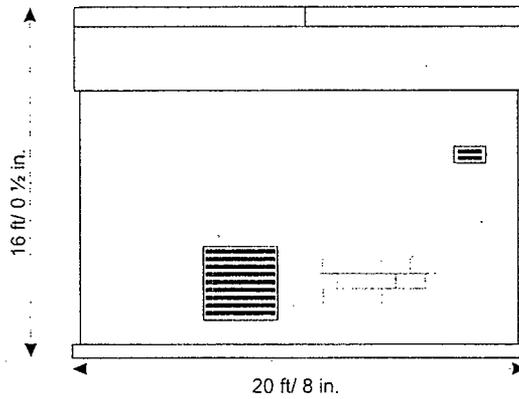
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Survey Unit F8310002

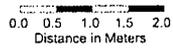




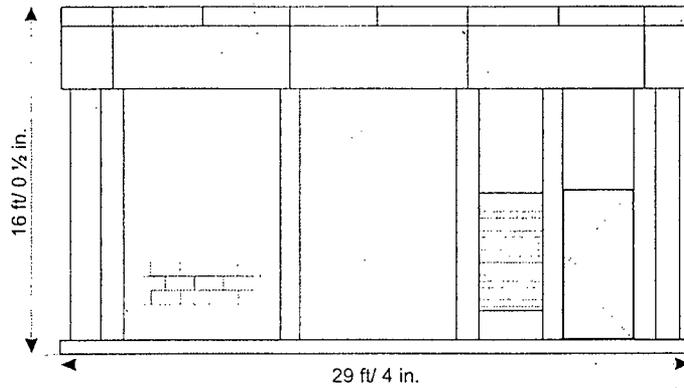
Microwave Building, East Elevation



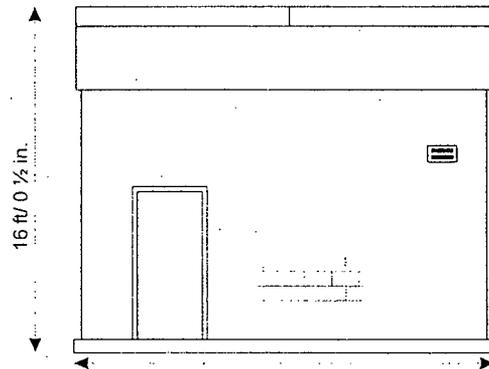
Microwave Building, South Elevation



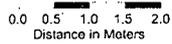
Map F8310002-2, Microwave Building - Exterior
East and South Elevations
Area Estimate: 38.3 sq. meters



