ATTACHMENT 12

CONSUMERS ENERGY
BIG ROCKPOINT

DOCKET NUMBERS 50-155 AND 72-043

TRANSMITTAL OF EXCAVATED SURFACE SURVEYS, RELOCATED SOIL SURVEYS AND FINAL STATUS SURVEY PACKAGES IN SUPPORT OF BIG ROCK POINT PHASED LICENSE TERMINATION

CLASS 3 FINAL STATUS SURVEY
RELEASE RECORD $14C_13$
SHORELINE WEST OF THE INDUSTRIAL SITE

August 24, 2006

33 Pages

Class 3 Final Status Survey
Release Record $14C_1 3$

Shoreline West Of The Industrial Site

SURVEY PACKAGE CLOSURE

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

Signed: _____ Date: 8-02-06
(ESSG Supervisor)

Signed: _____ Date: 8-8-06
(ES Superintendent)

Signed: _____ Date: 8-17-06
(RP & ES Manager)

Final Status Survey Requirements

Release Record $14C_1 3$
Shoreline West Of The Industrial Site

Survey Description

Survey Unit 14 is a narrow expanse of shoreline between the waters edge and the vegetation line in the northwest section of the owner controlled property. This location is 43,334 m^2 in area and contains no surface or subsurface structures, components or equipment.

History

Survey Unit 14 is a pristine section of the Lake Michigan shoreline that has remained remote from normal plant operational activities. The HSA designates this area as unlikely to contain residual radioactivity in area soils.

Current Radiological Status

Soil radioactivity in this survey unit is consistent with levels established as standard background for soils of this type in northwestern Michigan. Characterization efforts conducted for evaluation of this survey area did not identify soil radioactivity above environmental background levels (LTP, 2.4.5.1). Based on historical information and site knowledge this location is a Class 3 survey area.

Post-Construction Expectations

Survey $14C_1 3$ will be performed in the following activity sequence:

1. Walkdown: ESSG (Environmental Services Survey Group) 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, as applicable
    - All material of plant origin has been removed from the survey area
    - The current survey area 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 Survey $14C_1 3$ in accordance with the survey requirements established in RM-76, *Final Status Survey Design,and* RM-77, *Final Status Survey Implementation.* Survey size will be based on the statistical requirements of the Sign Test for Class 3 areas with soil samples collected in random data point locations. Surface scanning will be performed in areas with greatest potential to contain residual radioactivity. Scanning locations will be judgmentally selected based on historical data and process knowledge. 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 regulatory requirements for unrestricted site release have been satisfied.

DATA QUALITY OBJECTIVES

Release Record $14C_1 3$
Shoreline West Of The Industrial Site

1. STATE THE PROBLEM

The Problem:
To demonstrate that the level of residual radioactivity in Survey Unit $14C_1 3$ does not exceed the release criteria of 25 mrem/year Total Effective Dose Equivalent (TEDE) in this Class 3 survey area as specified in the License Termination Plan (LTP).

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 (FSS) 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 for Final Status Survey implementation 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) ESSG 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 this 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 soil samples collected within the affected local coordinate grids during the characterization process. This data also include the results of surveys performed following the removal of debris. 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 Section 5, Table 5-1 and Procedure RM-76, *Final Status Survey Design.*

Survey $14C_1 3$ will be conducted in accordance with LTP Section 5 for Class 3 areas and associated BRP survey procedures. 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 upper 15 cm of soil in a defined survey area of 43,334 m^2. The physical boundary includes all exposed soils designated by the survey design as Survey Unit 14.

Temporal Boundaries:
Scanning and sampling in this survey unit will only be performed during daylight hours during acceptable weather conditions. Surface soils must be free of excessive snow cover and significant 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 June 28, 2006.

Constraints:
Cold weather or excessive rain 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 at 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 0.5 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 FSS 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 0.5 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 by random selection. For sample point locations where access is impractical or unsafe, alternate locations will be randomly selected to achieve the sample size requirement.

