

ATTACHMENT 23

CONSUMERS ENERGY
BIG ROCKPOINT

DOCKET NUMBERS 50-155 AND 72-043

TRANSMITTAL OF SURVEY PACKAGES IN SUPPORT OF BIG ROCK POINT PHASED
LICENSE TERMINATION

CLASS 1 AREA – SUPPORTING SURVEY RELOCATED SOIL RELEASE RECORD, TBC_{x8}1,
RELOCATED SOILS FROM TURBINE BUILDING / CONTAINMENT DEMOLITION

October 9, 2006

38 Pages

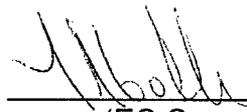
**Supporting Survey, Relocated Soil
Release Record TBC_{x8}1**

Relocated Soils From Turbine Building/Containment Demolition

SURVEY PACKAGE CLOSURE

Final Status Survey Documentation is authorized for closure. All required reviews are complete and the evaluation of data results have satisfied the criteria established for unrestricted release and onsite use for excavation backfill.

Signed:  Date: 06-08-06
(ESSG Supervisor)

Signed:  Date: 06-13-06
(ES Superintendent)

Signed:  Date: 7-3-06
(RP & ES Manager)

Survey Requirements

Release Record TBC_{x8}1 Relocated Soils From Turbine Building/Containment Demolition Area

Survey Description

Supporting survey TBC_{x8}1 consists of soils excavated during Turbine/Containment demolition and the removal of subsurface piping components. The excavated soil was transported to the soil verification area (SVA) and graded to maximum depth of 1.0 meter. The physical size of the survey area is 1990 square meters.

The evaluation of excavated soil will be performed in accordance with procedure RM-76, Final Status Survey Design. Sample locations will be established by random start, systematic square grid pattern over the graded area. Each soil sample will be a full core homogenized composite that is representative of total soil thickness. Surface scanning will be conducted over 100% of the survey area.

History

The soil for survey evaluation originated from a Class 1 area that was excavated to remove concrete and piping components in the Turbine Building/Containment demolition area. Soil remediation efforts were required for some areas associated with subsurface component removal.

Current Radiological Status

Based on post remediation analyses and supporting surveys the residual radioactivity in this excavated soil is not expected to exceed DCGL concentration values. Survey documentation is maintained in the 10 CFR 50.75(g) files. Input for this evaluation includes the following survey data:

**Turbine Building Demolition
Supporting Surveys for Soil Transport and Evaluation**

TB051005	SB040405	SB042905	TB062805	HH060705
TB052405	SB040605	SB050205	HH050505	TB060905
TB052505	SB040705	SB051705	HH051705	TB080805
TB052605	SB041205	SB051805	HH051905	TB080905
TB060105	SB041905	HH042705	HH041905	

Post-Construction Expectations

Survey TBC_{x8}1 will be performed in the following activity sequence:

1. Walkdown: Site Characterization personnel will perform a walkdown assessment to ensure survey area preparations are complete and confirm that the following post-construction expectations have been satisfied as applicable:

- Groundwater and Surface water control is adequate
 - All construction debris has been removed from the survey area
 - The survey location status meets all applicable safety requirements
2. **Survey Area Isolation and Control:** Control measures will be established to ensure that any potential ongoing decommissioning activities in adjacent locations do not impact the current survey area status. Isolation and control measures include postings, barriers, access points, and the evaluation of ongoing work activities in adjacent areas.
 3. **Survey Design and Execution:** Survey design and execution will follow the Data Quality Objectives for TBC_{x8}1 in accordance with the survey requirements established in procedures RM-76, *Final Status Survey Design* and RM-77, *Final Status Survey Implementation*, and LTP, Chapter 5. Survey size will be based on the statistical requirements of the Sign Test for Class 1 areas with soil samples collected in random start, systematic data point locations. Surface scanning will be performed with 100% survey area coverage. This survey will be conducted in accordance with approved BRP procedures and follow the guidance of NUREG 1575.
 4. **Data Quality Assessment:** Isolation and control of the survey area will be maintained until the survey Data Quality Assessment demonstrates that the regulatory requirements for unrestricted site release have been satisfied.

DATA QUALITY OBJECTIVES

Survey TBC_{x8}1 Relocated Soils From Turbine Building/Containment Demolition Area

1. STATE THE PROBLEM

The Problem:

To demonstrate that the level of residual radioactivity in soils excavated from the Turbine Building/Containment demolition area does not exceed the release criteria of 25 mrem/year Total Effective Dose Equivalent (TEDE) as specified in the License Termination Plan (LTP). This soil has been relocated to the soil verification area (SVA) and is to be prepared for survey by grading out to a depth of one (1) meter or less. The excavated soil for evaluation is to be designated as a Class 1 survey area. It must be demonstrated that soils in this survey area satisfy the criteria established for unrestricted release prior to disposition as fill material for onsite usage.

Stakeholders:

The primary stakeholders interested in the answer to this problem are Consumers Energy Co., and the general public as represented by the Michigan Department of Environmental Quality (MDEQ), and the US Nuclear Regulatory Commission (USNRC).

The Planning Team:

The planning team consists of members of the BRP Environmental Services Survey Group (ESSG). The primary decision maker will be the Final Status Survey Supervisor. The Final Status Survey Supervisor will obtain input from the site Construction Group and Scheduling Group for issues relating to schedule and costs.

Schedule:

Approximately five (5) working days are projected to implement the survey and to collect and analyze field data.

Resources:

The primary resources needed to determine the answer to the problem are two (2) technicians to perform fieldwork, one (1) technician to prepare the samples and conduct laboratory analyses, and two (2) survey team members to prepare and review the design, generate maps, coordinate field activities and evaluate data.

2. IDENTIFY THE DECISION

Several decisions need to be defined to address the stated problem.

Principal Study Question (1):

Does the mean concentration of residual radioactivity in the survey unit exceed the release criteria stated above?

Decision (1):

Determine whether the mean concentration of residual radioactivity in the survey exceeds the release criteria stated in the problem.

Actions (1):

Alternative actions include failure of the survey unit, remediation, or no action required.

Principal Study Question (2):

Do any areas of elevated activity in the survey unit exceed the release criteria?

The Decision (2):

Determine if any areas of elevated activity in the survey unit exceed the release criteria.

Actions (2):

Alternative actions include confirmation and investigation, performing the elevated measurement comparison (EMC), remediation, or no action required.

Principal Study Question (3):

Is the potential dose from residual radioactivity in the survey unit ALARA as stated?

The Decision (3):

Determine if the potential dose from residual radioactivity in the survey unit is ALARA. ALARA requirements for soil remediation are defined in Chapter 4 of the LTP.

Actions (3):

Alternative actions include remediation or no action required.

3. IDENTIFY INPUTS TO THE DECISION

Information Needed:

Characterization measurements are required to define the radionuclides present and determine the extent and variability of residual radioactivity in the survey area for design and implementation of the survey. Survey area classification, ALARA analysis, potential radionuclides of interest, and site-specific DCGL values are also required inputs to the decision process. The primary information required for evaluation is the analytical results of survey measurements.