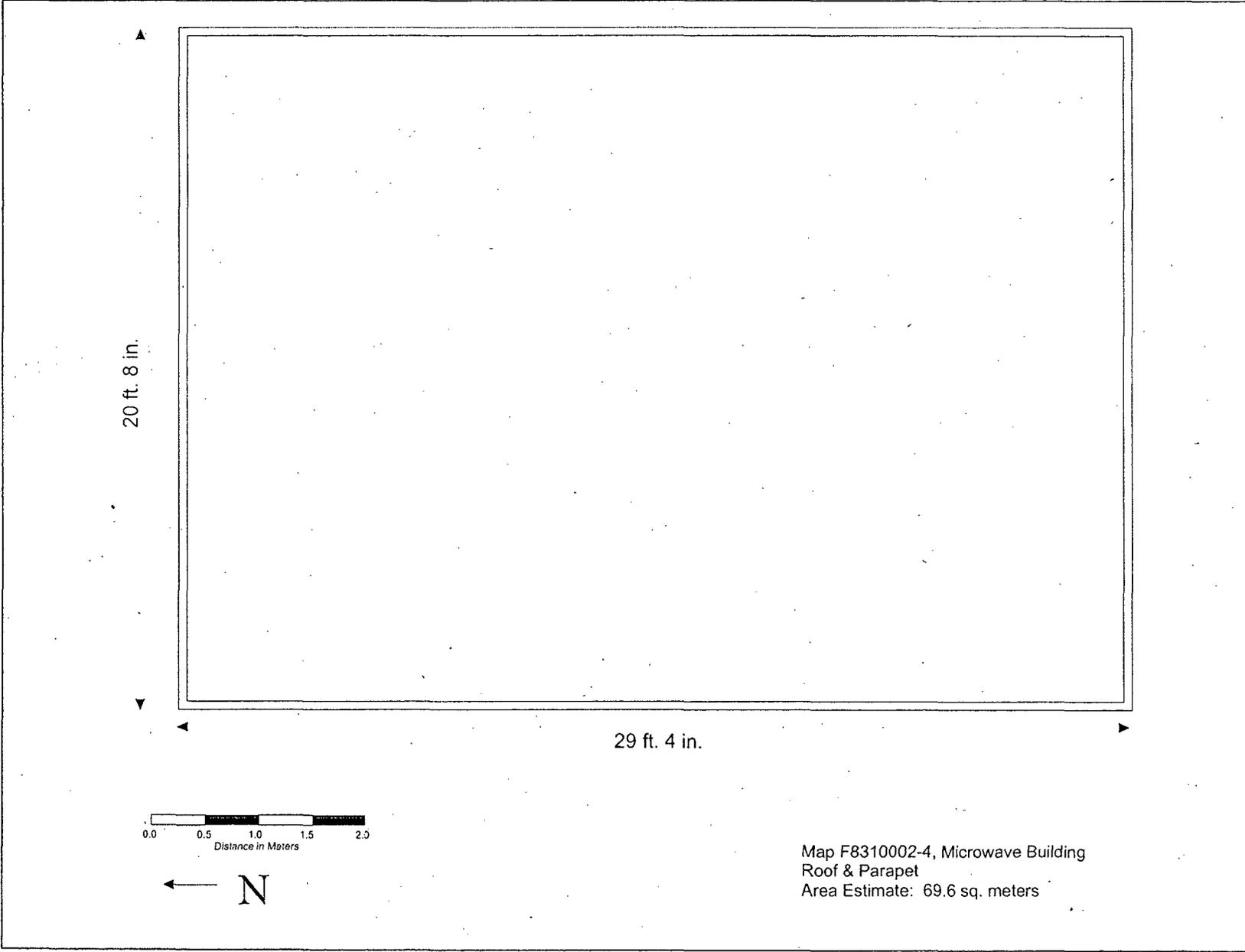
Microwave Building, West Elevation

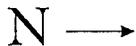
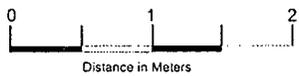
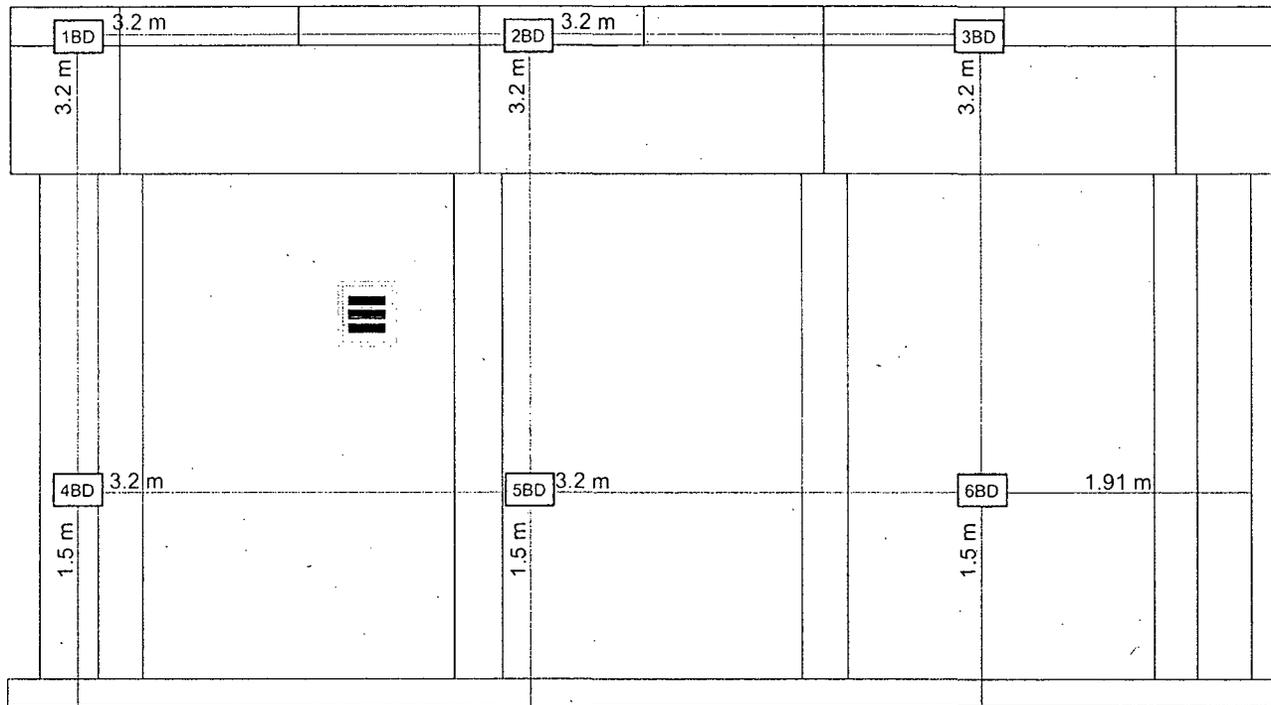