Judgmental Sampling:
Co-60 is the most limiting radionuclide for identification by surface scanning; biased samples will be collected in any location that exceeds the scan investigation level for this radionuclide.

Scan Coverage:
Surface scanning will be performed in areas of greatest potential to contain residual radioactivity. Scanning locations will be judgmentally selected based on historical data and process knowledge.

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:
Additional sampling for the evaluation of tritium in soil is not required in this survey area.

Investigation Levels:
Investigation levels are defined in LTP, Chapter 5 and Procedure RM-76, *Final Status Survey Design,* by individual survey area classification. A conservative approach for investigation will be established for this survey as shown below.

Investigation Levels for Survey $14C_t3$

Classification	Scan Measurement	Soil Sample Analysis
Class 3	> $DCGL_w$	> 50% $DCGL_w$

The investigation levels for soil sample measurements are meant to include any individual radionuclide result greater than 50% of the site-specific DCGL or where the combined radionuclide values exceed 50% of 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.

FINAL STATUS SURVEY DESIGN

Release Record $14C_t3$
Shoreline West Of The Industrial Site

Survey Unit Description

Survey Unit 14 is a Class 3 area that encompasses 43,334 m^2 of west of the Industrial site. The survey area is a narrow band of pristine shoreline that has remained remote from operational activities.

Soil Sample Design

Scoping Data

Sample measurements supporting development of the final status survey design resulted in the following input data:

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

Radionuclides	Cs-137	Co-60
σ	0.40*	NA**
DCGL	11.93	3.21

*Value developed from standard northwest Michigan background study (LTP, 2.3.3)
**Co-60 is not an applicable radionuclide in standard northwest Michigan background

Sample Requirements

The number of sample data points for this survey is based on the requirements of the Sign Test. The estimate of standard deviation established from the northwest Michigan background study is 0.40 pCi/g Cs-137 (LTP, Section 2.3.3)

Relative Shift

The DCGL for Cs-137 is 11.93 pCi/g. The relative shift is determined using an LBGR value set at 93% of the $DCGL_w$.

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

$$\text{Relative Shift} = \frac{11.93 - 11.09}{0.40}$$

$$\text{Relative Shift} = 2.1$$

With α and β error levels set at 0.05 and the relative shift of 2.1, the Sign Test requires 15 sample data points (Table 5.5 NUREG 1575).

FINAL STATUS SURVEY DESIGN

Release Record $14C_13$
Shoreline West Of The Industrial Site

Sample Locations

Survey Unit Dimensions:
X = 711 m Y = 500 m

Sample locations are selected in random pattern with the southwest corner of the survey unit as origin (X=0, Y=0). Two numbers between 0 and 1 are randomly selected and then applied to the survey unit maximum X and Y dimensions to determine sample point coordinates. These coordinates are then converted to longitude/latitude data points for GPS survey locations as provided in Attachment 1.

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 design surface scan area will be selected for QA/QC evaluation. Data point locations for soil sampling will be determined by random number selection; scanning locations will be judgmentally selected based on survey unit history and site knowledge. QA/QC survey locations are provided in Table 2.

Table 2
QA/QC Survey Locations

QA/QC Soil Samples	Random Sample Number	Verification Scan
Split Sample:	5	Judgmental
Sample Recount:	11	
Sample Recount:	14	

Surface Scanning

Surface scanning in this Class 3 area will be performed with coverage judgmentally selected for locations with highest potential to contain residual radioactivity. 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 2.

FINAL STATUS SURVEY DESIGN

Release Record $14C_1 3$
Shoreline West Of The Industrial Site

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:

$$SCAN_{DCGL} = \text{Detector Rating } \frac{CPM}{uR/hr} * \text{Exposure Model } \frac{uR/hr}{pCi/g} * DCGL_w$$

Scan $_{DCGL}$ for Co-60 = 1818 cpm

Scan $_{DCGL}$ for Cs-137 = 3518 cpm

Where:[1]

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

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

$DCGL_w$ = 11.93 pCi/g Cs-137 and 3.21 pCi/g Co-60

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 Final Status 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 $14C_1 3$.

