Consumers Energy

A CMS Energy Company

Big Rock Point Nuclear Plant
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General Manager

October 24, 2006

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

DOCKETS 50-155 AND 72-043 - LICENSE DPR-6 - BIG ROCK POINT PLANT – TRANSMITTAL OF SURVEY PACKAGES IN SUPPORT OF BIG ROCK POINT PHASED LICENSE TERMINATION

References:

1. U.S. NRC to Big Rock Point dated March 24, 2005, Big Rock Point – Issuance of Amendment 126 to Approve the License Termination Plan (TAC No. L52096)
2. Big Rock Point to U.S. NRC dated September 27, 2005, Revision 2 of the Big Rock Point License Termination Plan
3. Big Rock Point to U.S. NRC dated April 3, 2006, Letter of Intent Concerning the Release of Part of the Big Rock Point Site Property from the 10 CFR Part 50 License.
4. U.S. NRC to Big Rock Point dated April 25, 2006, Report of April 12, 2006 Meeting to Discuss Partial Site Release and Final Status Survey Report Content
5. Big Rock Point to U.S. NRC dated August 24, 2006, Transmittal of Excavated Surface Surveys, Relocated Soil Surveys and Final Status Survey Packages in Support of Big Rock Point Phased License Termination
6. Big Rock Point to U.S. NRC dated September 19, 2006, Transmittal of Relocated Soil Survey Packages in Support of Big Rock Point Phased License Termination
7. Big Rock Point to U.S. NRC dated October 9, 2006, Transmittal of Survey Packages in Support of Big Rock Point Phased License Termination
8. Big Rock Point to U.S. NRC dated October 10, 2006, Transmittal of Survey Packages in Support of Big Rock Point Phased License Termination
9. Big Rock Point to U.S. NRC dated October 13, 2006, Transmittal of Survey Packages in Support of Big Rock Point Phased License Termination

Attachment 1 contains a matrix of Final Status Survey (FSS) record numbers, survey area descriptions, and review status. This attachment is a revision to attachment of our letter dated October 13, 2006. It contains a list of the final status survey release records expected to be submitted in support of our FSS report. This FSS report is expected to be submitted on or around the fifteenth of November. Also attached, are the following survey release records:

CLASS 1 FINAL STATUS SURVEY RELEASE RECORDS

- North West Protected Area (Attachment 2)
- Central Protected Area (Attachment 3)
- South Central Protected Area (Attachment 4)

CLASS 1 RELOCATED SOIL SUPPORTING SURVEY RECORD

- Relocated Soils from Turbine Building/Containment Demolition (Attachment 5)

These records are being provided to facilitate U.S. Nuclear Regulatory Commission review, as discussed in our April 12, 2006 meeting. Attachments 2, and 3 to this letter comprise those portions of survey packages which may be of use for final review and will be summarized in our FSS report.

The phased release approach is described in Sections 1.4.2 and 5.1.2 of the BRP License Termination Plan (LTP). BRP intends to release site land from the 10 CFR Part 50 license using this phased approach. The first phase includes the majority of the site land scheduled for release after all demolition, remediation and FSS activities associated with plant operation are complete.

BRP LTP Chapter 5 commits BRP to producing FSS package(s) for each survey area and outlines the contents of each supporting survey package.

The intended partial site release supports the process of license termination by demonstrating that an additional portion of the remaining site lands can be released from the Site license. This letter, along with completed and future on-site inspections and letters, provides documentation that demolition activities have been performed in accordance with the LTP.

Your timely review of FSS information and approval of our request to release the associated land is particularly important to the project and smooth transition to an Independent Spent Fuel Storage Installation (ISFSI)-only operation.

If you have any questions or comments on these reports, please contact Ken Pallagi, Radiation Protection and Environmental Services Manager at 231-547-8416.

Kurt M. Haas
Site General Manager

ATTACHMENTS

cc: Administrator, Region III, USNRC (w/o Attachments)
NRC Decommissioning Inspector, Big Rock Point (w/o Attachments)
NRC NMSS Project Manager, James Shepherd (w/o Attachments)
NRC NMSS FSS Reviewer, Bruce Watson
Michigan Department of Environmental Quality, Thor Strong (w/o Attachments)

ATTACHMENT 1

CONSUMERS ENERGY
BIG ROCKPOINT

DOCKET NUMBERS 50-155 AND 72-043

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

MATRIX OF FSS SUPPORTING DOCUMENTATION

October 24, 2006

5 Pages

MATRIX OF BIG ROCK POINT FINAL STATUS SURVEY REPORTS

SURVEY AREA[1]	RECORD[2] NUMBER	SURVEY AREA DESCRIPTION	PACKAGE SIGNOFF DATE	U.S. NRC REVIEW METHOD	PACKAGE REVIEW DATE	LETTER DATE
CLASS 1 AREAS – FINAL STATUS SURVEY OF SURFACES						
1	$01C_11$	Class 1 Final Status Release Record, South West Protected Area	10/11/06	Letter		10/13/06
2	$02C_11$	Class 1 Final Status Release Record, West Central Protected Area	10/11/06	Letter		10/13/06
3	$03C_11$	Class 1 Final Status Release Record, North West Protected Area	10/16/06	Letter		10/24/06
4	$04C_11$	Class 1 Final Status Release Record, North Central Protected Area	10/04/06	Letter		10/10/06
5	$05C_11$	Class 1 Final Status Release Record, Central Protected Area	10/16/06	Letter		10/24/06
6	$06C_11$	Class 1 Final Status Release Record, South Central Protected Area	10/23/06	Letter		10/24/06
7	$07C_11$	Class 1 Final Status Release Record, South East Protected Area				
8	$08C_11$	Class 1 Final Status Release Record, East Central Protected Area				
9	$09C_11$	Class 1 Final Status Release Record, North East Protected Area	10/04/06	Letter		10/13/06
10	$10C_11$	Class 1 Final Status Release Record, East Protected Area				
11[3]	North$11C_11$	Class 1 Final Status Release Record, North Radwaste Staging Area				
11	South$11C_11$	Class 1 Final Status Release Record, South Radwaste Staging Area				
15	$15(2R)C_11$	Class 1 Final Status Release Record, Woods Road Storage Area	05/23/06	On-Site Inspection and Letter	06/13-14/06	10/9/06
20	$20C_11$	Class 1 Final Status Release Record, East Radwaste Staging Area				
23	$23C_11$	Class 1 Final Status Release Record, North Protected Area	10/05/06	Letter		10/10/06
24	$24C_11$	Class 1 Final Status Release Record, South Protected Area				
Discharge Canal[4]	Canal C_11	Class 1 Final Status Survey, Discharge Canal	01/27/05	On-Site Inspection and Letter	06/13-14/06	10/9/06
CLASS 1 AREAS- EXCAVATED SOIL FINAL STATUS SURVEYS[5]						
2	$02Cx_11$	Class 1 Final Status Survey, Excavated Soil from Retention Pond Construction	10/13/2004	On-Site Inspection and Letter	06/13-14/06	10/9/06
8	$08Cx_11$	Class 1 Final Status Survey, Excavated Soil from Turbine Building Subfloor	05/16/05	On-Site Inspection and Letter	06/13-14/06	10/9/06
9	$09Cx_11$	Class 1 Final Status Survey, Excavated Soil from Screenhouse Area	12/09/04	On-Site Inspection and Letter	06/13-14/06	10/9/06
9	$09Cx_21$	Class 1 Final Status Survey, Excavated Soil from Screenhouse Area	12/08/04	On-Site Inspection and letter	06/13-14/06	10/9/06

[1] Survey Area Map – Big Rock Point License Termination Plan, Chapter 5, figure 5-3, Initial Land Area Survey Units
[2] Record Number nomenclature is defined in Procedure RM-76, Final Status Survey Design, step 6.2, Survey Unit Nomenclature
[3] Surface of survey unit 11 was divided into North and South areas due to intermediate use of land between the quarry survey and the final surface survey (served as solid Radwaste storage yard in interim.)
[4] Discharge Canal is North East of the Protected Area
[5] Soils removed from Class 1 Area excavations

MATRIX OF BIG ROCK POINT FINAL STATUS SURVEY REPORTS

SURVEY AREA[1]	RECORD[2] NUMBER	SURVEY AREA DESCRIPTION	PACKAGE SIGNOFF DATE	U.S. NRC REVIEW METHOD	PACKAGE REVIEW DATE	LETTER DATE
9	$09Cx_31$	Class 1 Final Status Survey, Excavated Soil from Screenhouse Area	12/09/04	On-Site Inspection and letter	06/13-14/06	10/9/06
9	$09Cx_41$	Class 1 Final Status Survey, Excavated Soil from Screenhouse Area	12/09/04	On-Site Inspection and letter	06/13-14/06	10/9/06
9	$09Cx_51$	Class 1 Final Status Survey, Excavated Soil from Screenhouse Area	12/14/04	On-Site Inspection and letter	06/13-14/06	10/9/06
9	$09Cx_61$	Class 1 Final Status Survey, Excavated Soil from Screenhouse Area	01/19/05	On-Site Inspection and Letter	06/13-14/06	10/9/06
9	$09Cx_71$	Class 1 Final Status Survey, Excavated Soil from Screenhouse Area	05/16/05	On-Site Inspection and Letter	06/13-14/06	10/9/06
11	$11Cx_11$	Class 1 Final Status Survey, Excavated Soil from Radwaste Storage Vaults	10/13/04	On-Site Inspection and Letter	06/13-14/06	10/9/06
Slurry[6] Wall	Slurry Wall Cx_11	Class 1 Final Status Survey, Excavated Soil from Slurry Wall Construction	12/08/04	On-Site Inspection and Letter	06/13-14/06	10/9/06
Slurry Wall	Slurry Wall Cx_21	Class 1 Final Status Survey, Excavated Soil from Slurry Wall Construction	12/20/04	On-Site Inspection and Letter	06/13-14/06	10/9/06
Turbine Building[7]	$TBCx_11$	Class 1 Supporting Survey– Soil Excavated from Turbine Building Demolition Area, Supporting Subsurface Structure and Component Removal	08/24/05	On-Site Inspection and Letter	06/13-14/06	10/9/06
Turbine Building	$TBCx_21$	Class 1 Supporting Survey– Soil Excavated from Turbine Building Demolition Area, Supporting Subsurface Structure and Component Removal	10/13/05	On-Site Inspection and Letter	06/13-14/06	10/9/06
Turbine Building	$TBCx_31$	Class 1 Supporting Survey– Soil Excavated from Turbine Building Demolition Area, Supporting Subsurface Structure and Component Removal	11/23/05	On-Site Inspection and Letter	06/13-14/06	10/9/06
Turbine Building	$TBCx_41$	Class 1 Supporting Survey– Soil Excavated from Turbine Building Demolition Area, Supporting Subsurface Structure and Component Removal	11/23/05	On-Site Inspection and Letter	06/13-14/06	10/9/06
Turbine Building	$TBCx_51$	Class 1 Supporting Survey– Soil Excavated from Turbine Building Demolition Area, Supporting Subsurface Structure and Component Removal	01/06/06	On-Site Inspection and Letter	06/13-14/06	10/9/06
Turbine Building	$TBCx_61$	Class 1 Supporting Survey– Soil Excavated from Turbine Building Demolition Area, Supporting Subsurface Structure and Component Removal	07/03/06	On-Site Inspection and Letter	06/13-14/06	10/9/06
Turbine Building	$TBCx_71$	Class 1 Supporting Survey– Soil Excavated from Turbine Building Demolition Area, Supporting Subsurface Structure and Component Removal	07/05/06	On-Site Inspection and Letter	06/13-14/06	10/9/06

[6] Slurry Wall crossed several survey areas on the ease, south, and west sides of the protected area.
[7] Turbine building excavation was beneath survey areas 5, 6, and 8