Microwave Building, North Elevation

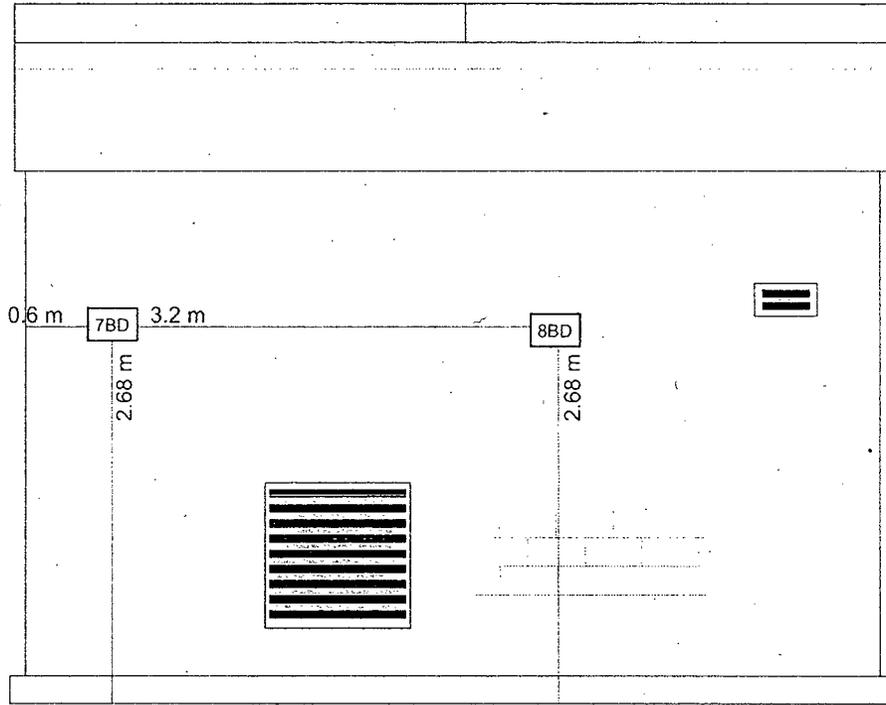


Map F8310002-3, Microwave Building - Exterior
West and North Elevations
Area Estimate: 38.3 sq. meters