[1] These values established in EA-BRP-SC-0201, *NaI Scanning Sensitivity For Open Land Survey*

FINAL STATUS SURVEY DESIGN
Release Record $14C_13$

Attachment 1
Soil Sample Locations

Sample #	RandX	RandY	X Coord.	Y Coord.	Latitude	Longitude
1	0.887588418	0.245433	572.5	56.4	45^0 21' 40.4"	-85^0 12' 16.8"
2	0.334440214	0.656488	215.7	151.0	45^0 21' 40.8"	-85^0 12' 14.9"
3	0.569899678	0.605522	367.6	139.3	45^0 21' 41.6"	-85^0 12' 14.0"
4	0.310660715	0.792063	200.4	182.2	45^0 21' 42.5"	-85^0 12' 16.2"
5	0.658883365	0.491291	425.0	113.0	45^0 21' 43.9"	-85^0 12' 9.1"
6	0.284450535	0.782715	183.5	180.0	45^0 21' 43.4"	-85^0 12' 9.3"
7	0.495777501	0.799283	319.8	183.8	45^0 21' 43.5"	-85^0 12' 8.5"
8	0.096176245	0.418844	62.0	96.3	45^0 21' 42.5"	-85^0 12' 7.9"
9	0.053273825	0.646095	34.4	148.6	45^0 21' 41.9"	-85^0 12' 8.9"
10	0.032534181	0.365239	21.0	84.0	45^0 21' 43.5"	-85^0 12' 3.1"
11	0.299793886	0.581401	193.4	133.7	45^0 21' 42.1"	-85^0 12' 0.9"
12	0.919993515	0.157902	593.4	36.3	45^0 21' 41.2"	-85^0 11' 58.3"
13	0.944498289	0.089355	609.2	20.6	45^0 21' 39.3"	-85^0 11' 51.5"
14	0.291789828	0.850499	188.2	195.6	45^0 21' 38.7"	-85^0 11' 50.5"
15	0.128660925	0.534589	83.0	123.0	45^0 21' 38.1"	-85^0 11' 49.8"

FINAL STATUS SURVEY DESIGN
Release Record $14C_1 3$

Attachment 2
Scan MDC In Varying Backgrounds

				CPM	MDER uR/hr		Scan MDC pCi/g	
Background	d'	i	s_i	$MDCR_{surveyor}$	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						

RM-76-5
FINAL STATUS SURVEY APPROVAL

AND AUTHORIZATION FOR IMPLEMENTATION

Survey Code 14C$_1$3

Survey Area Description:

Survey 14C$_1$3 is a narrow expanse of shoreline between the waters edge and the vegetation line in the northwest section of the owner controlled property. This is a Class 3 area of 43,334 m^2.

The survey area is authorized for Final Status Survey Implementation.

Designed by	6-26-06 Date
WE Ellman dwP Technical Review by	6-27-06 Date

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

Step (+)		Initial	Date
1.0	PREPARATION FOR SURVEY 14C,3 (Survey #)		
1.1	Survey Area Status:		
✓	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.	JAR (ESSG)	6-27-06
✓	b. Survey area has been turned over to the Environmental Services Survey Group (ESSG) in acceptable condition for FSS.	JAR (ESSG)	6-27-06
1.2	Field Preparation:		
✓	a. Survey unit boundaries delineated (Step 6.1.1)		
✓	b. Statistical soil samples predetermined in the survey design are located and marked within the survey unit. (Step 6.1.2)		
✓	c. Soil sample locations verified (Step 6.1.2.c)		
✓	d. Instruments and equipment have been collected and calibrated for data measurement and collection (Step 6.1.3)		
✓	e. Field documentation is prepared (Step 6.1.4)	JAR (ESSG)	6-27-06