Source of the Information:

The soil sample data to be used for survey development are the radionuclide-specific measurements of representative soil samples collected for characterization to determine suitability for transport to the SVA. The soil samples obtained were judgmentally selected as a result of multiple surveys conducted during the excavation and transport process. The ALARA analysis for potential soil remediation is provided in LTP, Section 4.4. Site-specific DCGL values and BRP radionuclides of interest are defined in LTP Chapter 5, Table 5-1 and Procedure RM-76, *Final Status Survey Design*.

The survey will be conducted in accordance with applicable regulatory guidance as established in LTP Chapter 5 for Class 1 areas. Soil samples will be utilized for radionuclide-specific measurements in this evaluation.

4. BOUNDARIES OF THE STUDY

Boundaries of the Survey:

The target population for this survey is the total thickness of prepared soil in the survey area of 1990 m².

Temporal Boundaries:

Scanning and sampling in this survey unit will only be performed during daylight hours under dry weather conditions. Surface soils must be free of significant snow cover and standing water prior to surface scanning. Soils must be in a non-frozen state or fragmented for collection to satisfy BRP procedural sampling requirements. The anticipated start date for the survey is May 18, 2006.

Constraints:

Cold weather or rainy conditions may effect the operation of electronic equipment. Adverse weather conditions that include accumulations of rain or snow may limit area access and delay survey efforts.

5. DEVELOP A DECISION RULE

The following decision rules have been developed to define a logical process for choosing among alternative actions for the principal study questions associated with this survey area.

Decision Rule (1):

If all reported concentrations for residual radioactivity are less than the site-specific DCGL's and the unity rule has been satisfied for each sample, then the survey unit meets release criteria. No further action is required.

Decision Rule (2):

If the mean value of activity in the survey unit is greater than the DCGL, then the survey unit fails to meet the release criteria.¹ Remediate, resurvey, and evaluate the results relative to the decision rule.

Decision Rule (3):

If the mean activity in the survey unit is less than the DCGL and any individual sample measurement exceeds this value, conduct the Sign Test and the elevated measurement comparison (EMC) per LTP, Chapter 5 and Procedure RM-76, *Final Status Survey Design*. If the EMC and the Sign Test have been satisfied then the survey unit meets the release criteria and no further action is required. If the EMC or the Sign Test has not been satisfied then remediate the area(s) of elevated activity, resurvey as appropriate, and evaluate the results relative to the decision rule.

¹ When multiple radionuclides are present the mean activity value is determined as the average of the weighted sum. The DCGL of the weighted sum is 1.

Decision Rule (4):

If the potential dose from residual radioactivity in the survey unit is ALARA, then no further action is necessary. If the potential dose from residual radioactivity in the survey unit is not ALARA, then remediate and resurvey.

6. SPECIFY TOLERABLE LIMITS ON DECISION ERRORS

The Null Hypothesis:

It is assumed that residual radioactivity in the survey unit exceeds the release criterion.

Type I Error (α):

The α error is the maximum probability of rejecting the null hypotheses when it is true. The α error is defined in the LTP at a value of 0.05 (5%) and cannot be changed to a less restrictive value unless prior approval is granted by the USNRC. The α error value of 0.05 will be used for survey planning and data assessment for this survey area.

Type II Error (β):

The β error is the probability of accepting the null hypothesis when it is false. A value of 0.05 (5%) will be used for survey planning and data assessment for this survey area.

The Lower Bound of the Gray Region (LBGR):

The LBGR is initially set at one-half the DCGL_w for this survey unit. The LBGR may be adjusted during survey design to achieve an optimum relative shift between 1.0 and 3.0.

Relative Shift (Δ/σ):

The relative shift will be maintained within the range of 1.0 and 3.0 by adjusting the LBGR as appropriate.

7. OPTIMIZE DESIGN FOR OBTAINING DATA

Statistical Test

Sign Test:

Radionuclides of potential plant origin also present in soil as background activity resulting from fallout constitute only a small fraction of the DCGL. Therefore, the Sign Test will be used where applicable in the survey evaluation to determine if the survey area meets the requirements for unrestricted release.

Number of Samples Determined:

The number of samples required for this survey will be determined based on the relative shift as defined by the requirements of the Sign Test (LTP, Chapter 5.) and Procedure RM-76, *Final Status Survey Design*. The LBGR is initially set at one-half the DCGL_w and may be adjusted as necessary for optimizing the survey design to achieve a relative shift between 1.0 and 3.0. Sample point locations are to be determined using a random start, systematic square grid spacing.

Judgmental Sampling:

Co-60 is the most limiting radionuclide for identification by surface scanning; judgmental surface and subsurface core samples will be collected in any location that exceeds the scan investigation level.

Scan Coverage:

Scanning for this survey area will provide 100% coverage.

Number of Samples for Quality Control:

A minimum of 5% of the sample population will be collected for quality evaluation. These samples may include sample splits, sample recounts, or third party sample analysis. Quality analyses will be conducted as defined in LTP, Chapter 5 and Procedure RM-79, *Final Status Survey Quality Control*.

Additional Sample Analysis Requirements:

The area of soil excavation intersects the identified waterborne pathway for Tritium migration and shall require Tritium in soil analyses for a minimum of 10% of the sample population. Soil samples will be collected in the same random locations as those selected for QA/QC evaluation and sent to an independent laboratory for Tritium analysis. Data results will be provided in the survey package.

Investigation Levels:

Investigation levels defined in LTP, Chapter 5 and BRP Procedure RM-76, *Final Status Survey Design*, shall be conservatively established for this survey as shown below:

Investigation Levels for Survey TBC_{x8}1

Classification	Scan Measurement	Soil Sample Analysis
Class 1	> DCGL	> DCGL _w

The investigation levels for soil sample measurements are meant to include any individual radionuclide result greater than the site-specific DCGL or where the combined radionuclide values exceed the unity rule. Co-60 is the most limiting radionuclide for identification by surface scanning; further investigation will be initiated at any location that exceeds the Co-60 Scan_{DCGL} of 1818 CPM above background as detailed in the survey design.

SURVEY DESIGN

Survey TBC_{x8}1
Survey Design
Relocated Soils from Turbine Building/Containment Demolition Area

Survey Unit Description

Survey TBC_{x8}1 consists of excavated soils that have been removed from the Turbine Building/Containment demolition area for subsurface structure and component removal. Areas of excavation include the Containment foundation and the following subsurface piping and components:

- Underground diesel storage tank (heating boiler),
- Condenser cooling water piping,
- Service water and firewater piping
- East side storm drain, and
- Radwaste effluent piping in Survey Units 8, 9, and 10.

The soil has been graded out to a maximum thickness of one (1) meter over a total area of 1990 m². Soil sample locations for this survey will be determined using a random start, systematic, square-grid pattern over the graded area. Each soil sample will be an homogenized composite representative of the total thickness of soil. Surface scanning will be conducted over 100% of the graded area.

Soil Sample Design

Scoping Data

Sample measurements obtained to determine suitability for soil transport to the designated survey area have not identified residual radioactivity above fractional concentrations of the DCGL value. Input data for survey design were conservatively estimated based on supporting surveys for transport suitability obtained in the Turbine Building demolition area.