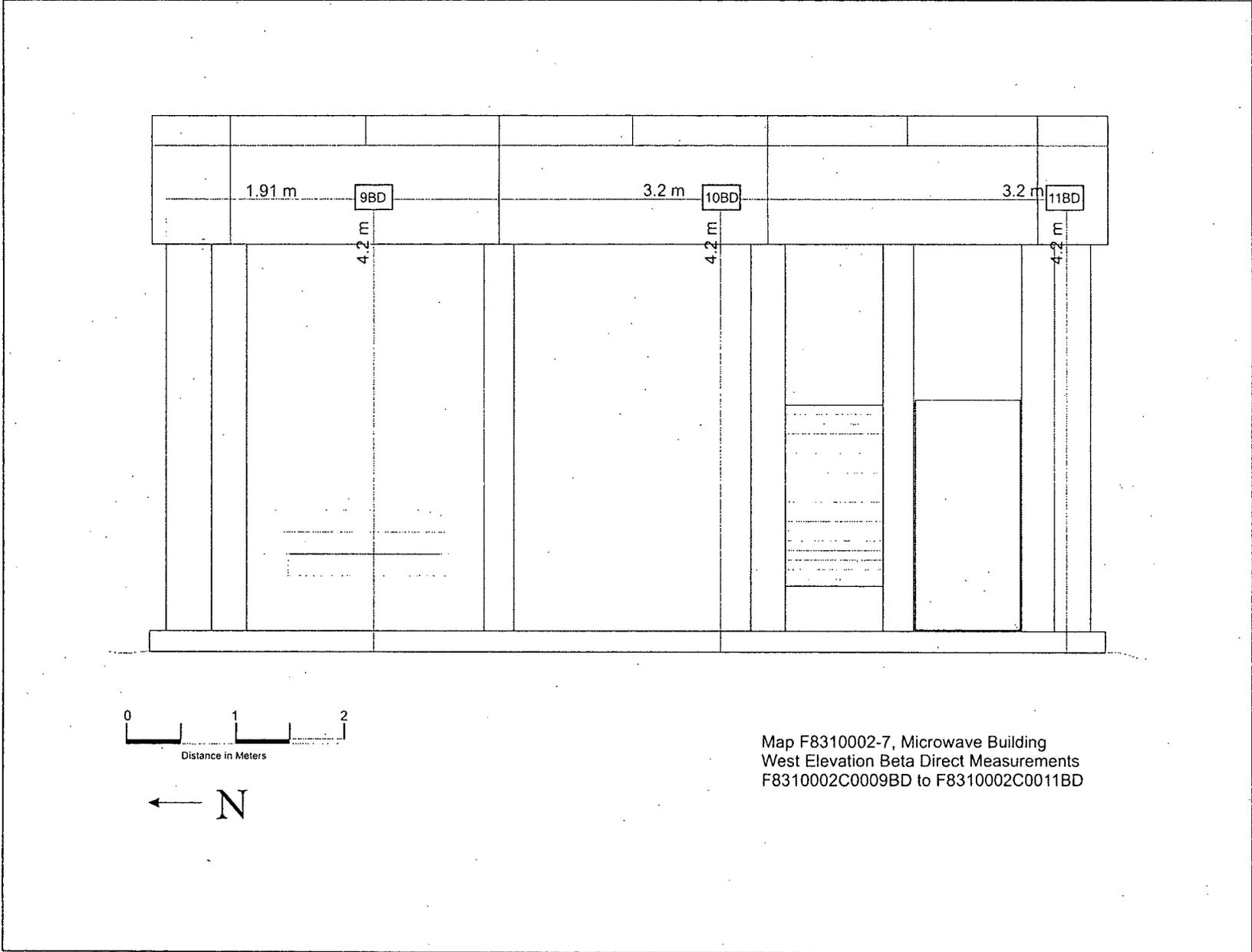


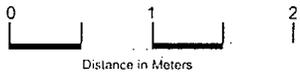
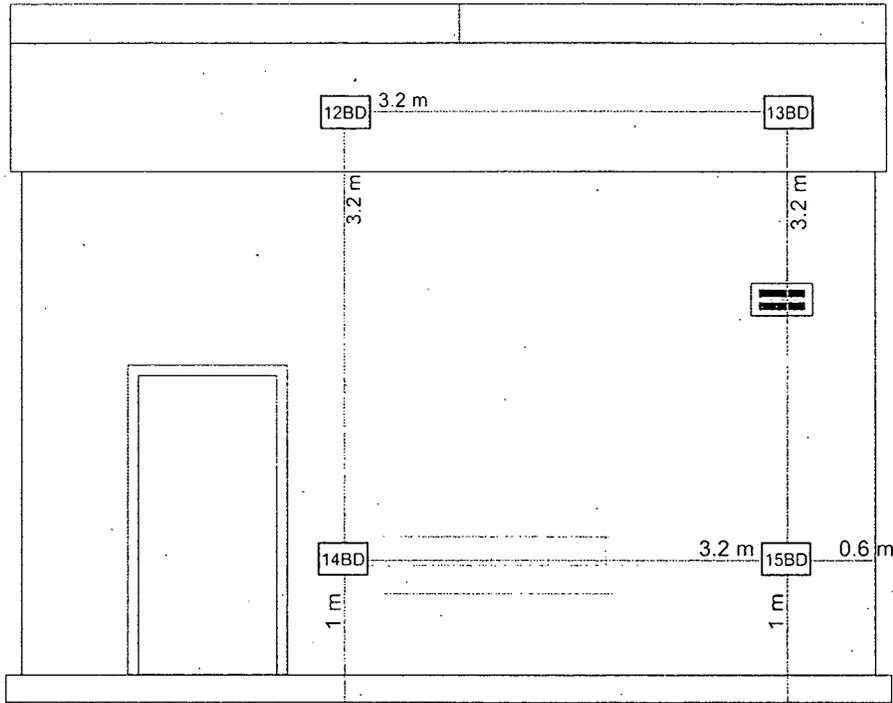


Map F8310002-5, Microwave Building
East Elevation Beta Direct Measurements
F8310002C0001BD to F8310002C0006BD

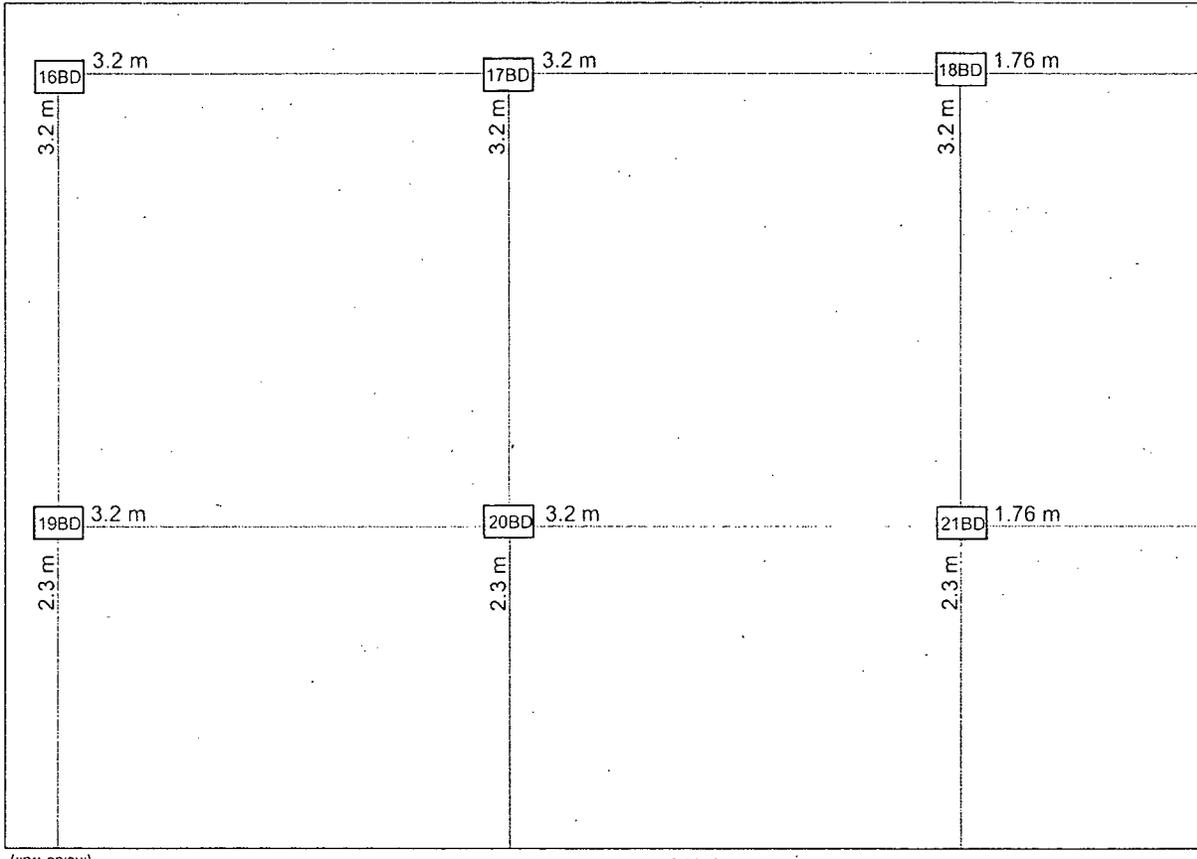


Map F8310002-6, Microwave Building
South Elevation Beta Direct Measurements
F8310002C0007BD to F8310002C0008BD