MATRIX OF BIG ROCK POINT FINAL STATUS SURVEY REPORTS

SURVEY AREA[1]	RECORD[2] NUMBER	SURVEY AREA DESCRIPTION	PACKAGE SIGNOFF DATE	U.S. NRC REVIEW METHOD	PACKAGE REVIEW DATE	LETTER DATE
Turbine Building	TBCx$_{8}$1	Class 1 Supporting Survey – Relocated Soil from Turbine Building/Containment Demolition	07/03/06	On-Site Inspection and Letter	06/13-14/06	10/9/06
Turbine Building	TBCx$_{9}$1	Class 1 Supporting Survey – Relocated Soil from Turbine Building/Containment Demolition	07/03/06	On-Site Inspection and Letter	06/13-14/06	10/9/06
Turbine Building	TBCx$_{10}$1	Class 1 Relocated Soil Supporting Survey Release Record – Relocated Soils from Turbine Building/Containment Demolition	08/03/06	Letter		8/24/06
Turbine Building	TBCx$_{11}$1	Class 1 Relocated Soil Supporting Survey Release Record – Relocated Soils from Turbine Building/Containment Demolition	08/14/06	Letter		8/24/06
Turbine Building	TBCx$_{12}$1	Class 1 Relocated Soil Supporting Survey Release Record – Relocated Soils from Turbine Building/Containment Demolition	9/6/06	Letter		9/20/06
Turbine Building	TBCx$_{13}$1	Class 1 Relocated Soil Supporting Survey Release Record – Relocated Soils from Turbine Building/Containment Demolition	9/6/06	Letter		9/20/06
Turbine Building	TBCx$_{14}$1	Class 1 Relocated Soil Supporting Survey Release Record – Relocated Soils from Turbine Building/Containment Demolition	09/15/06	Letter		10/10/06
Turbine Building	TBCx$_{14}$1	Class 1 Relocated Soil Supporting Survey Release Record – Relocated Soils from Turbine Building/Containment Demolition	10/23/06	Letter		10/24/06
CLASS 1 AREAS – FINAL STATUS SURVEY – SUBSURFACE (QUARRY)						
9	09Cq$_{1}$1	Class 1 Final Status Survey, Screenhouse Area Excavation	12/20/04	On-Site Inspection and Letter	06/13-14/06	10/9/06
11	11Cq$_{1}$1	Class 1 Final Status Survey, Solid Radwaste Storage Area Excavation	10/13/04	On-Site Inspection and Letter	06/13-14/06	10/9/06
Containment[8]	CSCq$_{1}$1	Excavated Surface Supporting Survey Release Record – Base Elevation Survey of Containment Structure Excavation	08/03/06	Letter		8/24/06
Circulating Water Piping	CWCq$_{1}$1	Excavated Surface Supporting Survey Release Record – Base Elevation Survey of Circulating Water Piping Excavation	08/07/06	Letter		8/24/06
Turbine Building	East TBCq$_{1}$1	Class 1 Final Status Release Record, Turbine Building East Excavation Surface	03/30/06	Letter		4/03/06
Turbine Building	West TBCq$_{1}$1	Excavated Surface Supporting Survey Release Record – Base Elevation Survey of the Turbine Building Excavation Following Removal of West-Side Foundations and Subsurface Components	08/14/06	Letter		8/24/06

[8] Containment quarry was beneath survey areas 4, 5, 8, and 9. Circulation Water quarry was beneath survey areas 7, 8, 9, and 10. Turbine Building quarry was beneath survey areas 5, 6, and 8

MATRIX OF BIG ROCK POINT FINAL STATUS SURVEY REPORTS

SURVEY AREA[1]	RECORD[2] NUMBER	SURVEY AREA DESCRIPTION	PACKAGE SIGNOFF DATE	U.S. NRC REVIEW METHOD	PACKAGE REVIEW DATE	LETTER DATE
CLASS 2 AREAS – FINAL STATUS SURVEY OF SURFACE						
12	$12C_12$	Class 2 Final Status Survey Release Record, Shoreline North of the Protected Area	08/14/06	Letter		8/24/06
15	$15(1)C_12$	Class 2 Final Status Survey Release Record, Eastern Section Woods Road Area				
15	$15(2)C_12$	Class 2 Final Status Survey Release Record, Central Section Woods Road Area	08/09/06	Letter		8/24/06
16	$16C_12$	Class 2 Final Status Survey Release Record, Shoreline East of Breakwall	08/14/06	Letter		8/24/06
19	North$19C_12$	Class 2 Final Status Survey Release Record, North West Transport Route				
19	South$19C_12$	Class 2 Final Status Survey Release Record, South West Transport Route				
21	North$21C_12$	Class 2 Final Status Survey Release Record, North East Transport Route				
21	South$21C_12$	Class 2 Final Status Survey Release Record, South East Transport Route				
22	East$22C_12$	Class 2 Final Status Survey Release Record, East Powerline Corridor				
22	West$22C_12$	Class 2 Final Status Survey Release Record, West Powerline Corridor				
26	$26C_12$	Class 2 Final Status Release Record, Drainage Ditch, South and West of the Industrial Area				
Septic Drain Field[9]	DFC_12	Class 2 Final Status Survey Release Record, Septic Field Drain	08/14/06	Letter		8/24/06
CLASS 2 AREAS – EXCAVATED SOIL FINAL STATUS SURVEYS						
12	$12Cx_12$	Class 2 Final Status Survey Record, Excavated Soil from Building Construction	12/07/04	On-Site Inspection and Letter	06/13-14/06	10/9/06
19	$19Cx_12$	Class 2 Final Status Survey Record, Excavated Soil from Storm Drain Modification	12/02/04	On-Site Inspection and Letter	06/13-14/06	10/9/06

[9] Septic Field Drain survey area is contained within survey area 15(1)

MATRIX OF BIG ROCK POINT FINAL STATUS SURVEY REPORTS

SURVEY AREA[1]	RECORD[2] NUMBER	SURVEY AREA DESCRIPTION	PACKAGE SIGNOFF DATE	U.S. NRC REVIEW METHOD	PACKAGE REVIEW DATE	LETTER DATE
CLASS 3 AREAS – FINAL STATUS SURVEY OF SURFACE						
13	$13C_13$	Class 3 Final Status Survey Release Record, Shoreline East of the Industrial Site	08/14/06	Letter		8/24/06
14	$14C_13$	Class 3 Final Status Survey Release Record, Shoreline West of the Industrial Site	08/17/06	Letter		8/24/06
17	$17C_13$	Class 3 Final Status Survey Release Record, East Woods Boundary				
18	$18C_13$	Class 3 Final Status Survey Release Record, Wooded Area West of Industrial Site	07/03/06[10]	On-Site Inspection and Letter	06/13-14/06	10/9/06
25	$25C_13$	Class 3 Final Status Survey Release Record, South Woods Boundary				
59	$59C_13$	Class 3 Final Status Survey Release Record, Soil Storage Area South of US 31	07/03/06	On-Site Inspection and Letter	06/13-14/06	10/9/06

[10] Revisions to packages signed after NRC review were administrative only – no changes to technical content.

ATTACHMENT 2

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 FINAL STATUS SURVEY RELEASE RECORD, $03C_I1$,
NORTH WEST PROTECTED AREA

October 24, 2006

37 Pages

Class 1 Final Status Survey
Release Record $03C_1 1$

North West Protected Area

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.

Signed: Joshua T. Read (ESSG) Date: 10-16-06

Signed: [signature] (ES Superintendent) Date: 10-16-06

Signed: [signature] (RP & ES Manager) Date: 10-16-06

Survey Area Requirements

Final Status Survey, Release Record $03C_1 1$
North West Protected Area

Survey Description

Final Status Survey $03C_1 1$ encompasses 1956 m^2 at or below the grade elevation present during plant power operations in the north west section of the Protected Area. No materials of plant origin remain in the survey area.

History

During power operations the Protected Area supported the components and systems necessary for electrical generation. The location of Survey Unit 03 is adjacent to the transport route used to move spent resin and filter media for radiological survey and offsite removal. Structures and enclosures formerly located in this area were once used for the storage of contaminated materials. A detailed review of the history and radiological characterization of Survey Unit 3 is provided in Appendix 2B and 2E of the LTP (License Termination Plan).

Current Radiological Status

Scoping measurements and supporting surveys performed in the Protected Area following removal of subsurface components and demolition debris do not indicate the presence of elevated levels of residual radioactivity in this survey area. Based on operational history and former locations of radioactive systems and material transport pathways the radiological status of this survey unit is Class 1.

Post-Construction Expectations

Final Status Survey $03C_1 1$ will be performed in the following activity sequence:

1. Walkdown: Environmental Services Survey Group (ESSG) 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 $03C_1 1$ 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

Final Status Survey, Release Record $03C_11$
North West Protected Area

1. STATE THE PROBLEM

The Problem:
To demonstrate that the level of residual radioactivity in Class 1 Survey Unit 03 does not exceed the release criteria of 25 mrem/year Total Effective Dose Equivalent (TEDE) 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 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 radiological characterization and excavated soil surveys conducted to determine suitability for transport of excavated soil 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 1956 m^2.

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 September 19, 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.

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.

[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.

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 $03C_1 1$

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.

FINAL STATUS SURVEY DESIGN

Release Record $03C_1 1$
North West Protected Area

Survey Unit Description

Survey $03C_1 1$ encompasses an area of 1956 m^2 in the north west section of the Protected Area. No materials of plant origin exist in this survey unit.

Soil Sample Design

Scoping Data

Scoping measurements and supporting surveys performed in the Protected Area following removal of subsurface components and demolition debris do not indicate the presence of elevated levels of residual radioactivity in this survey area. Input data for survey design were conservatively estimated based on supporting surveys of excavated soils resulting from subsurface structure and component removal within the Protected 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:

$$\sigma = \sqrt{\left(\frac{\sigma_{Cs137}}{DCGL_{Cs137}}\right)^2 + \left(\frac{\sigma_{Co60}}{DCGL_{Co60}}\right)^2}$$

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

$\sigma = 0.091$

Relative Shift

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

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

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

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
0.353393	0.688176

Survey Unit Dimensions: X = 40.0 meters
Y = 48.9meters

Random Start Location With SW Corner Origin: X = (0.353393)(40.0) = 14.1 meters
Y = (0.688176)(48.9) = 33.7 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.

$$L = \sqrt{\frac{1956}{18}} = 10.4 \text{ meters}$$

With sample spacing established at 10.4 meters, 20 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:	2	Start Point:	5
Sample Recount:	10	Scan Toward:	13
Sample Recount:	13	Scan Area Requirement:	196 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:

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

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 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 FSS $03C_11$.