RM-77-1
SURVEY IMPLEMENTATION CHECKLIST
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		Initial	Date
2.0	DATA COLLECTION		
2.1	Soil Survey:		
✓	All soil samples collected and controlled (Step 6.2.1).	JAR ESSG	6-27-06
2.2	Surface Scan:		
✓	Surface Scan complete. Action response requirements have been conducted on any identified areas exceeding the investigation level (Step 6.3).	JAR ESSG	6-27-06
2.3	Judgmental Soil Samples:		
N/A	a. Judgmental soil samples have been collected and controlled (Step 6.2.3).		
N/A	b. Deep core profiles performed in areas identified to contain elevated residual activity (Step 6.2.3).	JAR ESSG	6-27-06
3.0	SAMPLE PREPARATION AND LABORATORY ANALYSIS		
3.1	Sample Preparation (Step 6.4.1):		
✓	a. Soil samples are homogenous		
✓	b. Soil samples are visibly dry prior to packing		
✓	c. Non-soil materials have been removed from sample		
✓	d. Soil samples have been transferred to one-liter Marinelli containers and are labeled and sealed.	JAR ESSG	6-28-06

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

		Initial	Date
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).	ESSG	6-28-06
3.3	Sample Control and Documentation:		
✓	Chain of custody documentation exhibits control of soil samples (Step 6.4.3).	ESSG	6-28-06

Reviewed by

7-26-06
Date

ATTACHMENT RM-59-1
SAMPLING AND ANALYSIS REPORT

Date: 06-27-06	Time: 1630	Location: Survey Unit 14	Tech: T schlueter/W Ellman

SURVEY IDENTIFICATION / DESCRIPTION

Final ftatus evaluation of the shoreline west of the former Protected Area

SURVEY TYPE

Survey Type: ☐ Characterization ☒ Scan (Motive)
☐ Remediation
☒ Final ☐ Scan (Static)
☐ Trenching and Digging (use RM-59-4)

SURVEY DESIGN

Sample Collection: ☐ Judgmental ☒ Random ☐ Systematic ☐ Large Container Assay
Scan Coverage: Judgmental %

ANALYSIS

Inst.SN/Cal Due 186201/9-30-06	DAILY CHECK:	☒	SAT	☐	UNSAT	INIT: TRS
Inst.SN/Cal Due 186185/9-23-06	DAILY CHECK:	☒	SAT	☐	UNSAT	INIT: TRS
Inst.SN/Cal Due Det. 6	DAILY CHECK:	☒	SAT	☐	UNSAT	INIT: TRS
Inst.SN/Cal Due _____	DAILY CHECK:	☐	SAT	☐	UNSAT	INIT: _____
Inst.SN/Cal Due _____	DAILY CHECK:	☐	SAT	☐	UNSAT	INIT: _____
Investigation Of Unidentified Peaks:		☒	SAT	☐	UNSAT	INIT: RB
Minimum Detectable Activity (Section 5.3.2)		☒	SAT	☐	UNSAT	INIT: RB