Table 1
Input Data for Survey Design (pCi/g)

Radionuclides	Cs-137	Co-60
σ^*	0.524	0.255
DCGL	11.93	3.21

*Survey data detailed in Attachment 1

Sample Requirements

The number of sample data points for this survey is based on the requirements of the Sign Test. The Unity Rule is used for the presence of multiple radionuclides. The Standard Deviation of the weighted sum is described by the following:

$$\sigma = \sqrt{\left(\frac{\sigma_{\text{CS137}}}{\text{DCGL}_{\text{CS137}}}\right)^2 + \left(\frac{\sigma_{\text{CO60}}}{\text{DCGL}_{\text{CO60}}}\right)^2}$$

$$\sigma = \sqrt{\left(\frac{0.524}{11.93}\right)^2 + \left(\frac{0.255}{3.21}\right)^2}$$

$$\sigma = 0.091$$

Relative Shift

$$\text{Relative Shift} = \frac{\text{DCGLw} - \text{LBGR}}{\sigma}$$

$$\text{Relative Shift} = \frac{1 - 0.818}{0.091}$$

$$\text{Relative Shift} = 2.0$$

With α and β error levels set at 0.05 and the relative shift of 2.0, the Sign Test requires 15 sample data points (Table 5.5 NUREG 1575).

Sample Locations

Sample locations are selected in a random start, systematic square grid pattern with the southwest corner of the survey unit as origin (X=0, Y=0). Two numbers between 0 and 1 have been randomly selected and then applied to the survey unit maximum X and Y dimensions to determine the random start location as shown below:

Table 2
Random Numbers

Random #, X Axis	Random #, Y Axis
0.675914	0.576298

Survey Unit Dimensions: X = 199 meters
Y = 10 meters

Random Start Location With SW Corner Origin: X = (0.675914)(199) = 134.5 meters
Y = (0.576298)(10) = 5.7 meters

Sample Spacing

As a conservative measure sample spacing will be calculated based on 18 samples for this survey. Samples are located in a systematic square grid pattern with sample spacing determined by the following:

$$L = \sqrt{\frac{A}{n}}$$

where A = area of survey unit, and
n = number of samples.

$$L = \sqrt{\frac{1990}{18}} = 10.5 \text{ meters}$$

With sample spacing established at 10.5 meters, 19 data points are available for this survey. Data point locations are identified in Attachment 2.

QA/QC Sampling

A minimum of 5% of the sample population and 5% of the scan survey area are required to be selected for QA/QC verification in accordance with BRP Procedure RM-79, *Final Status Survey Quality Control*. As a conservative measure, three (3) soil samples and 10% of the scan survey area will be selected for QA/QC evaluation. Data point locations for soil samples will be determined by random number selection.

The QA/QC scan starting point and track direction are also determined by random number selection. The first random data point selected will identify the scanning start point and the second random data point will determine the direction in which the scan will track. QA/QC location results are provided in Table 3 below:

Table 3
Random Numbers Generated for QA/QC

QA/QC Soil Samples	Random Sample Number	Verification Scan	Random Sample Number
Split Sample:	5	Start Point:	3
Sample Recount:	7	Scan Toward:	9
Sample Recount:	16	Minimum Scan Area Requirement:	199 m ²

Surface Scanning

The coverage requirement for surface scanning in this Class 1 area is 100%. The Scan_{MDC} has been established at fractional values of the DCGL_w for typical background activity levels at Big Rock Point. Scan_{MDC} values for varying backgrounds are provided in Attachment 3. The investigation level for identification of potential areas of elevated activity in this survey area will be the Scan_{DCGL} as defined by the following:

$$\text{Scan}_{\text{DCGL}} = \text{Detector Rating} \frac{\text{CPM}}{\text{uR/hr}} * \text{Exposure Model} \frac{\text{uR/hr}}{\text{pCi/g}} * \text{DCGL}_w$$

$$\text{Scan}_{\text{DCGL}} \text{ for Co-60} = 1818 \text{ CPM}$$

$$\text{Scan}_{\text{DCGL}} \text{ for Cs-137} = 3518 \text{ CPM}$$

Where:¹

$$\text{Detector Rating} = \frac{1200 \text{ CPM}}{\text{uR/hr}} \text{Cs-137} \text{ and } \frac{565 \text{ CPM}}{\text{uR/hr}} \text{Co-60}$$

$$\text{Exposure Model} = \frac{1.229 \text{ uR/hr}}{5 \text{ pCi/g}} \text{Cs-137} \text{ and } \frac{5.029 \text{ uR/hr}}{5 \text{ pCi/g}} \text{Co-60}$$

$$\text{DCGL}_w = 11.93 \text{ pCi/g Cs-137 and } 3.21 \text{ pCi/g Co-60}$$

¹ These values established in EA-BRP-SC-0201, *NaI Scanning Sensitivity for Open Land Survey*.

The DCGL_w for Co-60 is the most limiting value for scanning measurements performed to identify areas of potentially elevated activity. Scanning conducted for this survey will assume all residual radioactivity to originate from Co-60 and the instrument response at the Co-60 DCGL_w (1818 cpm) will be used as the scanning investigation level for Survey TBC_{x8}1.

Attachment 1

Design Data - Survey TBC_{x8}1 Relocated Soils From Turbine Building Demolition Area

Survey No.	Sequence No.	Cs-137 Activity (pCi/g)	Co-60 Activity (pCi/g)
HH060705	16538	1.26	0.66
HH060705	16539	0.06	0.06*
HH060705	16540	1.05	0.66
TB062805	16755	1.16	0.27
TB062805	16756	0.47	0.15*
TB062805	16774	0.19	0.31

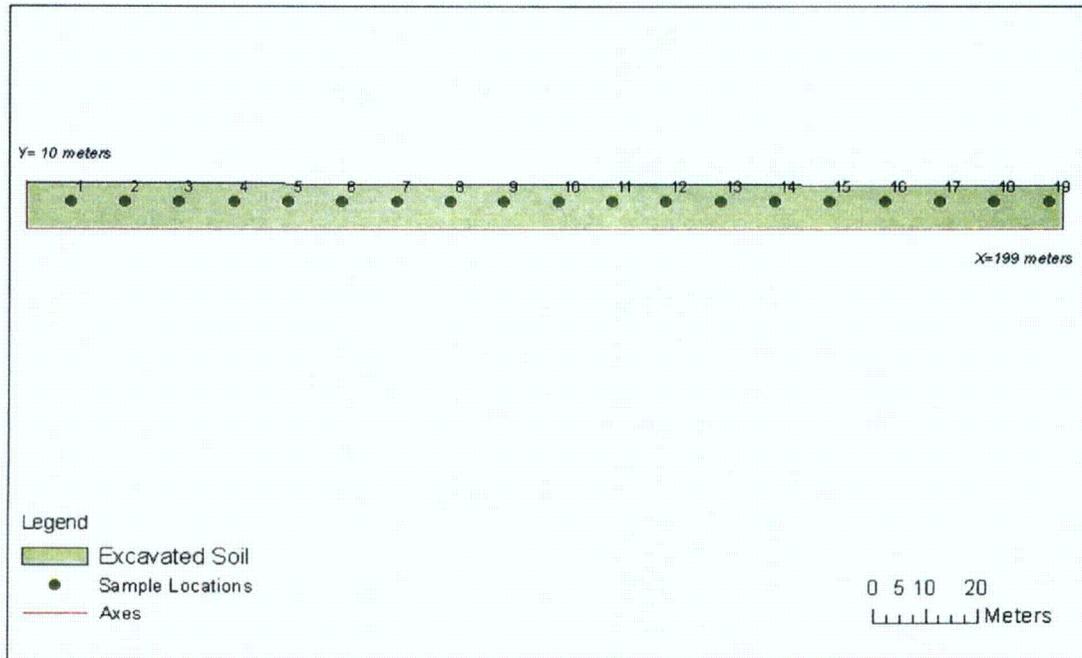
Mean: 0.698 0.352

Std Dev: 0.524 0.255

* Measurement system MDA - Co-60 not identified in this sample

Attachment 2

Soil Sample Locations - Survey TBC_{x81} Relocated Soils From Turbine Building Demolition Area