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

Attachment 1

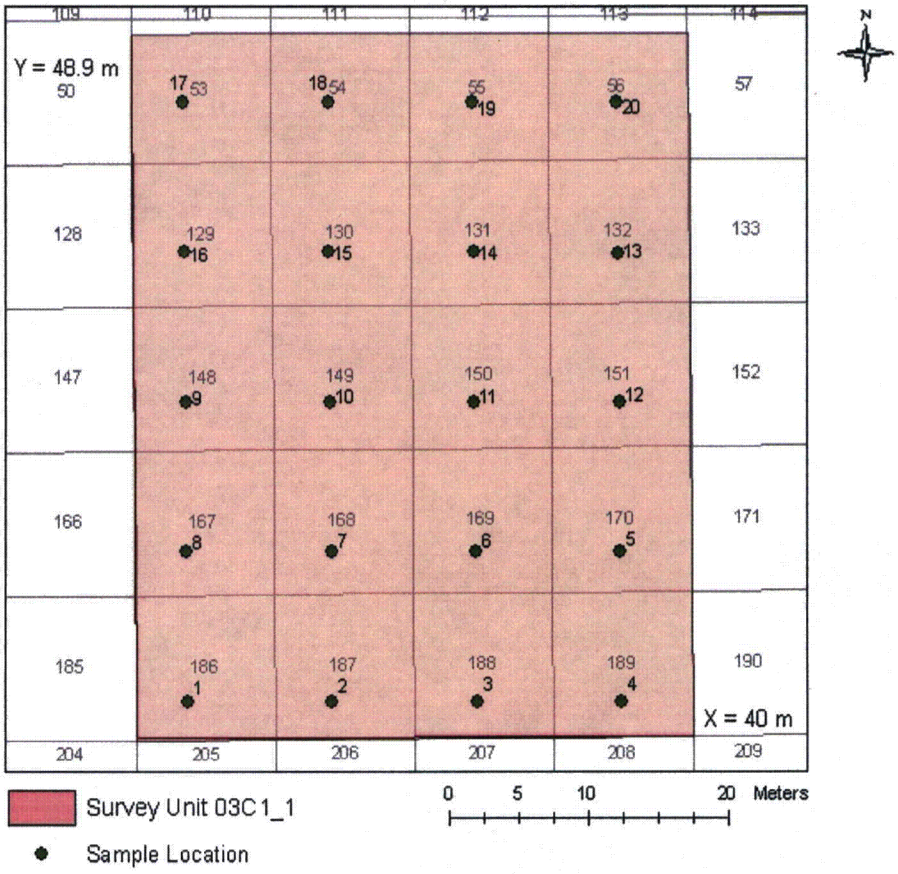
Design Data - FSS $03C_1$1
Protected Area Supporting Surveys

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 03C$_1$1
North West Protected Area



Sample No.	Grid Number	X Coord.	Y Coord.	Sample No.	Grid Number	X Coord.	Y Coord.
1	186	3.7	2.5	11	150	4.5	3.3
2	187	4.1	2.5	12	151	4.9	3.3
3	188	4.5	2.5	13	132	4.9	3.7
4	189	4.9	2.5	14	131	4.5	3.7
5	170	4.9	2.9	15	130	4.1	3.7
6	169	4.5	2.9	16	129	3.7	3.7
7	168	4.1	2.9	17	53	3.7	4.1
8	167	3.7	2.9	18	54	4.1	4.1
9	148	3.7	3.3	19	55	4.5	4.1
10	149	4.1	3.3	20	56	4.9	4.1

Sample spacing is 10.4 meters

Attachment 3

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						

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

RM-76-5
FINAL STATUS SURVEY APPROVAL

AND AUTHORIZATION FOR IMPLEMENTATION

Survey Code 03C$_1$1

Survey Area Description:

Final Status Survey 03C$_1$1 encompasses 1956 m^2 at or below the grade elevation present during plant power operations in the north west section of the Protected Area. No materials of plant origin remain in the survey area.

The survey area is authorized for Final Status Survey Implementation.

Designed by — Date: 09-13-06

Technical Review by — Date: 09-13-06

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

Step (+)		Initial	Date
1.0	PREPARATION FOR SURVEY 03C.1 (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.	JKR ESSG	09/13/06
✓	b. Survey area has been turned over to the Environmental Services Survey Group (ESSG) in acceptable condition for FSS.	JKR ESSG	09/14/06
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)	JKR ESSG	09/19/06

RM-77-1
SURVEY IMPLEMENTATION CHECKLIST
Page 2 of 3

		Initial	Date
2.0	DATA COLLECTION		
2.1	Soil Survey:		
✓	All soil samples collected and controlled (Step 6.2.1).	ESSG	09/19/06
2.2	Surface Scan:		
✓	Surface Scan complete. Action response requirements have been conducted on any identified areas exceeding the investigation level (Step 6.3).	ESSG	09/19/06
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).	ESSG	09/19/06
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.	ESSG	09/23/06

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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	09/25/06
3.3	Sample Control and Documentation:		
✓	Chain of custody documentation exhibits control of soil samples (Step 6.4.3).	ESSG	09/25/06

Jodie L. Reed — Reviewed by
09/25/06 — Date

ATTACHMENT RM-59-1
SAMPLING AND ANALYSIS REPORT

Date: 09-19-2006	Time: 1600	Location: $03C_11$	Tech: TRS/WMH/JNS

SURVEY IDENTIFICATION / DESCRIPTION

Survey $03C_11$ encompasses 1956 m^2 at or below the grade elevation present during plant power operations in the north west section of the Protected Area. No materials of plant origin remain in this area.

SURVEY TYPE

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

SURVEY DESIGN

Sample Collection: ____ Judgmental ____ Random X Systematic ____ Large Container Assay
Scan Coverage: 100%

ANALYSIS

Item	DAILY CHECK	SAT		UNSAT	INIT
Inst.SN/Cal Due 186201/09-30-2006	DAILY CHECK:	X	SAT		TRS
Inst.SN/Cal Due 186194/02-08-2007	DAILY CHECK:	X	SAT		TRS
Inst.SN/Cal Due 193709/02-21-2007	DAILY CHECK:	X	SAT		TRS
Inst.SN/Cal Due Det. # 6	DAILY CHECK:	X	SAT		JP
Inst.SN/Cal Due	DAILY CHECK:		SAT		
Investigation of Unidentified Peaks:		X	SAT		JLR
Minimum Detectable Activity (Section 5.3.2)		X	SAT		JLR

COMMENTS

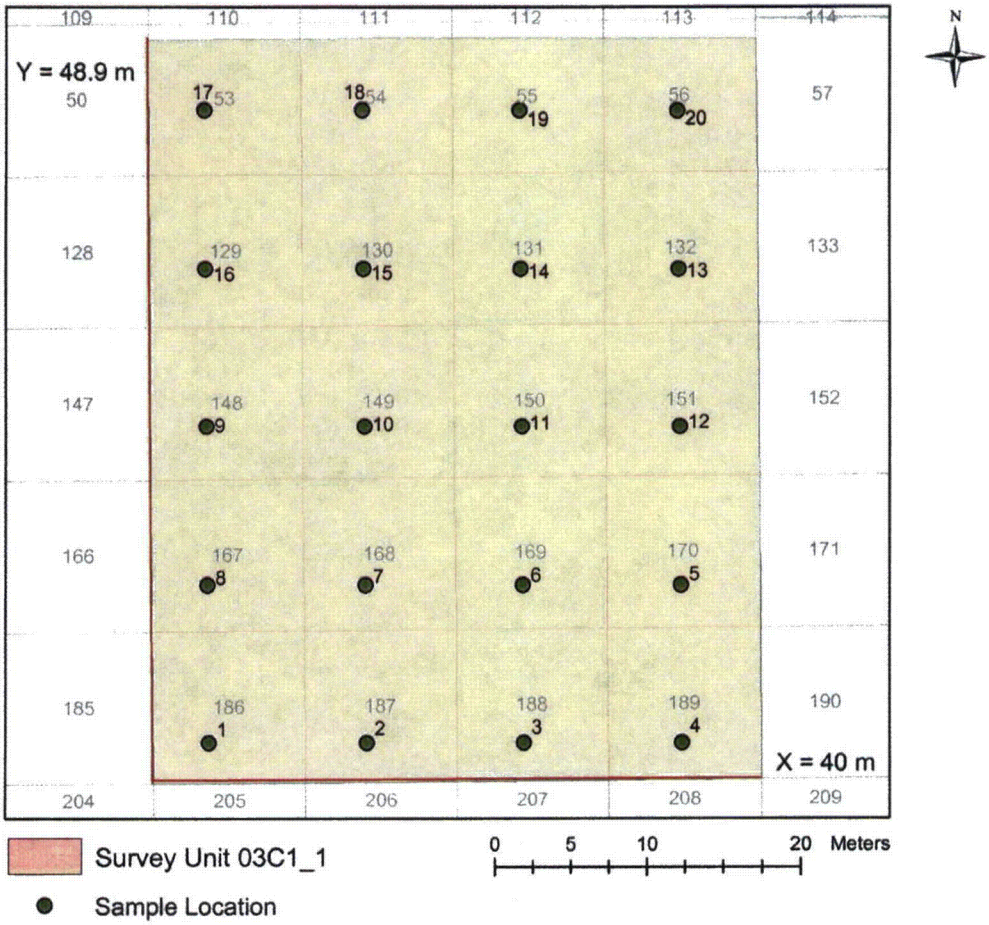
Survey $03C_11$ was performed in a random start, square grid, systematic sampling pattern with samples collected at 20 data point locations. Laboratory analyses did not identify residual radioactivity above trace levels of the DCGL value. Surface scanning identified no areas of elevated residual radioactivity. The results of the QA/QC verification scan (10%) were consistent with the findings of the primary survey scan.

Technician Signature: [signatures] Date: 9-19-06

Second Level Review
Signature: [signature] Date: 10-13-06

Soil Sample Activity Summary

Release Record 03C-1
North West Protected Area

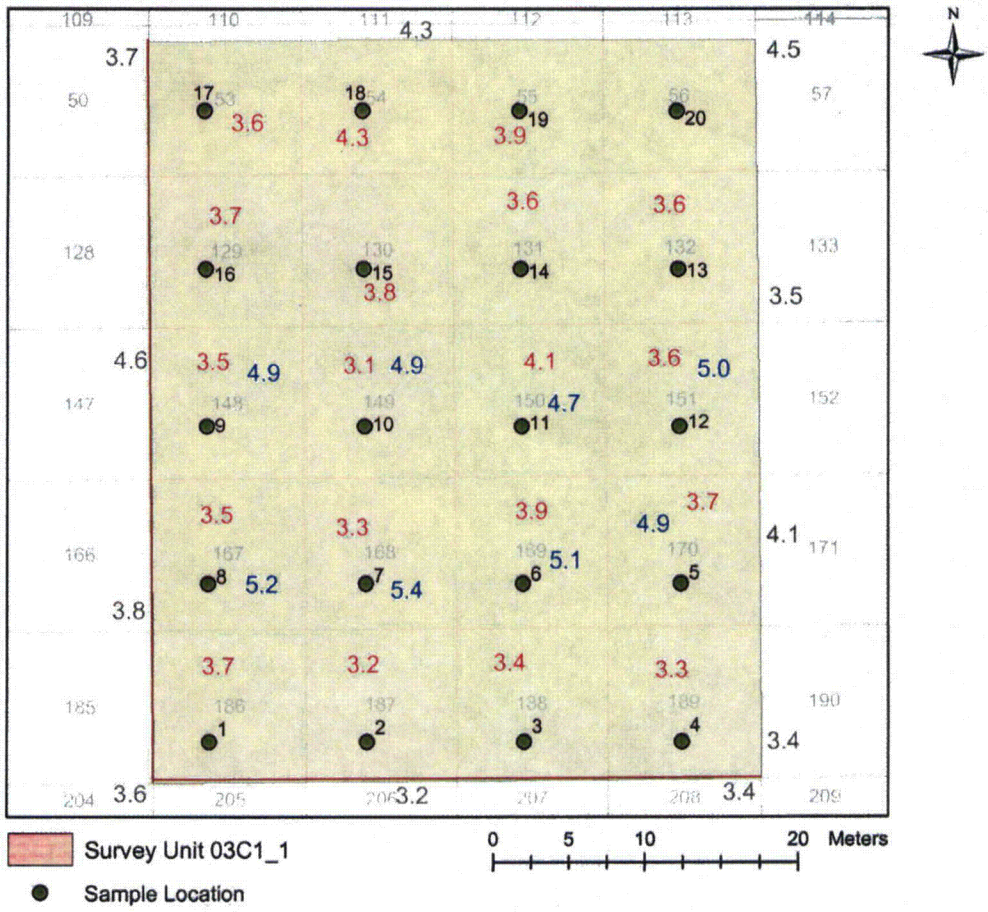


Sample No.	Grid #	X Coord.	Y Coord.	Cs-137 (pCi/g)		Co-60 (pCi/g)	
				Activity	MDA	Activity	MDA
1	194	5.0	4.0	0.0591		*0.0023	0.0436
2	195	5.5	4.0	0.0912		*0.0288	0.0560
3	196	6.0	4.0	0.0698		*0.0118	0.0538
4	197	6.5	4.0	0.0872		*0.0012	0.0528
5	178	6.5	4.5	0.0638		*0.0073	0.0476
6	177	6.0	4.5	0.2535		*-0.0063	0.0546
7	176	5.5	4.5	0.0529		*0.0243	0.0645
8	175	5.0	4.5	0.3983		*0.0343	0.0743
9	156	5.0	5.0	0.1171		*0.0110	0.0477
10	157	5.5	5.0	0.2412		*0.0077	0.0607
11	158	6.5	5.0	0.0677		*0.0010	0.0571
12	159	6.5	5.0	*-0.0001	0.0437	*-0.0101	0.0466
13	140	6.5	5.5	*0.0114	0.0480	*0.0117	0.0583
14	139	6.0	5.5	0.0503		*0.0210	0.0683
15	138	5.5	5.5	0.0834		*0.0175	0.0581
16	137	5.0	5.5	0.1165		*0.0552	0.0646
17	61	5.0	6.0	0.0651		*-0.0035	0.0498
18	62	5.5	6.0	*0.0558	0.0712	*0.0250	0.0643
19	63	6.0	6.0	*0.0458	0.0615	*0.0254	0.0617
20	64	6.5	6.0	0.1818		*0.0046	0.0593

*Forced-count values

Surface Scan Summary

Release Record 03C$_1$1
North West Protected 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)

No areas of elevated activity identified
No investigation levels exceeded

Primary Scan : 100 %

Technician Signature: [signature] **Date:** 9-19-06
Time: 1400

QC Verification Scan: 10 %

Technician Signature: [signature] **Date:** 9-19-06
Time: 1500

* Samples collected by 3 seperate teams.