COMMENTS

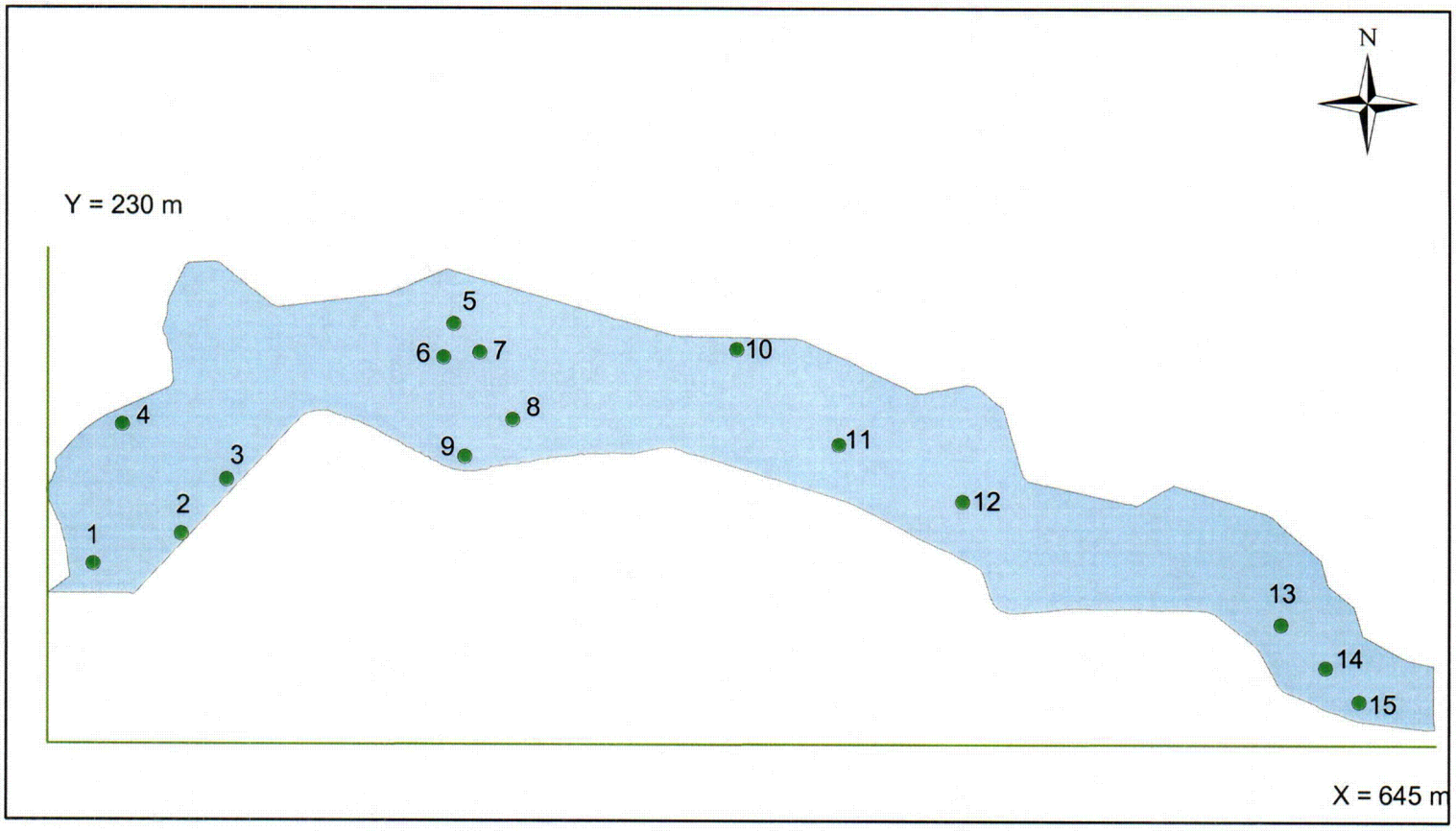
Soil samples for Survey $14C_13$ were collected at 15 random data point locations. Laboratory analyses did not identify residual radioactivity above trace levels of the DCGL value. Judgmental scanning identified no areas of elevated residual radioactivity. The results of QA/QC scanning were consistent with scan values identified in the final survey.