Sample No.	X Coord.	Y Coord.	Sample No.	X Coord.	Y Coord.
1	8.5	5.7	11	113.5	5.7
2	19.0	5.7	12	124.0	5.7
3	29.5	5.7	13	134.5	5.7
4	40.0	5.7	14	145.0	5.7
5	50.5	5.7	15	155.5	5.7
6	61.0	5.7	16	166.0	5.7
7	71.5	5.7	17	176.5	5.7
8	82.0	5.7	18	187.0	5.7
9	92.5	5.7	19	197.5	5.7
10	103.0	5.7			

*Sample no. 13 is the random start location
Sample spacing is 10.5 meters

Attachment 3

Scan MDC In Varying Backgrounds

Background	d'	/	s _i	CPM	MDER uR/hr		Scan MDC pCi/g	
				MDCR _{surveyor}	Cs-137	Co-60	Cs-137	Co-60
2000	2.48	4	28.64	607.47	0.51	1.08	2.06	1.07
2500	2.48	4	32.02	679.18	0.57	1.20	2.30	1.20
3000	2.48	4	35.07	744.00	0.62	1.32	2.52	1.31
3500	2.48	4	37.88	803.61	0.67	1.42	2.72	1.41
4000	2.48	4	40.50	859.10	0.72	1.52	2.91	1.51
4500	2.48	4	42.95	911.21	0.76	1.61	3.09	1.60
5000	2.48	4	45.28	960.50	0.80	1.70	3.26	1.69
5500	2.48	4	47.49	1,007.38	0.84	1.78	3.42	1.77
6000	2.48	4	49.60	1,052.17	0.88	1.86	3.57	1.85
6500	2.48	4	51.63	1,095.14	0.91	1.94	3.71	1.93
7000	2.48	4	53.57	1,136.48	0.95	2.01	3.85	2.00
7500	2.48	4	55.45	1,176.37	0.98	2.08	3.99	2.07
8000	2.48	4	57.27	1,214.95	1.01	2.15	4.12	2.14
8500	2.48	4	59.04	1,252.34	1.04	2.22	4.25	2.20
9000	2.48	4	60.75	1,288.65	1.07	2.28	4.37	2.27
9500	2.48	4	62.41	1,323.96	1.10	2.34	4.49	2.33
10000	2.48	4	64.03	1,358.35	1.13	2.40	4.61	2.39
10500	2.48	4	65.61	1,391.90	1.16	2.46	4.72	2.45
11000	2.48	4	67.16	1,424.65	1.19	2.52	4.83	2.51
11500	2.48	4	68.67	1,456.67	1.21	2.58	4.94	2.56
12000	2.48	4	70.14	1,488.00	1.24	2.63	5.04	2.62
12500	2.48	4	71.59	1,518.68	1.27	2.69	5.15	2.67
13000	2.48	4	73.01	1,548.76	1.29	2.74	5.25	2.73
13500	2.48	4	74.40	1,578.26	1.32	2.79	5.35	2.78
14000	2.48	4	75.77	1,607.22	1.34	2.84	5.45	2.83
14500	2.48	4	77.11	1,635.67	1.36	2.89	5.55	2.88
15000	2.48	4	78.42	1,663.63	1.39	2.94	5.64	2.93
Modeled Exposure (uR/hr) @ 5 pCi/g								
	Cs-137	1.23E+00						
	Co-60	5.03E+00						

Attachment 4

Area Factors for Open Land Survey Evaluation

Contaminated Area (m ²)	Calculated Area Factors at Time of Peak Dose								
	H-3	Mn-54	Fe-55	Co-60	Sr-90	Cs-137	Eu-152	Eu-154	Eu-155
8094	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4047	1.00	1.01	1.00	1.01	1.00	1.02	1.02	1.01	1.02
2024	1.00	1.03	1.00	1.03	1.00	1.03	1.03	1.03	1.03
1012	1.35	1.04	1.00	1.04	1.00	1.04	1.05	1.04	1.04
506	2.91	1.09	1.98	1.08	1.98	1.13	1.07	1.07	1.06
253	6.05	1.14	3.95	1.13	3.94	1.20	1.11	1.11	1.09
126	12.4	1.20	7.93	1.20	7.87	1.29	1.17	1.16	1.14
63	24.9	1.30	15.8	1.30	15.6	1.41	1.27	1.26	1.23
32	49.2	1.49	31.2	1.49	30.5	1.62	1.44	1.45	1.39
16	98.9	1.78	62.0	1.78	59.9	1.93	1.72	1.73	1.63
8	198	2.38	123	2.38	117	2.58	2.30	2.31	2.14
4	397	3.61	243	3.62	230	3.91	3.49	3.52	3.19
2	794	5.68	473	5.75	452	6.14	5.48	5.55	4.90
1	1590	9.57	905	9.73	887	10.3	9.24	9.39	7.88

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<u>Step</u>		<u>Initial</u>	<u>Date</u>
(+) 1.0	PREPARATION FOR SURVEY <u>TBC 8/1</u> Survey #		
1.1	Survey Area Status:		
<input checked="" type="checkbox"/>	a. Final Status Survey Design has been approved for implementation (see RM-76-5, Final Status Survey Approval and Authorization for Supplementation).		
	1. Survey area walkdown complete		
	2. Survey area determined ready for FSS		
	3. Decommissioning activities that may impact the environmental status of the survey area have been completed.		
	4. Survey area environment is controlled by barriers and postings or other approved method to restrict access.	<u>JAR</u> ESSG	<u>5-17-06</u>
<input checked="" type="checkbox"/>	b. Survey area has been turned over to the Environmental Services Survey Group (ESSG) in acceptable condition for FSS.	<u>JAR</u> ESSG	<u>5-17-06</u>
1.2	Field Preparation:		
<input checked="" type="checkbox"/>	a. Survey unit boundaries delineated (Step 6.1.1)		
<input checked="" type="checkbox"/>	b. Statistical soil samples predetermined in the survey design are located and marked within the survey unit. (Step 6.1.2)		
<input checked="" type="checkbox"/>	c. Soil sample locations verified (Step 6.1.2.c)		
<input checked="" type="checkbox"/>	d. Instruments and equipment have been collected and calibrated for data measurement and collection (Step 6.1.3)		
<input checked="" type="checkbox"/>	e. Field documentation is prepared (Step 6.1.4)	<u>JAR</u> ESSG	<u>5-17-06</u>