03C$_1$1
RM-72-1

CHAIN-OF-CUSTODY RECORD

Sample Number	Sampling Location	Date	Time	Final Disposition of Sample
1	Grid # 186 (3.7) (2.5)	9-19-06	1320	To Permanent Storage
2	Grid # 187 (4.1) (2.5)	9-19-06	1322	
2 QA Split	Grid # 187 (4.1) (2.5)	9-19-06	1322	
3	Grid # 188 (4.5) (2.5)	9-19-06	1325	
4	Grid # 189 (4.9) (2.5)	9-19-06	1327	
5	Grid # 170 (4.9) (2.9)	9-19-06	1328	
6	Grid # 169 (4.5) (2.9)	9-19-06	1330	
7	Grid # 168 (4.1) (2.9)	9-19-06	1332	
8	Grid # 167 (3.7) (2.9)	9-19-06	1330	
9	Grid # 148 (3.7) (3.3)	9-19-06	1331	
10 (R)	Grid # 149 (4.1) (3.3)	9-19-06	1313	
11	Grid # 150 (4.5) (3.3)	9-19-06	1314	
12	Grid # 151 (4.9) (3.3)	9-19-06	1315	
13 (R)	Grid # 132 (4.9) (3.7)	9-19-06	1310	
14	Grid # 131 (4.5) (3.7)	9-19-06	1318	
15	Grid # 130 (4.1) (3.7)	9-19-06	1319	
16	Grid # 129 (3.7) (3.7)	9-19-06	1320	
17	Grid # 53 (3.7) (4.1)	9-19-06	1321	
18	Grid # 54 (4.1) (4.1)	9-19-06	1322	
19	Grid # 55 (4.5) (4.1)	9-19-06	1323	
20	Grid # 56 (4.9) (4.1)	9-19-06	1324	

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

1. Relinquished by:	Date 9-19-06	Time 1350	Received in good condition by:
2. Relinquished by: To Permanent Storage	Date 9/25/06	Time 1500	Received in good condition by: Permanent Storage
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: 03C, 1

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.

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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 _____

_____

_____

_____

_____

Jodie L Reed
Assessor

10-13-06
Date

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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.
- ✓ Results of judgmental samples have been reviewed and evaluated.
- ✓ 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: 20

c. Calculate % Completeness: $\frac{b \times 120}{a}$ = 160%

✓ 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 10-13-06
Assessor Date

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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:

✓ 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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3.2.2 Calculate Basic Statistical Quantities:

a. Number of qualified data points 20

b. Calculation of the Mean 0.0131 (SOR)

c. Calculation of the Median 0.0119 (SOR)

d. Calculation Standard Deviation 0.0100 (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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✓ 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. N/o 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 1.1

Jodie L. Reed
Assessor

10-13-06
Date

Reviews:

Technical Review

10-16-06
Date

ES Superintendent

10-16-06
Date

RP&ES Manager

10-16-06
Date

RM-78-3, Attachment 1
Statistical Quantities

Release Record $03C_11$
North West Protected Area

Sample Number	Cs-137 (pCi/gm)	Co-60 (pCi/gm)	Weighted Sum (SOR)	**Weighted Sum <DCGLw?	DCGL-W. Sum	Sign
1	0.0591	0.0023	0.0057	yes	0.9943	+1
2	0.0912	0.0288	0.0166	yes	0.9834	+1
3	0.0698	0.0118	0.0095	yes	0.9905	+1
4	0.0872	0.0012	0.0077	yes	0.9923	+1
5	0.0638	0.0073	0.0076	yes	0.9924	+1
6	0.2535	-0.0063	0.0193	yes	0.9807	+1
7	0.0529	0.0243	0.0120	yes	0.9880	+1
8	0.3983	0.0343	0.0441	yes	0.9559	+1
9	0.1171	0.0110	0.0132	yes	0.9868	+1
10	0.2412	0.0077	0.0226	yes	0.9774	+1
11	0.0677	0.0010	0.0060	yes	0.9940	+1
12	-0.0001	-0.0101	-0.0032	yes	0.9968	+1
13	0.0114	0.0117	0.0046	yes	0.9954	+1
14	0.0503	0.0210	0.0108	yes	0.9892	+1
15	0.0834	0.0175	0.0124	yes	0.9876	+1
16	0.1165	0.0552	0.0270	yes	0.9730	+1
17	0.0651	-0.0035	0.0044	yes	0.9956	+1
18	0.0558	0.0250	0.0125	yes	0.9875	+1
19	0.0458	0.0254	0.0118	yes	0.9882	+1
20	0.1818	0.0046	0.0167	yes	0.9833	+1

Std. Dev	0.0955	0.0157	0.0100
Mean	0.1056	0.0135	0.0131
Median	0.0688	0.0114	0.0119

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 # 03C,1 QC Package # 03C,1

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 # 2 = QA/QC split; Sample # 10 + #13 = Sample Recounts.

Reviews:

Joshua Read — Evaluator — 10-13-06 — Date

Technical Review — 10-13-06 — Date

QA Verification
Split Sample Analysis

Date: 8/25/2006

QA: 03C$_1$1 North West Protected 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)**
2	Co-60	<	0.0560	n/a	n/a	n/a	<	0.0440	0.79	YES
2	Cs-137		0.0912	21.68	4.61	0.5-2.0		0.0696	0.76	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: 8/25/2006

QA: 03C$_1$1 North West Protected 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**)
10	Co-60	<	0.0607	n/a	n/a	n/a	<	0.0587	0.97	YES
10	Cs-137		0.2412	9.95	10.05	0.6-1.66		0.2059	0.85	YES
13	Co-60	<	0.0583	n/a	n/a	n/a	<	0.0568	0.97	YES
13	Cs-137	<	0.0480	n/a	n/a	n/a	<	0.0496	1.03	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.*

Tritium in Soil
Data Results
Final Status Survey $03C_1 1$

Sample Number	Tritium in Soil pCi/g
2	0.025
10	0.015
13	0.011

Mean:	0.0170
Median:	0.0150
St. Dev:	0.0072

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

Environmental, Inc.
Midwest Laboratory
an Allegheny Technologies Co.

700 Landwehr Road • Northbrook, IL 60062-2310
ph. (847) 564-0700 • fax (847) 564-4517

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

LABORATORY REPORT NO. 8022-100-239
DATE: 09-27-2006
SAMPLES RECEIVED: 09-22-2006
PURCHASE ORDER NO:

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

Excavated Soil Survey $03C_11$

Sample Description	Collection Date	Lab Code	Concentration (pCi/g of soil) H-3	MDA (pCi/g of soil)
2	09-19-06	BRSO-6484	0.025 ± 0.008	< 0.013
10	09-19-06	BRSO-6485	0.015 ± 0.007	< 0.011
13	09-19-06	BRSO-6486	0.011 ± 0.005	< 0.009

The error given is the probable counting error at 95 % confidence level. The less than, (<), value is based on 4.66 sigma counting error for background sample.

Sincerely,

Bronia Grob,
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance

ATTACHMENT 3

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 FINAL STATUS SURVEY RELEASE RECORD, $05C_t1$,
CENTRAL PROTECTED AREA

October 24, 2006

37 Pages

Class 1 Final Status Survey
Release Record $05C_1 1$

Central Protected Area

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.

Signed: Jodie L. Reed (ESSG) Date: 10-16-06

Signed: [signature] (ES Superintendent) Date: 10-16-06

Signed: [signature] (RP & ES Manager) Date: 10-16-06

Survey Area Requirements

Final Status Survey, Release Record $05C_1 1$
Central Protected Area

Survey Description

Final Status Survey $05C_1 1$ encompasses 1924 m^2 at or below the grade elevation present during plant power operations in the central section of the Protected Area. No materials of plant origin remain in the survey area.

History

During power operations the Protected Area supported the components and systems necessary for electrical generation. The location of Survey Unit 05 is adjacent to the transport route used to move spent resin and filter media for radiological survey and offsite removal. Structures and enclosures formerly located in this area were once used for the storage of contaminated materials. A detailed review of the history and radiological characterization of Survey Unit 5 is provided in Appendix 2B and 2E of the LTP (License Termination Plan).

Current Radiological Status

Scoping measurements and supporting surveys performed in the Protected Area following removal of subsurface components and demolition debris do not indicate the presence of elevated levels of residual radioactivity in this survey area. Based on operational history and former locations of radioactive systems and material transport pathways the radiological status of this survey unit is Class 1.

Post-Construction Expectations

Final Status Survey $05C_1 1$ will be performed in the following activity sequence:

1. Walkdown: Environmental Services Survey Group (ESSG) 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 $05C_1 1$ 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

Final Status Survey, Release Record $05C_11$
Central Protected Area

1. STATE THE PROBLEM

The Problem:
To demonstrate that the level of residual radioactivity in Class 1 Survey Unit 05 does not exceed the release criteria of 25 mrem/year Total Effective Dose Equivalent (TEDE) 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 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 radiological characterization and excavated soil surveys conducted to determine suitability for transport of excavated soil 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 1924 m^2.

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 September 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.

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.

---

[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.

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 $05C_1 1$

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.

FINAL STATUS SURVEY DESIGN

Release Record $05C_1 1$
Central Protected Area

Survey Unit Description

Survey $05C_1 1$ encompasses an area of 1924 m^2 in the central section of the Protected Area. No materials of plant origin exist in this survey unit.

Soil Sample Design

Scoping Data

Scoping measurements and supporting surveys performed in the Protected Area following removal of subsurface components and demolition debris do not indicate the presence of elevated levels of residual radioactivity in this survey area. Input data for survey design were conservatively estimated based on supporting surveys of excavated soils resulting from subsurface structure and component removal within the Protected 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:

$$\sigma = \sqrt{\left(\frac{\sigma_{Cs137}}{DCGL_{Cs137}}\right)^2 + \left(\frac{\sigma_{Co60}}{DCGL_{Co60}}\right)^2}$$

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

$\sigma = 0.091$

Relative Shift

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

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

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

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
0.091956	0.994458

Survey Unit Dimensions: X = 30.3 meters
Y = 70.0 meters

Random Start Location With SW Corner Origin: X = (0.091956)(30.3) = 2.8 meters
Y = (0.994458)(70.0) = 69.6 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.

$$L = \sqrt{\frac{1924}{18}} = 10.3 \text{ meters}$$

With sample spacing established at 10.3 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:	3	Start Point:	12
Sample Recount:	5	Scan Toward:	3
Sample Recount:	11	Scan Area Requirement:	193 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:

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

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 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 FSS $05C_1$1.