Technician Signature: J. T. Schlueter Date: 6-28-06

Second Level Review:
Signature: W. Harris Date: 6-28-06

Soil Sample Activity Summary

Release Record $14C_13$
Shoreline West of the Industrial Site



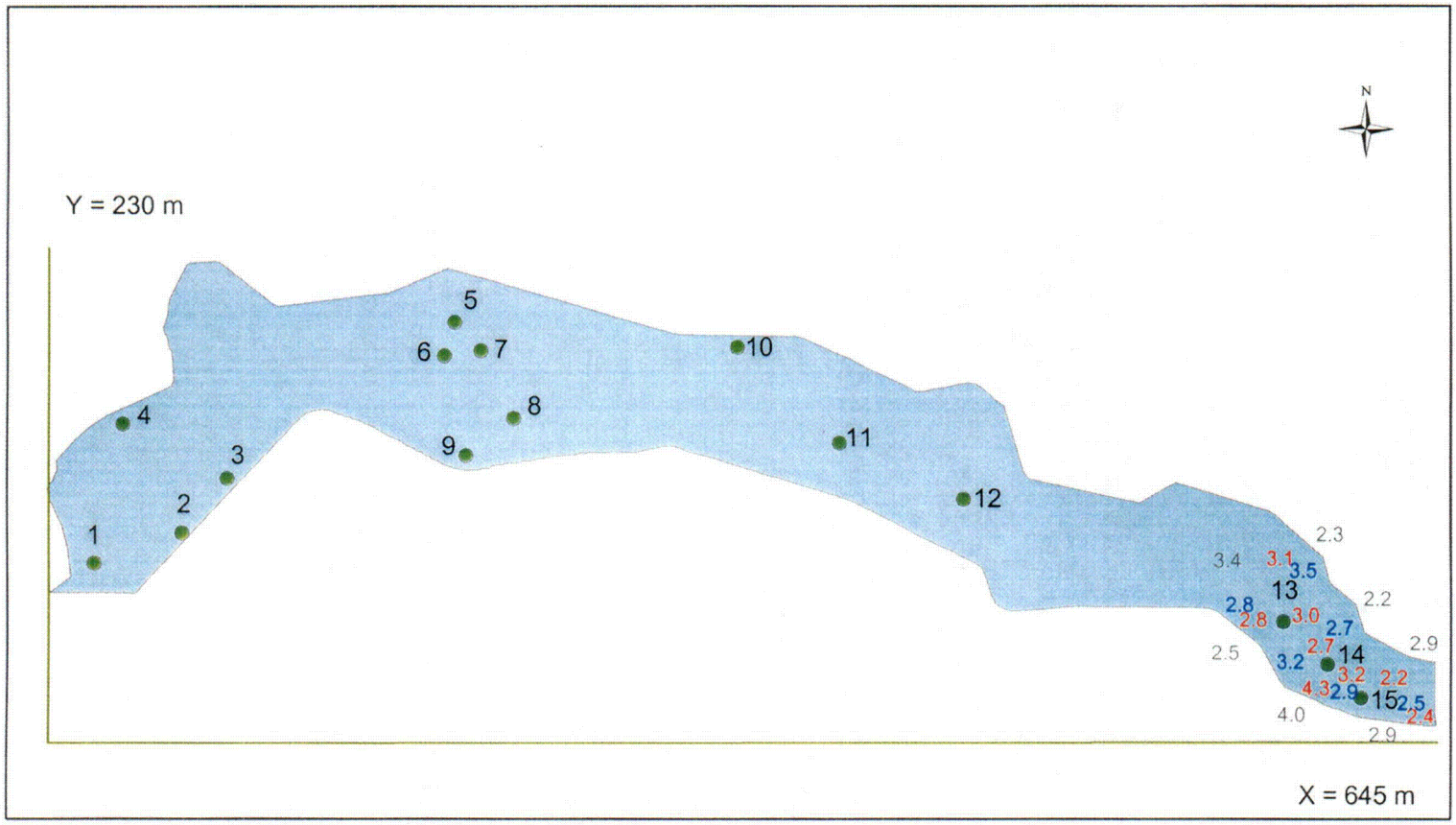
Sample No.	Latitude	Longitude	Cs-137 (pCi/g)		Co-60 (pCi/g)	
			Activity	MDA	Activity	MDA
1	45^0 21' 40.4"	-85^0 12' 16.8"	*-0.0003	0.0350	*-0.0062	0.0306
2	45^0 21' 40.8"	-85^0 12' 14.9"	0.0729		*-0.0041	0.0422
3	45^0 21' 41.6"	-85^0 12' 14.0"	0.0509		*0.0094	0.0374
4	45^0 21' 42.5"	-85^0 12' 16.2"	0.0354		*-0.0031	0.0275
5	45^0 21' 43.9"	-85^0 12' 9.1"	0.1545		*0.0102	0.0449
6	45^0 21' 43.4"	-85^0 12' 9.3"	*0.0213	0.0477	*0.0211	0.0563
7	45^0 21' 43.5"	-85^0 12' 8.5"	0.0351		*-0.0074	0.0457
8	45^0 21' 42.5"	-85^0 12' 7.9"	0.1130		*0.0279	0.0585
9	45^0 21' 41.9"	-85^0 12' 8.9"	0.0908		*0.0143	0.0517
10	45^0 21' 43.5"	-85^0 12' 3.1"	*0.0283	0.0526	*0.0222	0.0494
11	45^0 21' 42.1"	-85^0 12' 0.9"	0.4185		*0.0243	0.0611
12	45^0 21' 41.2"	-85^0 11' 58.3"	0.1299		*0.0064	0.0487
13	45^0 21' 39.3"	-85^0 11' 51.5"	0.0573		*0.0219	0.0566
14	45^0 21' 38.7"	-85^0 11' 50.5"	0.4007		*-0.0114	0.0461
15	45^0 21' 38.1"	-85^0 11' 49.8"	0.0432		*0.0046	0.0380