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		<u>Initial</u>	<u>Date</u>
2.0	DATA COLLECTION		
2.1	Soil Survey:		
<input checked="" type="checkbox"/>	All soil samples collected and controlled (Step 6.2.1).	<u>JAL</u> ESSG	<u>5-22-06</u>
2.2	Surface Scan:		
<input checked="" type="checkbox"/>	Surface Scan complete. Action response requirements have been conducted on any identified areas exceeding the investigation level (Step 6.3).	<u>JAL</u> ESSG	<u>5-22-06</u>
2.3	Judgmental Soil Samples:		
<u>N/A</u>	a. Judgmental soil samples have been collected and controlled (Step 6.2.3).		
<u>N/A</u>	b. Deep core profiles performed in areas identified to contain elevated residual activity (Step 6.2.3).	<u>JAL</u> ESSG	<u>5-22-06</u>
3.0	SAMPLE PREPARATION AND LABORATORY ANALYSIS		
3.1	Sample Preparation (Step 6.4.1):		
<input checked="" type="checkbox"/>	a. Soil samples are homogenous		
<input checked="" type="checkbox"/>	b. Soil samples are visibly dry prior to packing		
<input checked="" type="checkbox"/>	c. Non-soil materials have been removed from sample		
<input checked="" type="checkbox"/>	d. Soil samples have been transferred to one-liter Marinelli containers and are labeled and sealed.	<u>JAL</u> ESSG	<u>5-23-06</u>

RM-77-1
SURVEY IMPLEMENTATION CHECKLIST
Page 3 of 3

3.2 Laboratory Analysis:

Isotopic analyses are complete. The spectroscopy report requires a signature of completion by the laboratory analyst and a signature of evaluation documenting that a second level review has been performed (Step 6.4.2).

<u>Initial</u>	<u>Date</u>
JAL ESSG	5-23-06

3.3 Sample Control and Documentation:

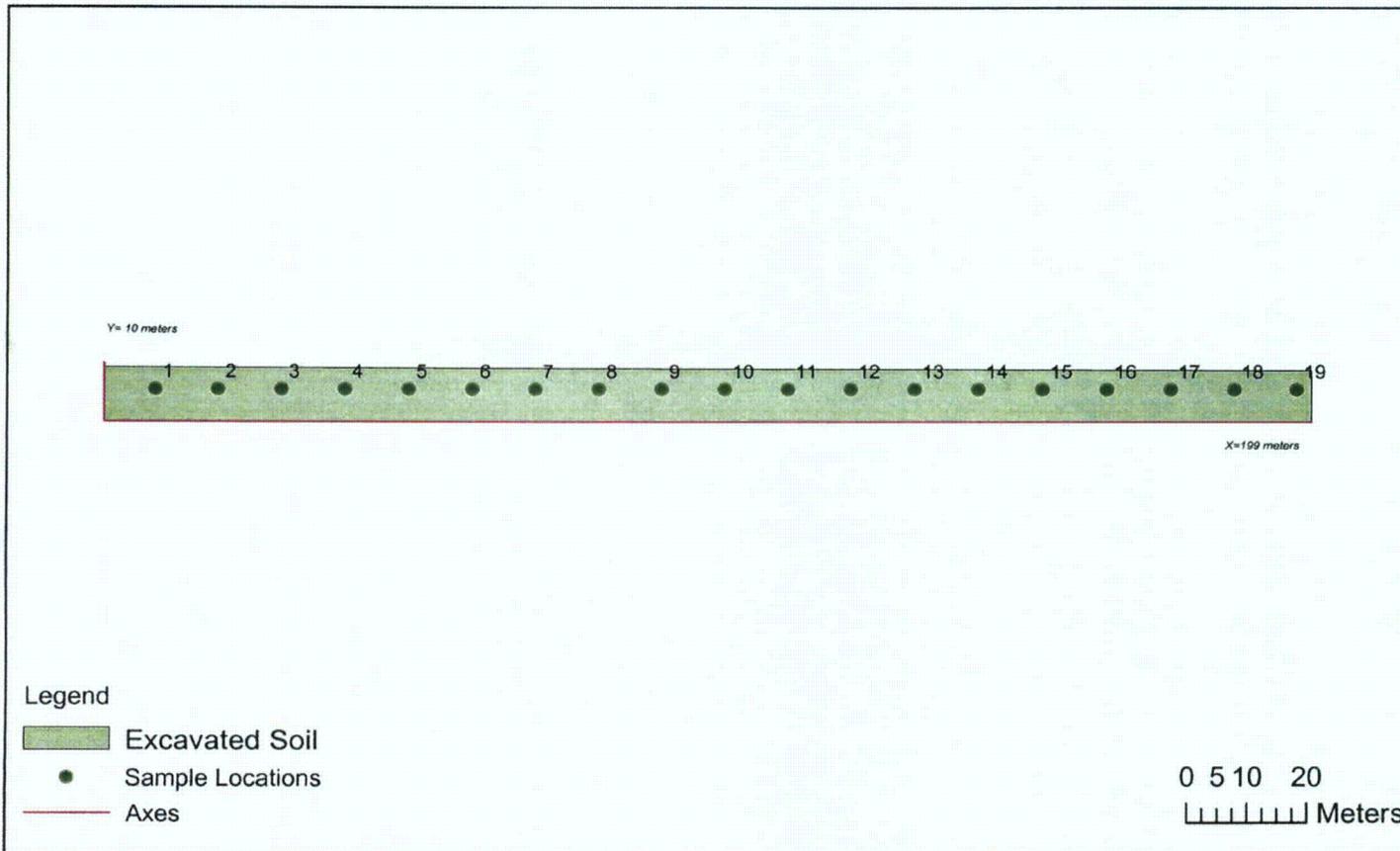
Chain of custody documentation exhibits control of soil samples (Step 6.4.3).