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

Attachment 1

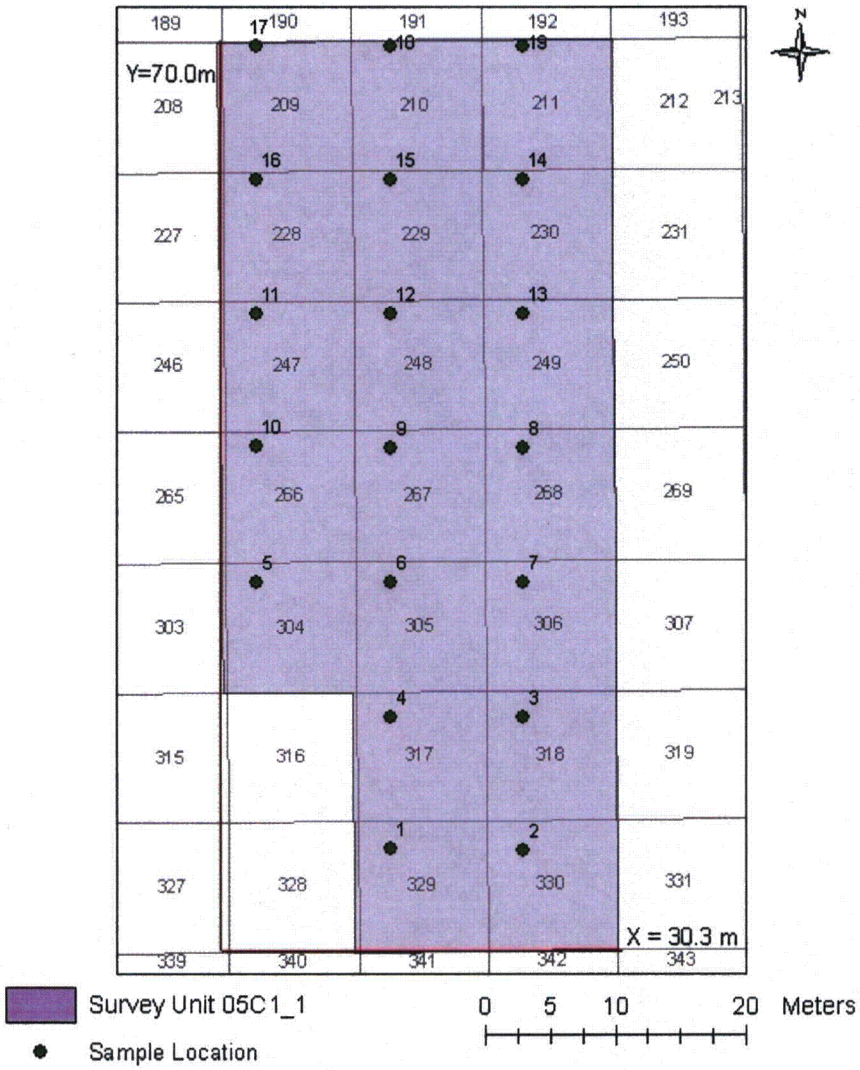
Design Data - FSS $05C_1 1$
Protected Area Supporting Surveys

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 05C$_1$1
Central Protected Area



Sample No.	Grid Number	X Coord.	Y Coord.	Sample No.	Grid Number	X Coord.	Y Coord.
1	329	2.8	7.2	11	247	2.5	8.8
2	330	3.1	7.2	12	248	2.8	8.8
3	318	3.1	7.6	13	249	3.1	8.8
4	317	2.8	7.6	14	230	3.1	9.2
5	304	2.5	8.0	15	229	2.8	9.2
6	305	2.8	8.0	16	228	2.5	9.2
7	306	3.1	8.0	17	209	2.5	9.6
8	268	3.1	8.4	18	210	2.8	9.6
9	267	2.8	8.4	19	211	3.1	9.6
10	266	2.5	8.4				

Sample spacing is 10.3 meters

Attachment 3

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						

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

RM-76-5
FINAL STATUS SURVEY APPROVAL

AND AUTHORIZATION FOR IMPLEMENTATION

Survey Code $05C_11$

Survey Area Description:

Final Status Survey $05C_11$ encompasses 1924 m^2 at or below the grade elevation present during plant power operations in the central section of the Protected Area. No materials of plant origin remain in the survey area.

The survey area is authorized for Final Status Survey Implementation.

Jackie L. Reed — Designed by — 09-14-2006 — Date

Technical Review by — 09-18-06 — Date

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

Step (+)		Initial	Date
1.0	PREPARATION FOR SURVEY 05C11 (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.	ESSG	09/18/06
✓	b. Survey area has been turned over to the Environmental Services Survey Group (ESSG) in acceptable condition for FSS.	ESSG	09/18/06
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)	ESSG	09/18/06

RM-77-1
SURVEY IMPLEMENTATION CHECKLIST
Page 2 of 3

		Initial	Date
2.0	DATA COLLECTION		
2.1	Soil Survey:		
✓	All soil samples collected and controlled (Step 6.2.1).	ESSG	09/18/06
2.2	Surface Scan:		
✓	Surface Scan complete. Action response requirements have been conducted on any identified areas exceeding the investigation level (Step 6.3).	ESSG	09/18/06
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).	ESSG	09/18/06
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.	ESSG	09/20/06

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	09/20/06
3.3	Sample Control and Documentation:		
✓	Chain of custody documentation exhibits control of soil samples (Step 6.4.3).	ESSG	09/20/06

Reviewed by

10-13-06
Date

ATTACHMENT RM-59-1
SAMPLING AND ANALYSIS REPORT

Date: 09-18-2006	Time: 1600	Location: $05C_1 1$	Tech: TRS/WMH/JNS

SURVEY IDENTIFICATION / DESCRIPTION

Survey $05C_1 1$ encompasses 1924 m^2 at or below the grade elevation present during plant power operations in the central section of the Protected Area. No materials of plant origin remain in this area.

SURVEY TYPE

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

SURVEY DESIGN

Sample Collection: ____ Judgmental ____ Random X Systematic ____ Large Container Assay
Scan Coverage: 100%

ANALYSIS

Inst.SN/Cal Due 186201/09-30-2006	DAILY CHECK:	X	SAT	UNSAT	INIT: TRS
Inst.SN/Cal Due 186194/02-08-2007	DAILY CHECK:	X	SAT	UNSAT	INIT: TRS
Inst.SN/Cal Due 193709/02-21-2007	DAILY CHECK:	X	SAT	UNSAT	INIT: TRS
Inst.SN/Cal Due Det. # 6	DAILY CHECK:	X	SAT	UNSAT	INIT: JP
Inst.SN/Cal Due	DAILY CHECK:		SAT	UNSAT	INIT:
Investigation of Unidentified Peaks:		X	SAT	UNSAT	INIT: JLR
Minimum Detectable Activity (Section 5.3.2)		X	SAT	UNSAT	INIT: JLR

COMMENTS

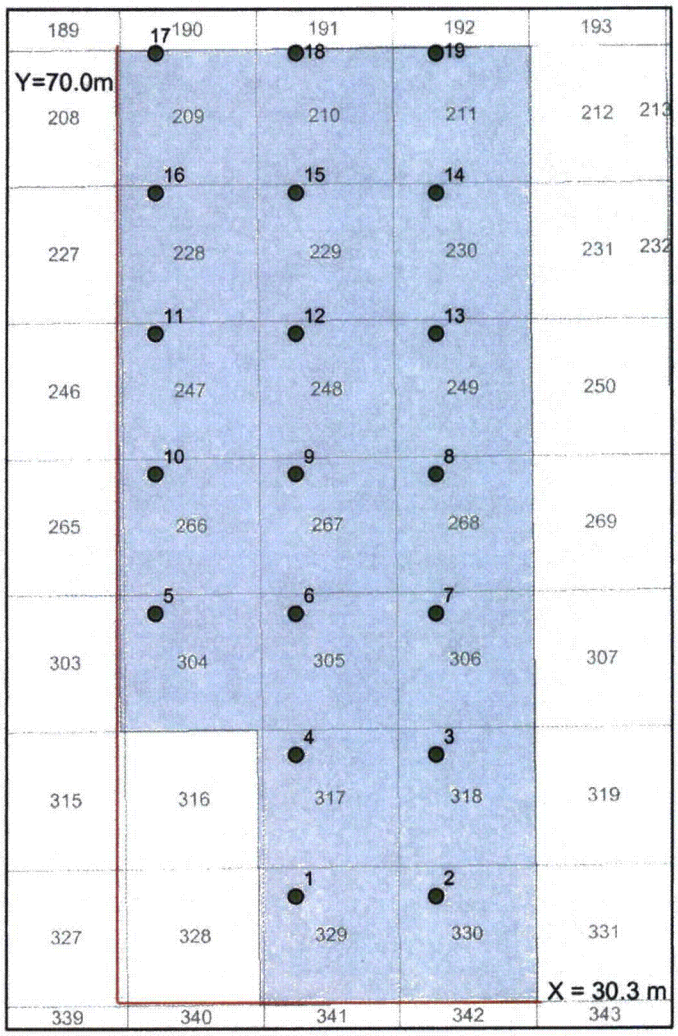
Survey $05C_1 1$ was performed in a random start, square grid, systematic sampling pattern with samples collected at 20 data point locations. Laboratory analyses did not identify residual radioactivity above trace levels of the DCGL value. Surface scanning identified no areas of elevated residual radioactivity. The results of the QA/QC verification scan (10%) were consistent with the scan values identified in the survey.

Technician Signature: DWP for JN Soderquist / B[illegible] / T Schluter Date: 9-18-06