*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 $14C_13$
Shoreline West of the Industrial Site



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)

NO AREAS OF ELEVATED ACTIVITY WERE IDENTIFIED.

Primary Scan : 2 %

Technician Signature: T. Lehnerth **Date:** 6-27-06
Time: 1400

QC Verification Scan: 2 % (total survey area)

Technician Signature: [signature] **Date:** 6-27-06
Time: 1510

RM-72-1
CHAIN-OF-CUSTODY RECORD

FSS #14C,3

Sample Number	Sampling Location (Lat/Long)	Date	Time	Final Disposition of Sample
1	45°21'40.4" -85°12'16.8"	6-27-06	0950	In permanent Storage
2	45°21'40.8"- 85°12'14.9"	6-27-06	0955	
3	45°21'41.6"- 85°12'14.0"	6-27-06	1000	
4	45°21'42.5"- 85°12'16.2"	6-27-06	1005	
5	45°21'43.9"-85°12'9.1"	6-27-06	1015	
5 QC	45°21'43.9" -85°12'9.1"	6-27-06	1015	
6	45°21'43.4" -85°12'9.3"	6-27-06	1025	
7	45°21'43.5" -85°12'8.5"	6-27-06	1030	
8	45°21'42.5" -85°12'7.9"	6-27-06	1040	
9	45°21'41.9" -85°12'8.9"	6-27-06	1045	
10	45°21'43.5" -85°12'3.1"	6-27-06	1050	
11 R	45°21'42.1 -85°12'0.9"	6-27-06	1055	
12	45°21'41.2" -85°11'58.3"	6-27-06	1100	
13	45°21'39.3" -85°11'51.5"	6-27-06	1245	
14 R	45°21'38.7" -85°11'50.5"	6-27-06	1250	
15	45°21'38.1" -85°11'49.8"	6-27-06	1255	

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

1. Relinquished by: To chem Lab Oven for drying T. Schuster	Date 6-27-06	Time 1600	Received in good condition by:
2. Relinquished by: To closet for storage after counting	Date 6-28-06	Time 1515	Received in good condition by: TO PERMANENT STORAGE [illegible] 11000 hours
3. Relinquished by:	Date	Time	Received in good condition by:
4. Relinquished by:	Date	Time	Received in good condition by:

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DATA ASSESSMENT REPORT
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FINAL STATUS SURVEY: 14C, 3

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 _____

Joshua T. Reed — Assessor

08/04/06 — Date

RM-78-3
DATA ASSESSMENT REPORT
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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.