JAL ESSG	5-23-06
-------------	---------

J. E. Essam 6-8-06
Reviewed by Date

Activity Summary

Release Record TBCxg1 Excavated Soil from Containment Building Demolition Area



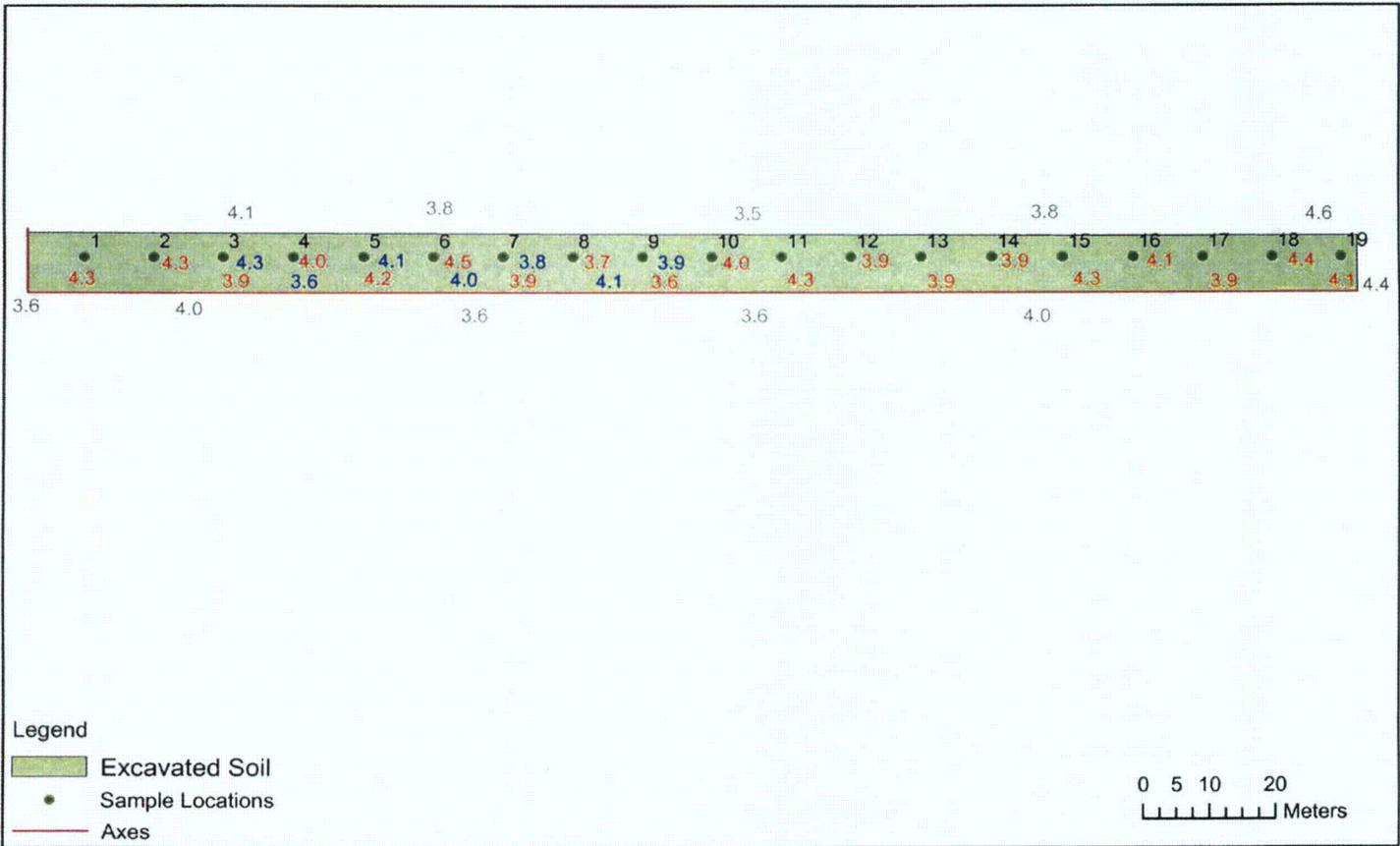
Sample No.	X Coord.	Y Coord.	Cs-137 (pCi/g)		Co-60 (pCi/g)	
			Activity	MDA	Activity	MDA
1	8.5	5.7	0.0188		*0.0138	0.0523
2	19.0	5.7	*0.0138	0.0499	*0.0105	0.0564
3	29.5	5.7	0.0643		*0.0006	0.0536
4	40.0	5.7	*-0.0091	0.0403	*0.0056	0.0602
5	50.5	5.7	*0.0197	0.0502	*0.0077	0.0579
6	61.0	5.7	*0.0052	0.0463	*-0.0055	0.0625
7	71.5	5.7	*-0.0098	0.0423	*0.0135	0.0583
8	82.0	5.7	*0.0336	0.0578	*-0.0195	0.0432
9	92.5	5.7	*0.0239	0.0595	*-0.0223	0.0449
10	103.0	5.7	0.0218		*-0.0103	0.0531
11	113.5	5.7	*0.0267	0.0574	*0.0135	0.0625
12	124.0	5.7	*0.0091	0.0483	*0.0159	0.0582
13	134.5	5.7	0.0505		*-0.0317	0.0557
14	145.0	5.7	*0.0189	0.0539	*0.0047	0.0536
15	155.5	5.7	0.0459		*0.0376	0.0638
16	166.0	5.7	*0.0144	0.0608	*0.0096	0.0626
17	176.5	5.7	0.0600		*0.0243	0.0615
18	187.0	5.7	*0.0241	0.0548	*0.0039	0.0538
19	197.5	5.7	*0.0252	0.0521	*0.0069	0.0465

*Forced-count values

**Coordinate location relative to SW corner of survey unit where X=0 m. and Y=0 m.

Surface Scan Summary

Release Record TBC_{x81} Excavated Soil from Containment Building Demolition Area



RED Values are Average Mobile Scan General Area Activity (kcpm)
BLUE Values are Average Verification Scan General Area Activity (kcpm)
GREY Values are Average General Background Area Activity (kcpm)

Primary Scan : 100 %

Technician Signature: B. [Signature] Date: 5-22-06
 Time: 1100

QC Verification Scan: 10 %

Technician Signature: T. [Signature] Date: 5-22-06
 Time: 1400

TBC_{x81}
RM-72-1
CHAIN-OF-CUSTODY RECORD

Sample Number	Sampling Location	Date	Time	Final Disposition of Sample
1	(8.5)(5.7)	05-22-06	0950	Permanent Storage ↓
2	(19.0)(5.7)	05-22-06	0954	
3	(29.5)(5.7)	05-22-06	0957	
4	(40.0)(5.7)	05-22-06	1000	
5	(50.5)(5.7)	05-22-06	1005	
5 QA Split	(50.5)(5.7)	05-22-06	1005	
6	(61.0)(5.7)	05-22-06	1008	
7	(71.5)(5.7)	05-22-06	1010	
8	(82.0)(5.7)	05-22-06	1013	
9	(92.5)(5.7)	05-22-06	1015	
10	(103.0)(5.7)	05-22-06	1023	
11	(113.5)(5.7)	05-22-06	1026	
12	(124.0)(5.7)	05-22-06	1029	
13	(134.5)(5.7)	05-22-06	1034	
14	(145.0)(5.7)	05-22-06	1039	
15	(155.5)(5.7)	05-22-06	1042	
16	(166.0)(5.7)	05-22-06	1047	
17	(176.5)(5.7)	05-22-06	1050	
18	(187.0)(5.7)	05-22-06	1054	
19	(197.5)(5.7)	05-22-06	1059	Permanent Storage

(Samples may be analyzed and stored, shipped for offsite evaluation or analyzed and disposed of.)

1. Relinquished by: <i>J. Schuster</i>	To Chem Lab Locked Storage	Date 5-22-06	Time 1125	Received in good condition by: <i>J. Schuster</i>
2. Relinquished by: <i>J. Schuster</i>	To Soil Storage Scalant (Shelf 09)	To Soil Storage Scalant Date 5-31-06	Time 1325	Received in good condition by: TO PERMANENT STORAGE
3. Relinquished by:		Date	Time	Received in good condition by:
4. Relinquished by:		Date	Time	Received in good condition by:

RM-78-3
DATA ASSESSMENT REPORT
Page 1 of 8

FINAL STATUS SURVEY: TBC x81

1.0 DATA VERIFICATION

1.1 Data Acceptance



Review the Implementation Checklist (RM-77-1) to verify that survey isolation and control measures were executed prior to FSS and are being maintained.