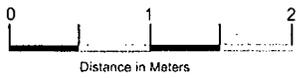


Map F8310002-8, Microwave Building
North Elevation Beta Direct Measurements
F8310002C0012BD to F8310002C0014BD



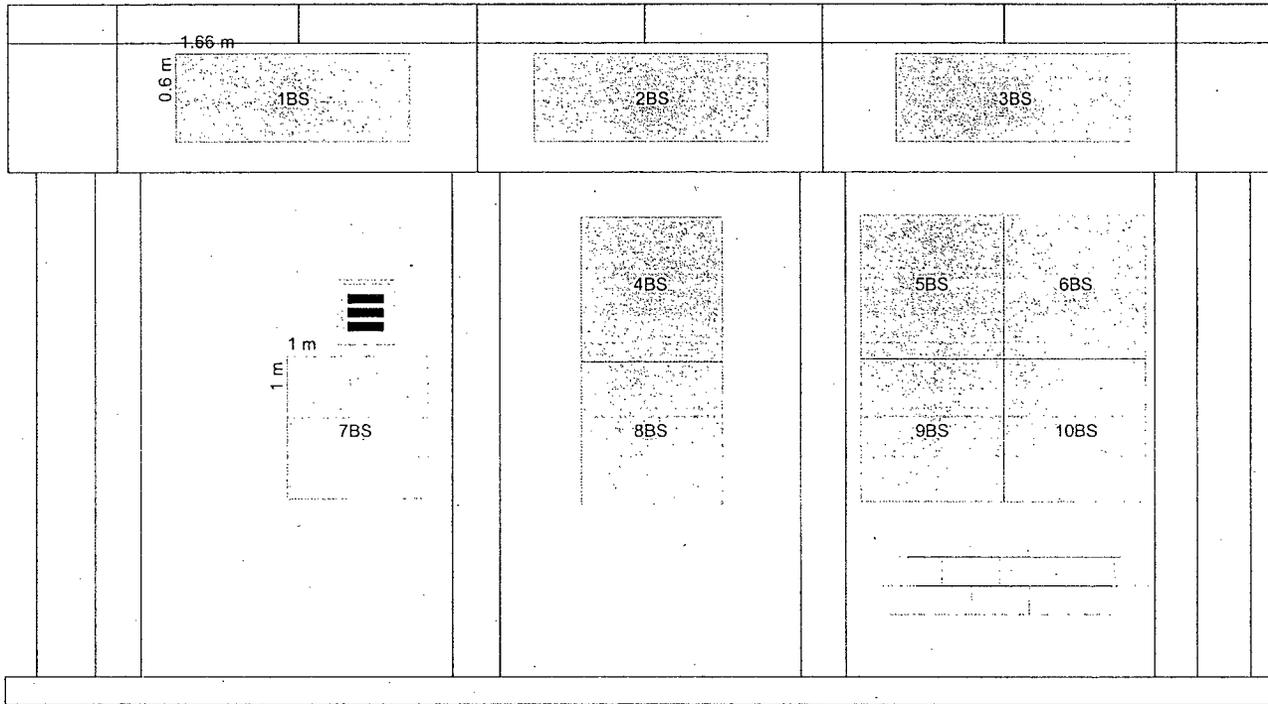
(inside wall)

(NOTE: Distance measurements are from inside wall of roof parapet.)