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DATA ASSESSMENT REPORT
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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: 15

b. Total number of statistical samples determined as valid: 15

c. Calculate % Completeness: $\frac{b \times 120}{a}$ = 120 %

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

Data Validation Completed: (Yes) No

Comments: _____

Jodie L Reed
Assessor

7-26-06
Date

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DATA ASSESSMENT REPORT
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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: _____

_____

_____

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DATA ASSESSMENT REPORT
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3.2.2 Calculate Basic Statistical Quantities:

a. Number of qualified data points 15

b. Calculation of the Mean 0.0119 (SOR)

c. Calculation of the Median 0.0093 (SOR)

d. Calculation Standard Deviation 0.0116 (SOR)

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 in 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
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✓ 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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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.

Jodie L. Lad
Assessor

7-26-06
Date

Reviews:

[signature]
Technical Review

8-2-06
Date

[signature]
ES Superintendent

8-8-06
Date

[signature]
RP&ES Manager

8-17-06
Date

RM-78-3, Attachment 1
Statistical Quantities

Release Record $14C_1 3$
Shoreline West of the Industrial Site

Sample Number	Cs-137 (pCi/gm)	Co-60 (pCi/gm)	Weighted Sum (SOR)	**Weighted Sum <DCGLw?	DCGL-W. Sum	Sign
1	-0.0003	-0.0062	-0.0020	yes	0.9980	+1
2	0.0729	-0.0041	0.0048	yes	0.9952	+1
3	0.0509	0.0094	0.0072	yes	0.9928	+1
4	0.0354	-0.0031	0.0020	yes	0.9980	+1
5	0.1545	0.0102	0.0161	yes	0.9839	+1
6	0.0213	0.0211	0.0084	yes	0.9916	+1
7	0.0351	-0.0074	0.0006	yes	0.9994	+1
8	0.1130	0.0279	0.0182	yes	0.9818	+1
9	0.0908	0.0143	0.0121	yes	0.9879	+1
10	0.0283	0.0222	0.0093	yes	0.9907	+1
11	0.4185	0.0243	0.0426	yes	0.9574	+1
12	0.1299	0.0064	0.0129	yes	0.9871	+1
13	0.0573	0.0219	0.0116	yes	0.9884	+1
14	0.4007	-0.0114	0.0300	yes	0.9700	+1
15	0.0432	0.0046	0.0051	yes	0.9949	+1
Std. Dev	0.1288	0.0130	0.0116			
Mean	0.1101	0.0087	0.0119			
Median	0.0573	0.0094	0.0093			

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 # 14C, 3 QC Package # 14C, 3

QC Measurement Type	Acceptance Criteria Met*?	Reference
✓ 1. Replicate Scan	(Yes) / No	Step 5.1.3
2. Sample Recounts		Step 5.1.4.1
✓ a. In-house	(Yes) / No	
N/A b. Third party	Yes / No	
3. Split Samples		Step 5.1.4.2
✓ c. In-house	(Yes) / No	
N/A 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 # 11 & #14 = recounts.

Reviews:

Jodie L. Reed — Evaluator — 07-26-06 — Date

[signature] — Technical Review — 8/1/06 — Date

QA Verification
Split Sample Analysis

Date: 6/27/2006

QA: 14C,3 Shoreline West of Industrial Site

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	<	0.0449	n/a	n/a	n/a	<	0.0481	1.07	YES
5	Cs-137		0.1545	13.26	7.54	0.5-2.0		0.1222	0.79	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 fthat fail agreement must be investigated per RM-79.

QA Verification
Sample Recount Analysis

Date: 6/27/2006

QA: 14C,3 Shoreline West of Industrial Site

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)
11	Co-60	<	0.0611	n/a	n/a	n/a	<	0.0510	0.83	YES
11	Cs-137		0.4185	7.12	14.04	0.6-1.66		0.4000	0.96	YES
14	Co-60	<	0.0461	n/a	n/a	n/a	<	0.0544	1.18	YES
14	Cs-137		0.4007	8.02	12.47	0.6-1.66		0.3456	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 fthat fail agreement must be investigated per RM-79.*