Second Level Review
Signature: [signature] Date: 10/13/06

Soil Sample Activity Summary

Release Record 05C$_1$1
Central Protected Area

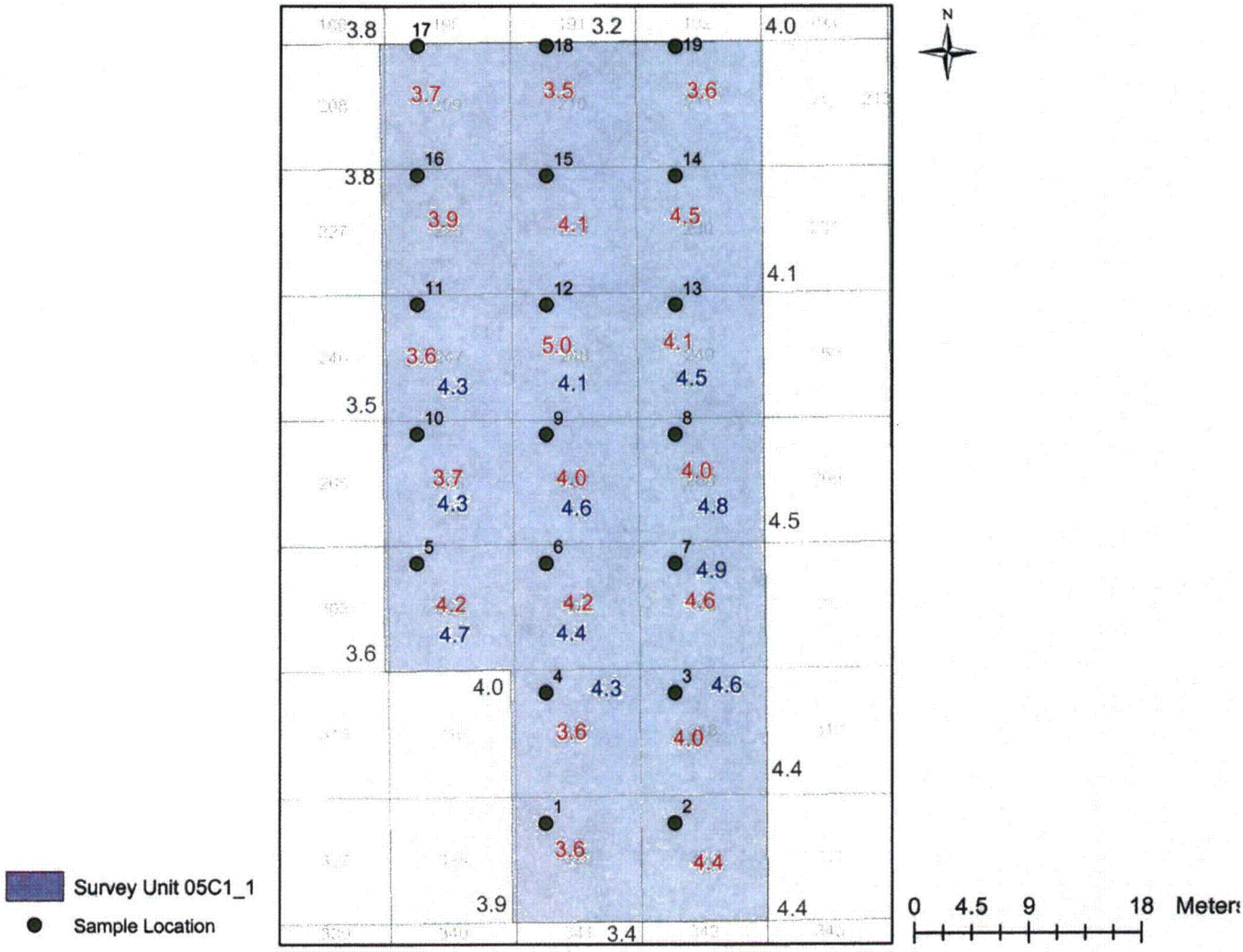


Sample No.	Grid #	X Coord.	Y Coord.	Cs-137 (pCi/g)		Co-60 (pCi/g)	
				Activity	MDA	Activity	MDA
1	329	2.8	7.2	*0.0218	0.0594	*0.0120	0.0624
2	330	3.1	7.2	0.0279		*0.0173	0.0621
3	318	3.1	7.6	0.0559		*0.0106	0.0633
4	317	2.8	7.6	0.0501		*0.0002	0.0511
5	304	2.5	8.0	0.0710		*0.0404	0.0731
6	305	2.8	8.0	0.0745		*0.0144	0.0614
7	306	3.1	8.0	0.1045		*0.0059	0.0659
8	268	3.1	8.4	0.1357		*-0.0099	0.0490
9	267	2.8	8.4	0.0861		*0.0101	0.0609
10	266	2.5	8.4	*0.0462	0.0653	*0.0048	0.0594
11	247	2.5	8.8	*0.0124	0.0523	*-0.0006	0.0494
12	248	2.8	8.8	*0.0018	0.0472	*0.0119	0.0561
13	249	3.1	8.8	*0.0386	0.0582	*0.0082	0.0684
14	230	3.1	9.2	*-0.0002	0.0440	*-0.0108	0.0507
15	229	2.8	9.2	0.0390		*0.0047	0.0585
16	228	2.5	9.2	*0.0208	0.0559	*-0.0117	0.0529
17	209	2.5	9.6	0.0531		*-0.0152	0.0602
18	210	2.8	9.6	0.0384		*-0.0027	0.0496
19	211	3.1	9.6	*0.0110	0.0545	*0.0126	0.0622

*Forced-count values

Surface Scan Summary

Release Record 05C$_1$1
Central Protected 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)

No investigation levels exceeded. JH 9-18-06

Primary Scan : 100 % Background

Technician Signature: _____ **Date:** 9-18-06
Time: 1400

QC Verification Scan: 10 %

Technician Signature: JSodergquist **Date:** 9-18-06
Time: 1400

$05C_11$
RM-72-1
CHAIN-OF-CUSTODY RECORD

Sample Number	Sampling Location	Date	Time	Final Disposition of Sample
1	Grid # 329 (2.8) (7.2)	9-18-06	1240	permanent storage
2	Grid # 330 (3.1) (7.2)	9-18-06	1243	
3	Grid # 318 (3.1) (7.6)	9-18-06	1246	
3 QA Split	Grid # 318 (3.1) (7.6)	9-18-06	1246	
4	Grid # 317 (2.8) (7.6)	9-18-06	1248	
5 (R)	Grid # 304 (2.5) (8.0)	9-18-06	1250	
6	Grid # 305 (2.8) (8.0)	9-18-06	1252	
7	Grid # 306 (3.1) (8.0)	9-18-06	1255	
8	Grid # 268 (3.1) (8.4)	9-18-06	1258	
9	Grid # 267 (2.8) (8.4)	9-18-06	1300	
10	Grid # 266 (2.5) (8.4)	9-18-06	1303	
11 (R)	Grid # 247 (2.5) (8.8)	9-18-06	1305	
12	Grid # 248 (2.8) (8.8)	9-18-06	1308	
13	Grid # 249 (3.1) (8.8)	9-18-06	1310	
14	Grid # 230 (3.1) (9.2)	9-18-06	1313	
15	Grid # 229 (2.8) (9.2)	9-18-06	1315	
16	Grid # 228 (2.5) (9.2)	9-18-06	1318	
17	Grid # 209 (2.5) (9.6)	9-18-06	1321	
18	Grid # 210 (2.8) (9.6)	9-18-06	1324	
19	Grid # 211 (3.1) (9.6)	9-18-06	1327	

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

1. Relinquished by: T. Schlueter to chem Lab locked Storage	Date 9-18-06	Time 1335	Received in good condition by: LAB LOCKED STORAGE permanent storage
2. Relinquished by: J Kurtz	Date 9/20/06	Time 1500	Received in good condition by: Permanent Lock Storage Solano
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: 05C, 1

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 L. Reed
Assessor

10-13-06
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.
- ✓ Results of judgmental samples have been reviewed and evaluated.
- ✓ 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
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: $\frac{b \times 120}{a}$ = 126.7 %

✓ 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

10-13-06 — Date

RM-78-3
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 19

b. Calculation of the Mean 0.0056 (SOR)

c. Calculation of the Median 0.0054 (SOR)

d. Calculation Standard Deviation 0.0051 (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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DATA ASSESSMENT REPORT
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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 _____

Assessor _____ Date 10-13-06

Reviews:

Technical Review _____ Date 10-16-06

ES Superintendent _____ Date 10-16-06

RP&ES Manager _____ Date 10-16-06

RM-78-3, Attachment 1
Statistical Quantities

Release Record $05C_1 1$
Central Protected Area

Sample Number	Cs-137 (pCi/gm)	Co-60 (pCi/gm)	Weighted Sum (SOR)	**Weighted Sum <DCGLw?	DCGL-W. Sum	Sign
1	0.0218	0.0120	0.0056	yes	0.9944	+1
2	0.0279	0.0173	0.0077	yes	0.9923	+1
3	0.0559	0.0106	0.0080	yes	0.9920	+1
4	0.0501	0.0002	0.0043	yes	0.9957	+1
5	0.0710	0.0404	0.0185	yes	0.9815	+1
6	0.0745	0.0144	0.0107	yes	0.9893	+1
7	0.1045	0.0059	0.0106	yes	0.9894	+1
8	0.1357	-0.0099	0.0083	yes	0.9917	+1
9	0.0861	0.0101	0.0104	yes	0.9896	+1
10	0.0462	0.0048	0.0054	yes	0.9946	+1
11	0.0124	-0.0006	0.0009	yes	0.9991	+1
12	0.0018	0.0119	0.0039	yes	0.9961	+1
13	0.0386	0.0082	0.0058	yes	0.9942	+1
14	-0.0002	-0.0108	-0.0034	yes	0.9966	+1
15	0.0390	0.0047	0.0047	yes	0.9953	+1
16	0.0208	-0.0117	-0.0019	yes	0.9981	+1
17	0.0531	-0.0152	-0.0003	yes	0.9997	+1
18	0.0384	-0.0027	0.0024	yes	0.9976	+1
19	0.0110	0.0126	0.0048	yes	0.9952	+1

Std. Dev	0.0356	0.0129	0.0051
Mean	0.0468	0.0054	0.0056
Median	0.0390	0.0059	0.0054

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 # 05C,1 QC Package # 05C,1

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 # 3 = QA/QC split; Sample # 5 & 11 = recounts.

Reviews:

Jodie L. Reed — Evaluator — 10-13-06 Date

[signature] — Technical Review — 10-16-06 Date

QA Verification
Split Sample Analysis

Date: 9/20/2006

QA: 05C,1 Central Protected 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)**
3	Co-60	<	0.0633	n/a	n/a	n/a	<	0.0594	0.94	YES
3	Cs-137		0.0559	38.89	2.57	n/a		0.0414	0.74	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: 9/20/2006

QA: 05C$_1$1 Central Protected 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)**
5	Co-60	<	0.0731	n/a	n/a	n/a	<	0.0822	1.12	YES
5	Cs-137		0.0710	24.90	4.02	0.5-2.0		0.0426	0.60	YES
11	Co-60	<	0.0494	n/a	n/a	n/a	<	0.0607	1.23	YES
11	Cs-137	<	0.0523	n/a	n/a	n/a		0.0564	1.08	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.*

Tritium in Soil
Data Results
Final Status Survey $05C_1 1$

Sample Number	Tritium in Soil pCi/g
3	1.227
5	0.009
11	0.013

Mean:	0.4163
Median:	0.0130
St. Dev:	0.7021

Note: The DCGL for Tritium is 327 pCi/g.
Sample results are less than 0.4% of the DCGL

Environmental, Inc.
Midwest Laboratory
an Allegheny Technologies Co.

700 Landwehr Road • Northbrook, IL 60062-2310
ph. (847) 564-0700 • fax (847) 564-4517

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

LABORATORY REPORT NO. 8022-100-234
DATE: 09-22-2006
SAMPLES RECEIVED: 09-20-2006
PURCHASE ORDER NO:

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

Excavated Soil Survey 05C,1

Sample Description	Collection Date	Lab Code	Concentration (pCi/g of soil) H-3	MDA (pCi/g of soil)
3	09-18-06	BRSO-6400	1.227 ± 0.031	< 0.018
3	09-18-06	BRSO-6401[a]	0.980 ± 0.028	< 0.018
5	09-18-06	BRSO-6402	0.009 ± 0.007	< 0.013
11	09-18-06	BRSO-6403	0.013 ± 0.007	< 0.012

[a] Denotes a duplicate.
The error given is the probable counting error at 95 % confidence level. The less than, (<), value is based on 4.66 sigma counting error for background sample.

Sincerely,

Bronia Grob,
Laboratory Manager

APPROVED BY Tony Coorlim

Tony Coorlim,
Quality Assurance

ATTACHMENT 4

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 FINAL STATUS SURVEY RELEASE RECORD, $06C_11$,
SOUTH CENTRAL PROTECTED AREA

October 24, 2006

37 Pages

Class 1 Final Status Survey
Release Record $06C_1 1$

South Central Protected Area

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.

Signed: _____ Date: 10/23/06
(ESSG)

Signed: _____ Date: 10-25-06
(ES Superintendent)

Signed: _____ Date: 10-23-06
(RP & ES Manager)

Survey Area Requirements

Final Status Survey, Release Record $06C_1 1$
South Central Protected Area

Survey Description

Final Status Survey $06C_1 1$ encompasses 1977 m^2 at or below the grade elevation present during plant power operations in the south central section of the Protected Area. No materials of plant origin remain in the survey area.

History

During power operations the Protected Area supported the components and systems necessary for electrical generation. The location of Survey Unit 06 is adjacent to the transport route used to move spent resin and filter media for radiological survey and offsite removal. Structures and enclosures formerly located in this area were once used for the storage of contaminated materials. A detailed review of the history and radiological characterization of Survey Unit 06 is provided in Appendix 2B and 2E of the LTP (License Termination Plan).

Current Radiological Status

Scoping measurements and supporting surveys performed in the Protected Area following removal of subsurface components and demolition debris do not indicate the presence of elevated levels of residual radioactivity in this survey area. Based on operational history and former locations of radioactive systems and material transport pathways the radiological status of this survey unit is Class 1.