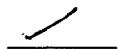
Review RM-77, Final Status Survey Implementation, to verify that methods, techniques, and survey activities required for FSS have been applied in accordance with the appropriate procedures.

1.2 Field QC Records:



Review all assessments, Condition Reports and audits to ensure that identified issues have been resolved.

Comments: _____

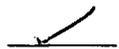


Verify scan instrumentation was in calibration and the QC source checks were performed prior to and after surveys.



Verify daily QC source checks for Canberra gamma spectroscopy detector properly logged prior to soil sample analysis.

1.3 Review Verification:



Verify that the Data Quality Objectives are complete.



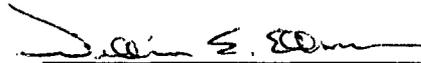
Verify that the survey design has been technically reviewed.

RM-78-3
DATA ASSESSMENT REPORT
Page 2 of 8

- Verify that gamma spectroscopy results have received a technical review.
- Verify the Sample and Analysis Report (RM-59-1) is completed and reviewed.

Data Verification Completed: Yes No

Comments _____

 06-03-06
Assessor Date

RM-78-3
DATA ASSESSMENT REPORT
Page 3 of 8

2.0 DATA VALIDATION

2.1 Documentation Review:

Perform documentation review for quality control purposes and validate the data collected is complete and appropriate for use as defined by the survey design. Documentation includes:

- Field measurement records
- Chain-of-custody
- Quality Control (QC) measurement records
- Current qualification of survey personnel
- Corrective Action Reports
- Data inputs (laboratory spectroscopy)
- Sample preparation techniques

2.2 Detection Limit Review:

- Scan MDCs are below established site DCGLs.
- Forced-count values are assigned as necessary when activity is not detected in a sample.
- Minimum Detectable Concentration (MDC) values of gamma spectroscopy are below established DCGLs.

2.3 Quality Control (QC) Data Review:

- Quality Control (QC) data results have received required reviews and are complete and consistent.
- N/A Results of judgmental samples have been reviewed and evaluated.
- N/A Review to ensure that the analytical results of judgmental samples do not impact the evaluation for unrestricted release of the survey area.

RM-78-3
DATA ASSESSMENT REPORT
Page 4 of 8

2.4 Qualification of Data:

Statistical radionuclide-specific measurements for completeness. Evaluate the survey for determination of data usability and confirm that sufficient qualified data are present for the decision process.

- a. Total number of statistical samples planned for the survey: 18
- b. Total number of statistical samples determined as valid: 19
- c. Calculate % Completeness: $\frac{b}{a} \times 120 = \underline{126.7\%}$

Qualified data are $\geq 100\%$ completeness and are sufficient to support the Sign Test requirement for determination of unrestricted release.

Data Validation Completed: Yes No

Comments: _____

Jodie L. Red 5-31-06
Assessor Date

RM-78-3
DATA ASSESSMENT REPORT
Page 5 of 8

3.0 DATA QUALITY ASSESSMENT

3.1 Review the DQOs and Survey Design:

- Confirm that all inputs to the decision have been reviewed and are complete.
- Verify that boundaries or constraints identified in the survey area have not affected the quality of the data.
- Review the Statement of Hypothesis and confirm that it remains relevant.
- Confirm that Type I and Type II error limits are consistent with DQOs.
- Confirm that the survey design is consistent with DQOs and that the appropriate number of data points were obtained.

3.2 Preliminary Review:

3.2.1 Preliminary Evaluation:

- N/A Quality Assessment (QA) reports consistent with procedure RM-79, Final Status Survey Quality Control.
- Survey is of sufficient intensity to satisfy classification requirement.
- Potential trends of radioactivity levels in the survey area do not impact a decision for unrestricted release.

Comments: _____

RM-78-3
DATA ASSESSMENT REPORT
Page 6 of 8

3.2.2 Calculate Basic Statistical Quantities:

- a. Number of qualified data points 19
- b. Calculation of the Mean 0.0033
- c. Calculation of the Median 0.0041
- d. Calculation Standard Deviation 0.0053

n/a Attach graphic representation of the data if any radionuclide-specific measurements exceed 50% of the DCGL.

Sample QA/QC measurements consistent with FSS data

3.3 Statistical Evaluation:

NOTE: If all measurement data are less than the $DCGL_w$, statistical testing is not required and the survey unit meets the regulatory requirement for unrestricted release.

All survey measurements are below the $DCGL_w$.

3.3.1 Verify Assumptions of the Survey Design

Review the posting plot to verify that the data exhibits spatial independence. Spatial trends must be investigated and resolved prior to further assessment.

Review to verify dispersion symmetry. The appearance of skewed data must be investigated for cause and documented prior to further assessment.

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DATA ASSESSMENT REPORT
Page 7 of 8

Review the dataset standard deviation and range for data variance. Questionable data must be investigated for cause and documented prior to further assessment.

Verify that the data exhibits adequate power and confirm that the sample size is sufficient to satisfy the DQOs.

3.4 Draw Conclusions from the Data:

3.4.1 Investigation Levels and Response Actions

Determine if data results have exceeded any investigation level. Document findings. *No investigation levels exceeded.*

3.4.2 Evaluation for Unrestricted Release

Select applicable conclusion:

Survey area acceptance criteria met and survey area satisfies the requirements for unrestricted release:

All concentrations are less than the $DCGL_w$. The Null Hypothesis is rejected.

N/A The mean concentration of the survey area is below the $DCGL_w$ but individual measurements in the survey unit exceed the $DCGL_w$. The Sign Test and EMC evaluation are successful and the Null Hypothesis is rejected.

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DATA ASSESSMENT REPORT
Page 8 of 8

N/A Survey area acceptance criteria not met and survey area fails to satisfy the requirements for unrestricted release:

N/A The mean concentration in the survey area exceeds the DCGL_w and the null hypothesis is confirmed.

N/A The mean concentration of the survey area is below the DCGL_w but individual measurements in the Unit exceed the DCGL_w. The Sign Test and EMC evaluation are unsuccessful and the null hypothesis is confirmed.

Data Quality Assessment Completed: Yes No

Comments Statistical Quantities provided in Attachment 1.

Joshie Lead
Assessor

5-31-06
Date

Reviews:

William E. Egan
Technical Review

06-03-06
Date

[Signature]
ES Superintendent

06-12-06
Date

[Signature]
RP&ES Manager

7-3-06
Date

**RM-78-3, Attachment 1
Statistical Quantities**

**Release Record TBC_{x8}1
Excavated Soil from Containment Building Demolition Area**

Sample Number	Cs-137 (pCi/gm)	Co-60 (pCi/gm)	Weighted Sum (SOR)	**Weighted Sum <DCGLw?	DCGL-W. Sum	Sign
1	0.0188	0.0138	0.0059	yes	0.9941	+1
2	0.0138	0.0105	0.0044	yes	0.9956	+1
3	0.0643	0.0006	0.0056	yes	0.9944	+1
4	-0.0091	0.0056	0.0010	yes	0.9990	+1
5	0.0197	0.0077	0.0041	yes	0.9959	+1
6	0.0052	-0.0055	-0.0013	yes	0.9987	+1
7	-0.0098	0.0135	0.0034	yes	0.9966	+1
8	0.0336	-0.0195	-0.0033	yes	0.9967	+1
9	0.0239	-0.0223	-0.0049	yes	0.9951	+1
10	0.0218	-0.0103	-0.0014	yes	0.9986	+1
11	0.0267	0.0135	0.0064	yes	0.9936	+1
12	0.0091	0.0159	0.0057	yes	0.9943	+1
13	0.0505	-0.0317	-0.0056	yes	0.9944	+1
14	0.0189	0.0047	0.0030	yes	0.9970	+1
15	0.0459	0.0376	0.0156	yes	0.9844	+1
16	0.0144	0.0096	0.0042	yes	0.9958	+1
17	0.0600	0.0243	0.0126	yes	0.9874	+1
18	0.0241	0.0039	0.0032	yes	0.9968	+1
19	0.0252	0.0069	0.0043	yes	0.9957	+1