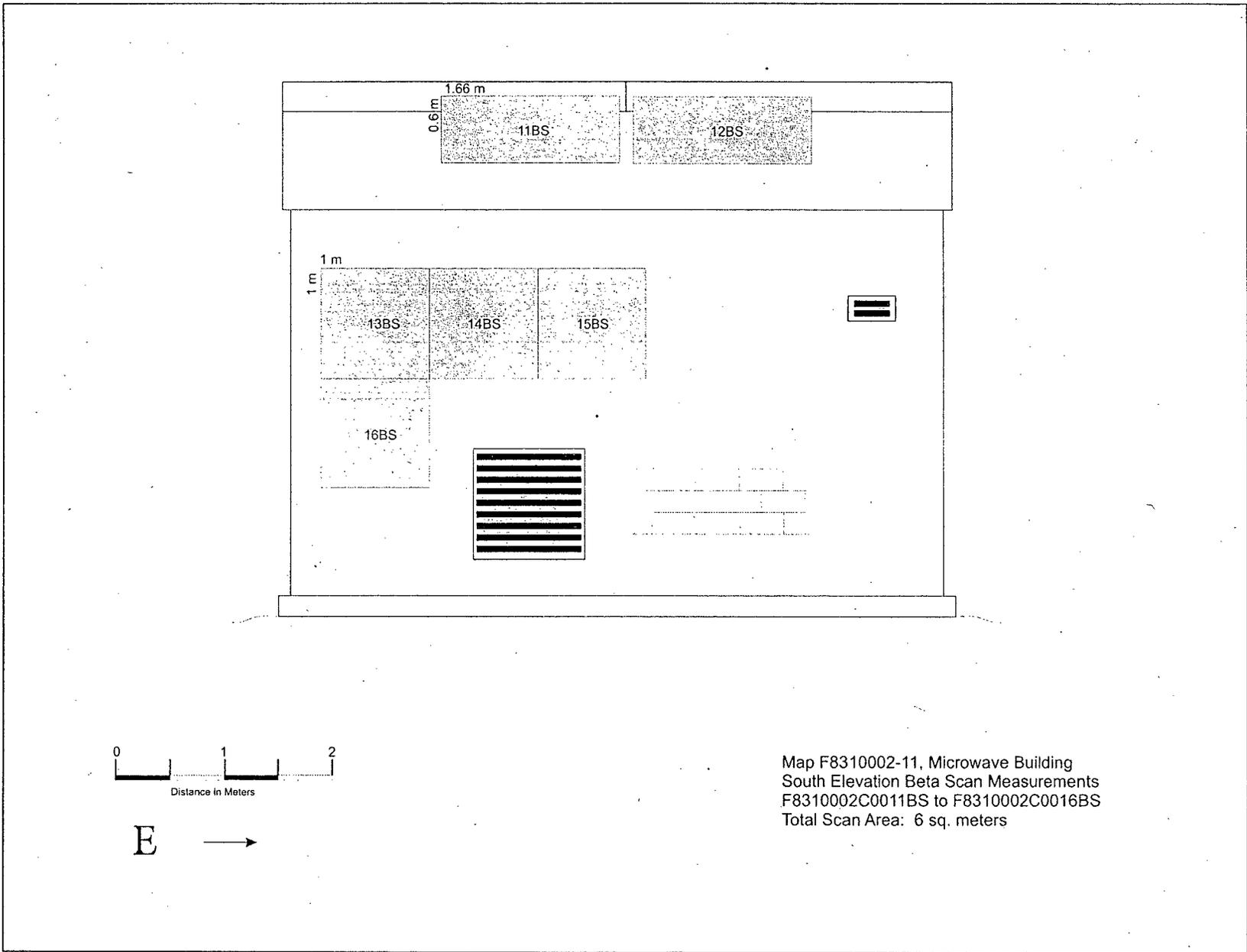


Distance in Meters
← N

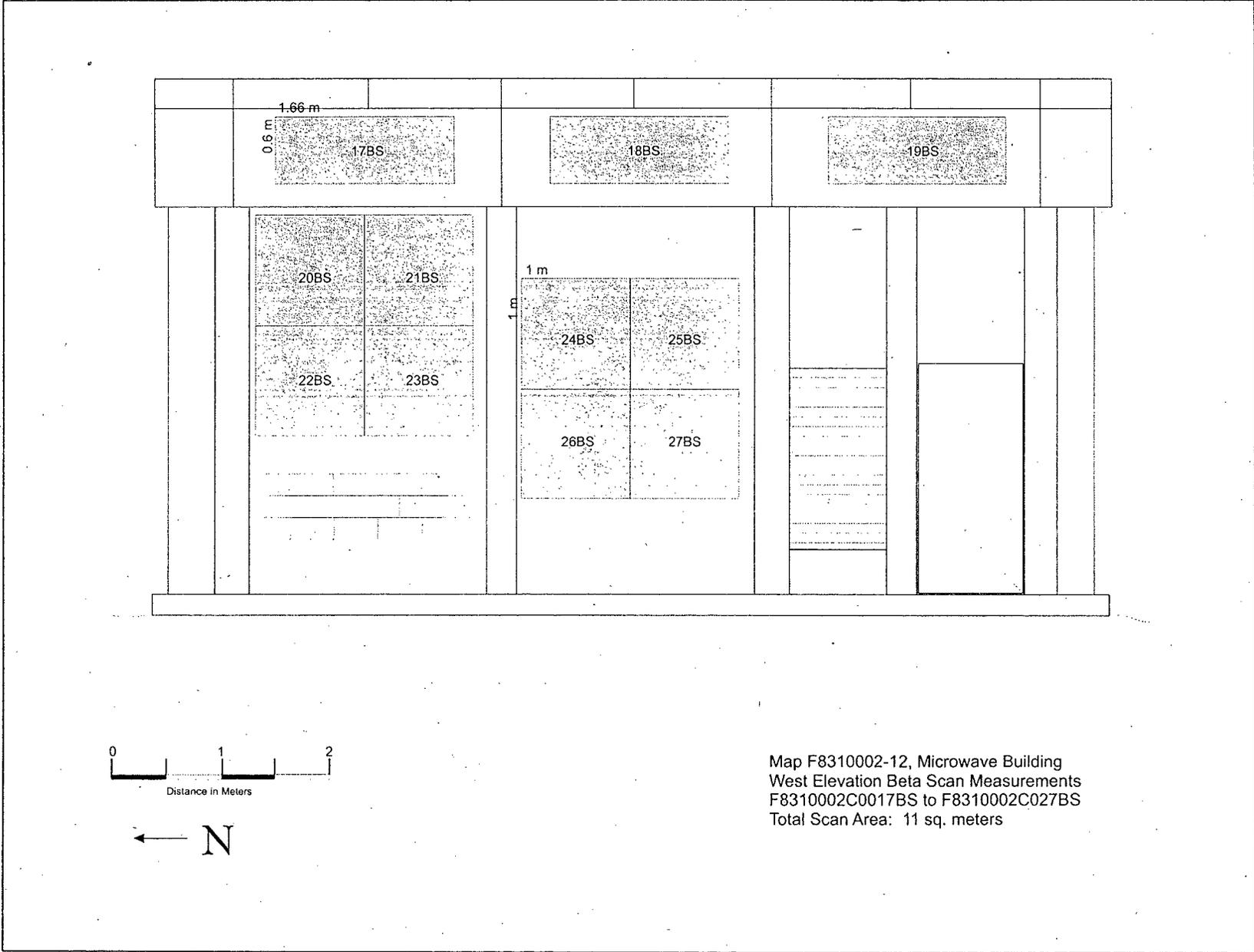
Map F8310002-9, Microwave Building Roof
Beta Direct Measurements
F8310002Q0016BD to F8310002Q0021BD