Post-Construction Expectations

Final Status Survey $06C_1 1$ will be performed in the following activity sequence:

1. Walkdown: Environmental Services Survey Group (ESSG) 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 $06C_11$ 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

Final Status Survey, Release Record $06C_1 1$
South Central Protected Area

1. STATE THE PROBLEM

The Problem:
To demonstrate that the level of residual radioactivity in Class 1 Survey Unit 06 does not exceed the release criteria of 25 mrem/year Total Effective Dose Equivalent (TEDE) 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 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 radiological characterization and excavated soil surveys conducted to determine suitability for transport of excavated soil 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 1977 m^2.

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 September 14, 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.

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.

[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.

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 $06C_1 1$

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.

FINAL STATUS SURVEY DESIGN

Release Record $06C_1 1$
South Central Protected Area

Survey Unit Description

Survey $06C_1 1$ encompasses an area of 1977 m^2 in the south central section of the Protected Area. No materials of plant origin exist in this survey unit.

Soil Sample Design

Scoping Data

Scoping measurements and supporting surveys performed in the Protected Area following removal of subsurface components and demolition debris do not indicate the presence of elevated levels of residual radioactivity in this survey area. Input data for survey design were conservatively estimated based on supporting surveys of excavated soils resulting from subsurface structure and component removal within the Protected 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:

$$\sigma = \sqrt{\left(\frac{\sigma_{Cs137}}{DCGL_{Cs137}}\right)^2 + \left(\frac{\sigma_{Co60}}{DCGL_{Co60}}\right)^2}$$

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

$$\sigma = 0.091$$

Relative Shift

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

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

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

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
0.803882	0.025830

Survey Unit Dimensions: X = 60.0 meters
Y = 39.3 meters

Random Start Location With SW Corner Origin: X = (0.803882)(60.0) = 48.2 meters
Y = (0.025830)(39.3) = 1.0 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.

$$L = \sqrt{\frac{1977}{18}} = 10.4 \text{ meters}$$

With sample spacing established at 10.4 meters, 20 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:	12	Start Point:	11
Sample Recount:	14	Scan Toward:	17
Sample Recount:	16	Minimum Scan Area Requirement:	198 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:

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

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 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 FSS $06C_1 1$.

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

Attachment 1

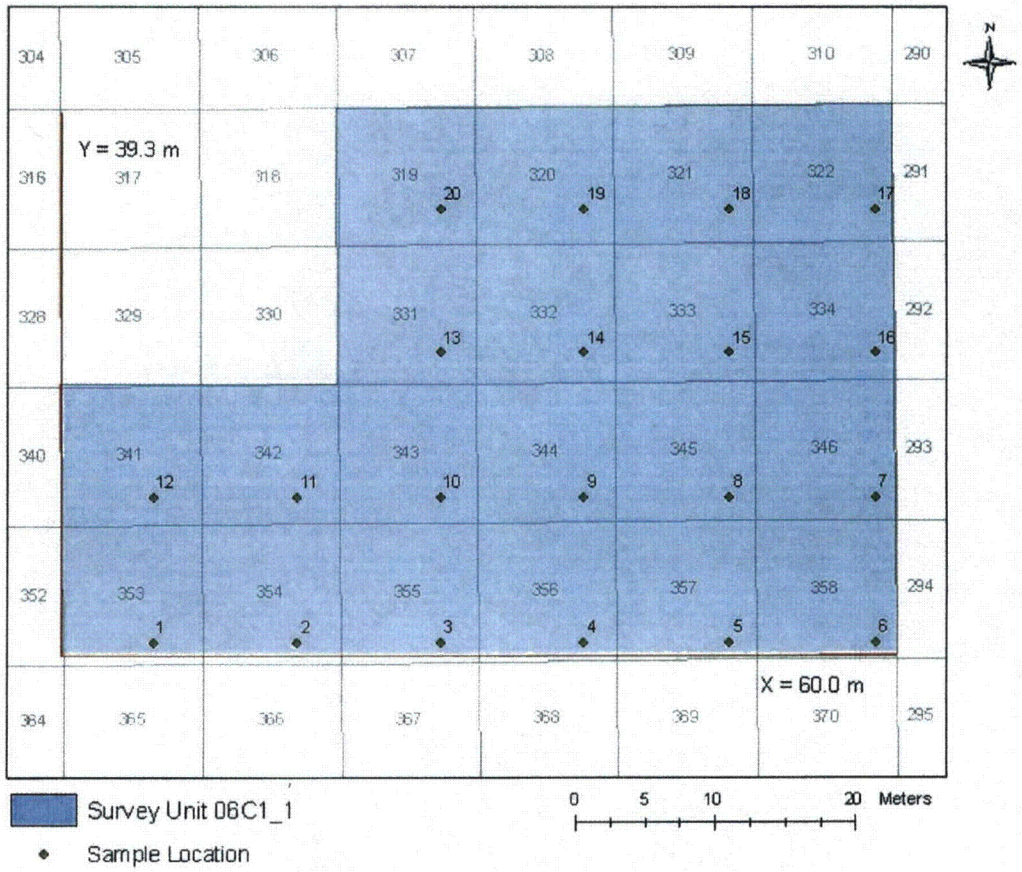
Design Data - FSS 06C$_1$1
Protected Area Supporting Surveys

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 06C$_1$1
South central Protected Area



Sample No.	Grid Number	X Coord.	Y Coord.	Sample No.	Grid Number	X Coord.	Y Coord.
1	353	6.6	1.0	11	342	7.0	1.4
2	354	7.0	1.0	12	341	6.6	1.4
3	355	7.4	1.0	13	331	7.4	1.8
4	356	7.8	1.0	14	332	7.8	1.8
5	357	8.2	1.0	15	333	8.2	1.8
6	358	8.6	1.0	16	334	8.6	1.8
7	346	8.6	1.4	17	322	8.6	2.2
8	345	8.2	1.4	18	321	8.2	2.2
9	344	7.8	1.4	19	320	7.8	2.2
10	343	7.4	1.4	20	319	7.4	2.2

Sample spacing is 10.4 meters

Attachment 3

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

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

RM-76-5
FINAL STATUS SURVEY APPROVAL
AND AUTHORIZATION FOR IMPLEMENTATION

Survey Code $06C_11$

Survey Area Description:

Final Status Survey $06C_11$ encompasses 1977 m^2 at or below the grade elevation present during plant power operations in the south central section of the Protected Area. No materials of plant origin remain in the survey area.

The survey area is authorized for Final Status Survey Implementation.

Jodie L. Reed — Designed by
09-12-2006 — Date

Technical Review by
09-12-2006 — Date

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

Step (+)		Initial	Date
1.0	PREPARATION FOR SURVEY 06C, 1 (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.	JHR ESSG	09/12/06
✓	b. Survey area has been turned over to the Environmental Services Survey Group (ESSG) in acceptable condition for FSS.	JHR ESSG	09/12/06
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)	JHR ESSG	09/14/06

RM-77-1
SURVEY IMPLEMENTATION CHECKLIST
Page 2 of 3

		Initial	Date
2.0	DATA COLLECTION		
2.1	Soil Survey:		
✓	All soil samples collected and controlled (Step 6.2.1).	JHL ESSG	09/14/06
2.2	Surface Scan:		
✓	Surface Scan complete. Action response requirements have been conducted on any identified areas exceeding the investigation level (Step 6.3).	JHL ESSG	09/14/06
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).	JHL ESSG	09/14/06
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.	JHL ESSG	09/18/06

ATTACHMENT RM-59-1
SAMPLING AND ANALYSIS REPORT

Date: 09-14-2006	Time: 1600	Location: $06C_1 1$	Tech: SSO/JHW/LED/JNS

SURVEY IDENTIFICATION / DESCRIPTION

Survey $06C_1 1$ encompasses 1977 m^2 at or below the grade elevation present during plant power operations in the south central section of the Protected Area. No materials of plant origin remain in this area.

SURVEY TYPE

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

SURVEY DESIGN

Sample Collection: ____ Judgmental ____ Random X Systematic ____ Large Container Assay
Scan Coverage: 100%

ANALYSIS

Inst.SN/Cal Due 201195/02-10-2007	DAILY CHECK:	X	SAT	____ UNSAT	INIT: SSO
Inst.SN/Cal Due 186185/09-23-2006	DAILY CHECK:	X	SAT	____ UNSAT	INIT: LED
Inst.SN/Cal Due 193709/02-21-2007	DAILY CHECK:	X	SAT	____ UNSAT	INIT: TRS
Inst.SN/Cal Due 189086/01-26-2007	DAILY CHECK:	X	SAT	____ UNSAT	INIT: JHW
Inst.SN/Cal Due Det. # 6	DAILY CHECK:	X	SAT	____ UNSAT	INIT: JP
Investigation of Unidentified Peaks:		X	SAT	____ UNSAT	INIT: JLR
Minimum Detectable Activity (Section 5.3.2)		X	SAT	____ UNSAT	INIT: JLR

COMMENTS

Survey $06C_1 1$ was performed in a random start, square grid, systematic sampling pattern with samples collected at 20 data point locations. Laboratory analyses did not identify residual radioactivity above trace levels of the DCGL value. Surface scanning identified no areas of elevated residual radioactivity. The results of the QA/QC verification scan (10%) were consistent with the findings of the primary survey scan.

Technician Signature: [signature] Date: 9-14-06

Second Level Review Signature: [signature] Date: 10-22-06

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

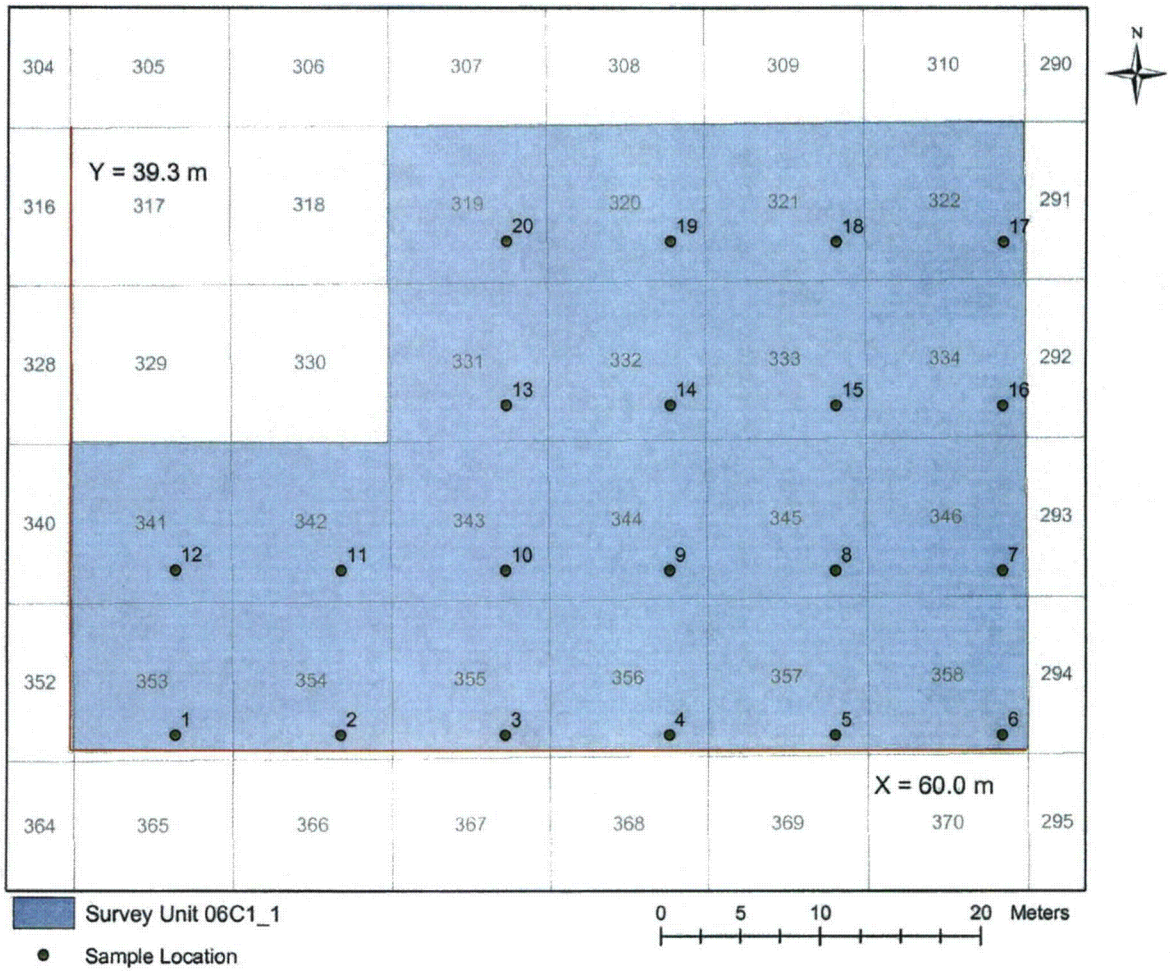
		Initial	Date
3.2	Laboratory Analysis:		
✓	Isotopic analyses are complete. The spectroscopy report requires a signature of completion by the laboratory analyst and a signature of evaluation documenting that a second level review has been performed (Step 6.4.2).	JLG ESSG	09/19/06
3.3	Sample Control and Documentation:		
✓	Chain of custody documentation exhibits control of soil samples (Step 6.4.3).	JLG ESSG	09/18/06