Std. Dev	0.0201	0.0165	0.0053
Mean	0.0241	0.0041	0.0033
Median	0.0218	0.0069	0.0041

Number of Positive Differences (S+): n/a

Critical Value, *k*, Table I.3 of *Marssim*: n/a

S+ > than *k*?: n/a

Survey Unit Pass or Fail: ****Pass**

**Note: Forced-Count values are used for samples with activity levels below the MDA.*

***Note: If all measurement data are less than the DCGL_w, then the Sign Test is not required.*

RM-79-1
FSS QUALITY CONTROL EVALUATION RESULTS

FSS Package # TBC x81

QC Package # TBC x81

QC Measurement Type	Acceptance Criteria Met*?	Reference
<input checked="" type="checkbox"/> 1. Replicate Scan	<input checked="" type="radio"/> No	Step 5.1.3
<input checked="" type="checkbox"/> 2. Sample Recounts		Step 5.1.4.1
<input checked="" type="checkbox"/> a. In-house	<input checked="" type="radio"/> Yes / No	
<u>N/A</u> b. Third party	Yes / No	
<input checked="" type="checkbox"/> 3. Split Samples		Step 5.1.4.2
<input checked="" type="checkbox"/> c. In-house	<input checked="" type="radio"/> Yes / No	
<u>N/A</u> d. Third party	Yes / No	

*NOTE: If Acceptance Criteria is not met, completion of Attachment RM-79-2, FSS Quality Control Investigation Results, is required.

Comments:

Sample # 5 = QA split; Sample # 7 + #16 = Recounts.

Reviews:

Jodie L. Lead
Evaluator

5-31-06
Date

[Signature]
Technical Review

6-3-06
Date

QA Verification Split Sample Analysis

Date: 5/22/2006

QA: TBC_{v,a}1 Excavated Soil From Contain. Bldg Area

Type: Split Sample

Lab: In-House

Table 1

Acceptance Criteria	
Resolution	Ratio
<4	N/A
4-7	0.5-2.0
8-15	0.6-1.66
16-50	0.75-1.33
51-200	0.8-1.25
>200	0.85-1.18

			A	B	C	D	E	F	G	
Sample	Radionuclide	BRP Result Below MDA	BRP Results (pCi/g)	BRP % Error (Sigma)	BRP Resolution	Acceptance Ratio (Table 1)	Split Results Below MDA	Split Results (pCi/g)	Comparison Ratio F/A	Results in Agreement Compare G with D)
5	Co-60	<	0.0579	n/a	n/a	n/a	<	0.0571	0.99	YES
5	Cs-137	<	0.0502	n/a	n/a	n/a	<	0.0470	0.94	YES

$$\text{Resolution C} = \frac{A}{(A)(B/100)}$$

< Indicates results less than the MDA.

*Note Results are considered in agreement for MDA and near-MDA measurement comparisons
Results that fail agreement must be investigated per RM-79.

QA Verification Sample Recount Analysis

Date: 5/22/2006

QA: TBC_{va}1 Excavated Soil from Contain. Bldg. Area

Type: Sample Recounts

Lab: In- House

Table 1

Acceptance Criteria	
Resolution	Ratio
<4	N/A
4-7	0.5-2.0
8-15	0.6-1.66
16-50	0.75-1.33
51-200	0.8-1.25
>200	0.85-1.18

		A	B	C	D	E	F	G		
Sample	Radionuclide	BRP Result Below MDA	BRP Results (pCi/g)	BRP % Error (Sigma)	BRP Resolution	Acceptance Ratio (Table 1)	Recount Result Below MDA	Recount Results (pCi/g)	Comparison Ratio F/A	Results in Agreement Compare G with D)
7	Co-60	<	0.0583	n/a	n/a	n/a	<	0.0586	1.01	YES
7	Cs-137	<	0.0423	n/a	n/a	n/a	<	0.0454	1.07	YES
16	Co-60	<	0.0626	n/a	n/a	n/a	<	0.0645	1.03	YES
16	Cs-137	<	0.0608	n/a	n/a	n/a	<	0.0521	0.86	YES

$$\text{Resolution C} = \frac{A}{(A)(B/100)}$$

< Indicates results less than the MDA.

*Note Results are considered in agreement for MDA and near-MDA measurement comparisons
Results that fail agreement must be investigated per RM-79.

**Tritium in Soil
Data Results
Final Status SurveyTBC_{x8}1**

Sample Number	Tritium in Soil pCi/g
5	0.013
7	0.028
16	0.027

Mean: 0.023
Median: 0.027
St. Dev: 0.008

Note: The DCGL for Tritium is 327 pCi/g.
Sample results are less than 0.2% of the DCGL



700 Landwehr Road • Northbrook, IL 60062-2310
 ph. (847) 564-3700 • fax (847) 564-4517

Mr. David W. Parish
 Big Rock Point
 10269 US-31 North
 Charlevoix, MI 49720

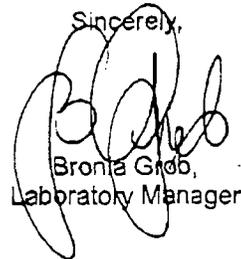
LABORATORY REPORT NO. 8022-100-218-2
 DATE: 06-06-2006
 SAMPLES RECEIVED: 06-01-2006
 PURCHASE ORDER NO: _____

Below are the results of the analyses for tritium on three soil samples.

Sample Description	Collection Date	Lab Code	Concentration (pCi/g of soil) H-3	MDA (pCi/g of soil)
#5	05-22-06	BRSO-3558	0.013 ± 0.004	< 0.007
#7	05-22-06	BRSO-3559	0.028 ± 0.005	< 0.007
#16	05-22-06	BRSO-3560	0.027 ± 0.005	< 0.007
#16	05-22-06	BRSO-3561*	0.022 ± 0.004	< 0.007

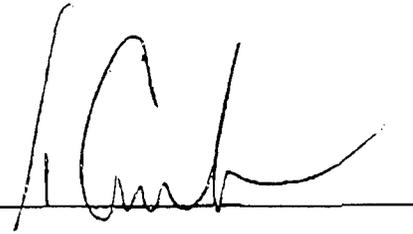
* Denotes a duplicate.
 The error given is the probable counting error at 95 % confidence level.

Sincerely,



Bronia Grob,
 Laboratory Manager

APPROVED BY _____



Tony Coorlim,
 Quality Assurance