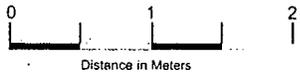
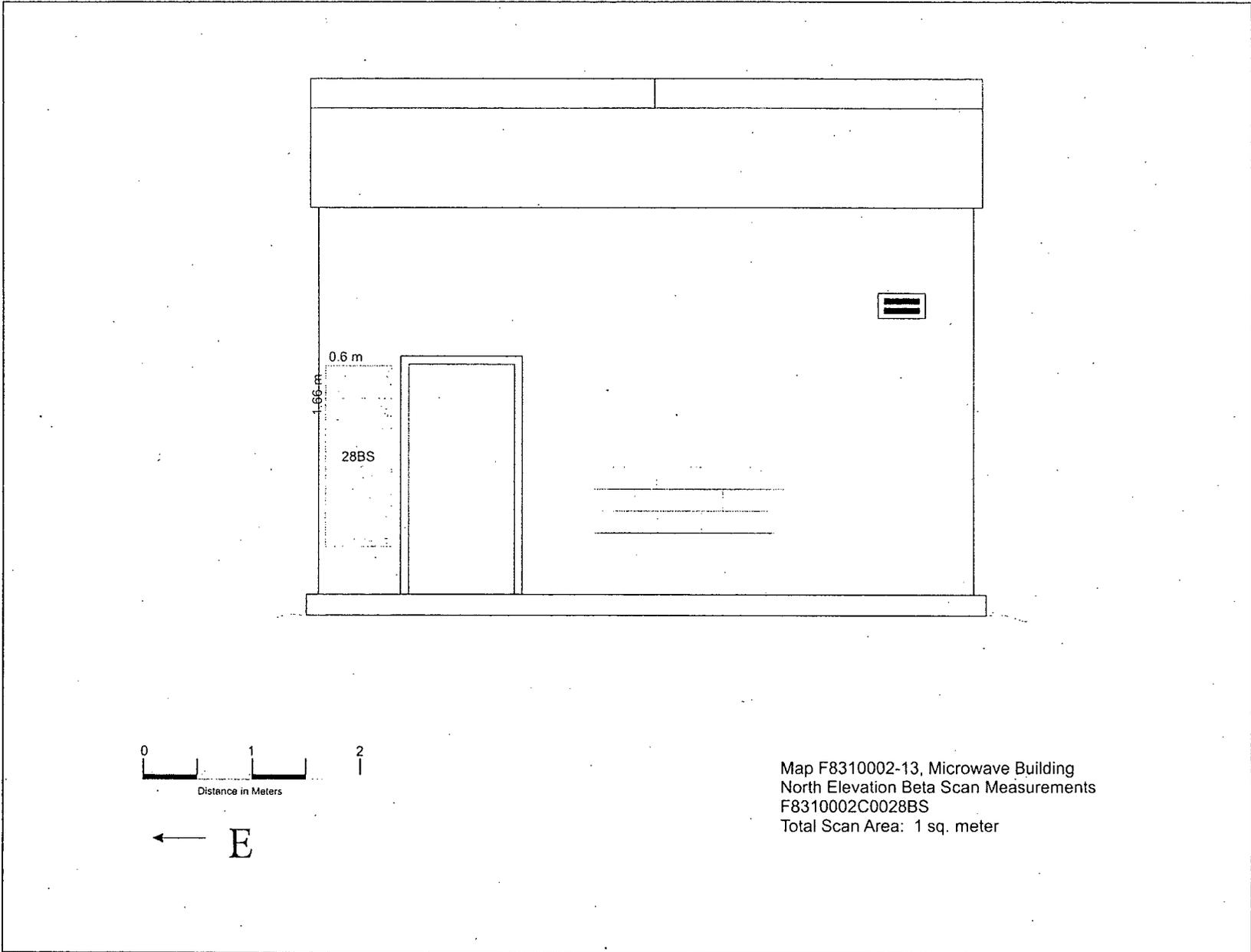


Map F8310002-10, Microwave Building
East Elevation Beta Scan Measurements
F8310002C0001BS to F8310002C0010BS
Total Scan Area: 10 sq. meters



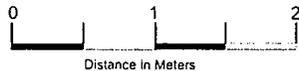
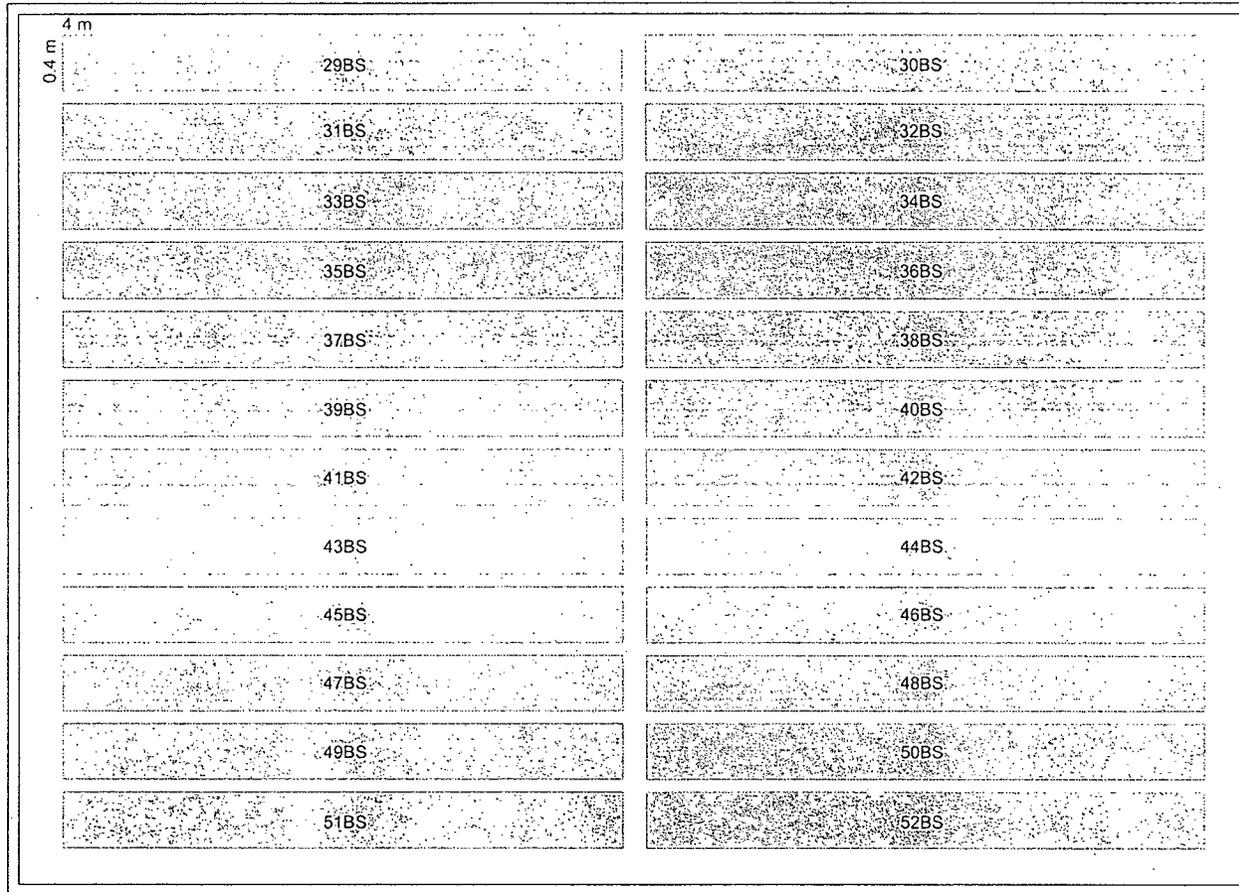
Map F8310002-11, Microwave Building
South Elevation Beta Scan Measurements
F8310002C0011BS to F8310002C0016BS
Total Scan Area: 6 sq. meters





← E

Map F8310002-13, Microwave Building
North Elevation Beta Scan Measurements
F8310002C0028BS
Total Scan Area: 1 sq. meter



Map F8310002-14, Microwave Building Roof
Beta Scan Measurements
F8310002Q0029BS to F8310002Q0052BS
Total Scan Area: 38.4 sq. meters

Attachment 2

Instrumentation

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Survey Unit F8310002

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; 189089	43-68B; 161406	433	1,033
M2350; 142499	43-37; 148502	198	616
Tennelec; 0401171	N/A	5 dpm α , 11 dpm β	N/A

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	32,250
Investigation Criteria – Scan	32,250
DCGL _w	43,000
DCGL _{EMC}	N/A

Attachment 3

Investigation

October 22, 2007

Survey Unit F8310002

(none required)

Attachment 4
Data Assessment
October 22, 2007
Survey Unit F8310002