Joshua L. Reed — Reviewed by

10/23/06 — Date

Soil Sample Activity Summary

Release Record 06C_1_1
South Central Protected Area

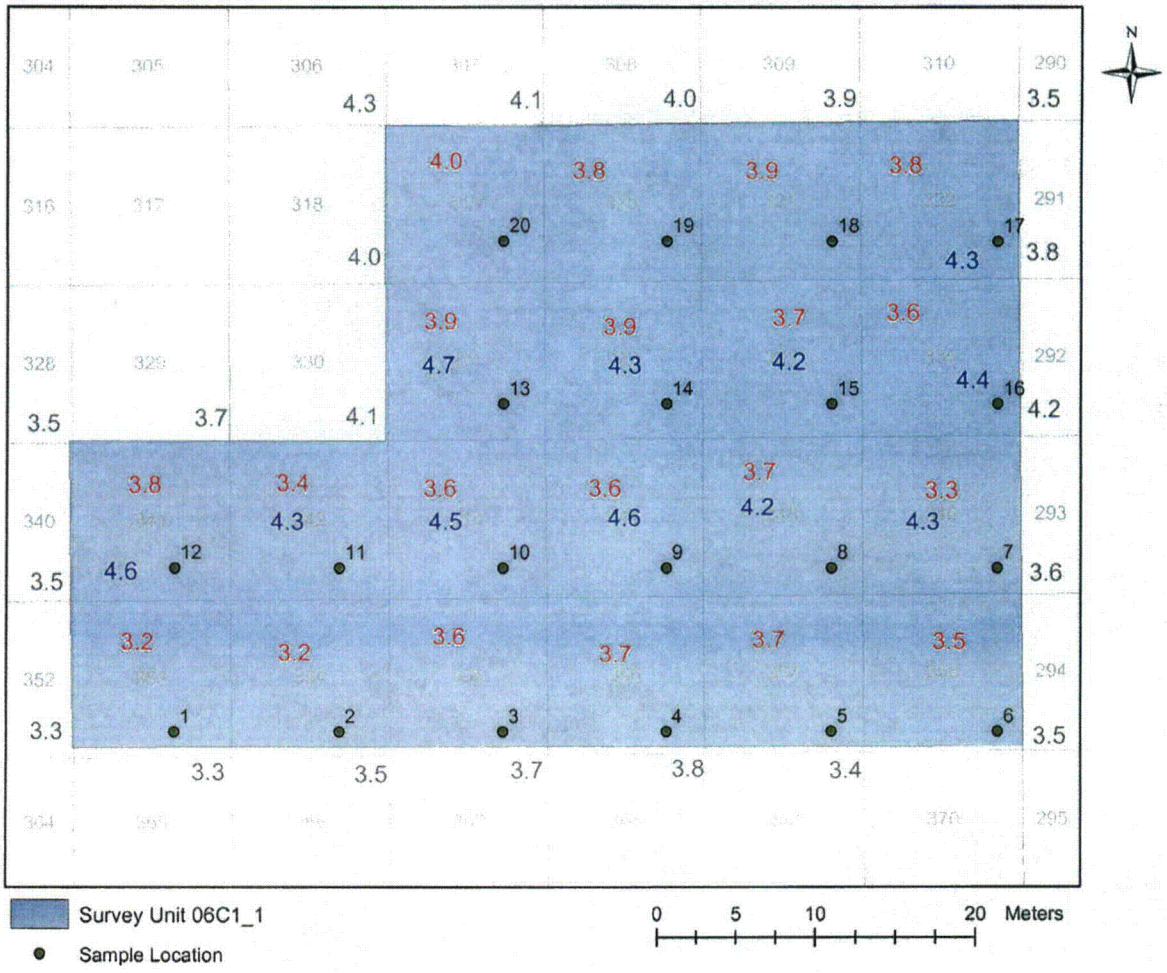


Sample No.	Grid #	X Coord.	Y Coord.	Cs-137 (pCi/g)		Co-60 (pCi/g)	
				Activity	MDA	Activity	MDA
1	353	6.6	1.0	0.0547		*0.0319	0.0593
2	354	7.0	1.0	0.0490		*-0.0036	0.0472
3	355	7.4	1.0	0.0472		*-0.0083	0.0569
4	356	7.8	1.0	0.0853		*0.0471	0.0749
5	357	8.2	1.0	0.0331		*0.0291	0.0640
6	358	8.6	1.0	0.0902		*-0.0150	0.0499
7	346	8.6	1.4	0.0581		*0.0132	0.0564
8	345	8.2	1.4	*0.0044	0.0430	*0.0023	*0.0579
9	344	7.8	1.4	0.0667		*0.0566	*0.0789
10	343	7.4	1.4	0.0918		*0.0369	*0.0763
11	342	7.0	1.4	0.0468		*0.0323	*0.0599
12	341	6.6	1.4	*0.0324	0.0612	*-0.0009	*0.0624
13	331	7.4	1.8	0.0624		*0.0013	*0.0607
14	332	7.8	1.8	0.0417		*0.0030	*0.0639
15	333	8.2	1.8	*0.0364	0.0555	*0.0474	*0.0722
16	334	8.6	1.8	*0.0213	0.0598	*0.0110	*0.0612
17	322	8.6	2.2	0.0613		*0.0049	*0.0583
18	321	8.2	2.2	0.0422		*0.0084	*0.0624
19	320	7.8	2.2	*0.0287	0.0560	*0.0119	*0.0491
20	319	7.4	2.2	0.0524		*0.0422	*0.0676

*Forced-count values

Surface Scan Summary

Release Record 06C$_1$1
South Central Protected 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)

* No investigation levels exceeded. gsk 10/03/06

Primary Scan : 100 % Scanned

Technician Signature: [signature] Date: 9.14.06
Time: 1400

QC Verification Scan: 10 %

Technician Signature: [signature] for JWS Date: 9.14.06
Time: 1400

06C$_1$1
RM-72-1
CHAIN-OF-CUSTODY RECORD

Sample Number	Sampling Location	Date	Time	Final Disposition of Sample
1	Grid # 353 (6.6) (1.0)	9.14.06	1238	Permanent locked storage
2	Grid # 354 (7.0) (1.0)	9.14.06	1240	
3	Grid # 355 (7.4) (1.0)	9.14.06	1243	
4	Grid # 356 (7.8) (1.0)	9.14.06	1229	
5	Grid # 357 (8.2) (1.0)	9.14.06	1230	
6	Grid # 358 (8.6) (1.0)	9.14.06	~~1255~~ 1235	
7	Grid # 346 (8.6) (1.4)	9.14.06	1255	
8	Grid # 345 (8.2) (1.4)	9.14.06	1252	
9	Grid # 344 (7.8) (1.4)	9.14.06	~~1249~~ 1251	
10	Grid # 343 (7.4) (1.4)	9.14.06	~~1251~~ 1249	
11	Grid # 342 (7.0) (1.4)	9.14.06	~~1255~~ 1248	
12	Grid # 341 (6.6) (1.4)	9.14.06	1246	
12 QA Split	Grid # 341 (6.6) (1.4)	9.14.06	1246	
13	Grid # 331 (7.4) (1.8)	9.14.06	1306	
14 (R)	Grid # 332 (7.8) (1.8)	9.14.06	1305	
15	Grid # 333 (8.2) (1.8)	9.14.06	1305	
16 (R)	Grid # 334 (8.6) (1.8)	9.14.06	1300	
17	Grid # 322 (8.6) (2.2)	9.14.06	1316	
18	Grid # 321 (8.2) (2.2)	9.14.06	1313	
19	Grid # 320 (7.8) (2.2)	9.14.06	1309	
20	Grid # 319 (7.4) (2.2)	9.14.06	1307	

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

1. Relinquished by: in chem. lab. locked storage J Scott Chatfield	Date 9.14.05	Time 1405	Received in good condition by: JPruchnicki
2. Relinquished by: JPruchnicki	Date 9/18/06	Time 1530	Received in good condition by: Permanent (sealed) storage locked
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: 06 C, 1

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 _____

_____

_____

_____

_____

Jodie L. Reed
Assessor

10/23/06
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: 15

b. Total number of statistical samples determined as valid: 20

c. Calculate % Completeness: $\frac{b \times 120}{a}$ = 160%

✓ 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

10/23/06
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 20

b. Calculation of the Mean 0.0097 (SOR)

c. Calculation of the Median 0.0064 (SOR)

d. Calculation Standard Deviation 0.0072 (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.

RM-78-3
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.

RM-78-3
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 _____

Joshie L. Reed
Assessor

10/23/06
Date

Reviews:

Technical Review

10/23/06
Date

ES Superintendent

10/23/06
Date

RP&ES Manager

10-23-06
Date

RM-78-3, Attachment 1
Statistical Quantities

Release Record $06C_1 1$
South Central Protected Area

Sample Number	Cs-137 (pCi/gm)	Co-60 (pCi/gm)	Weighted Sum (SOR)	**Weighted Sum <DCGLw?	DCGL-W. Sum	Sign
1	0.0547	0.0319	0.0145	yes	0.9855	+1
2	0.0490	-0.0036	0.0030	yes	0.9970	+1
3	0.0472	-0.0083	0.0014	yes	0.9986	+1
4	0.0853	0.0471	0.0218	yes	0.9782	+1
5	0.0331	0.0291	0.0118	yes	0.9882	+1
6	0.0902	-0.0150	0.0029	yes	0.9971	+1
7	0.0581	0.0132	0.0090	yes	0.9910	+1
8	0.0044	0.0023	0.0011	yes	0.9989	+1
9	0.0667	0.0566	0.0232	yes	0.9768	+1
10	0.0918	0.0369	0.0192	yes	0.9808	+1
11	0.0468	0.0323	0.0140	yes	0.9860	+1
12	0.0324	-0.0009	0.0024	yes	0.9976	+1
13	0.0624	0.0013	0.0056	yes	0.9944	+1
14	0.0417	0.0030	0.0044	yes	0.9956	+1
15	0.0364	0.0474	0.0178	yes	0.9822	+1
16	0.0213	0.0110	0.0052	yes	0.9948	+1
17	0.0613	0.0049	0.0067	yes	0.9933	+1
18	0.0422	0.0084	0.0062	yes	0.9938	+1
19	0.0287	0.0119	0.0061	yes	0.9939	+1
20	0.0524	0.0422	0.0175	yes	0.9825	+1

Std. Dev	0.0224	0.0210	0.0072
Mean	0.0503	0.0176	0.0097
Median	0.0481	0.0115	0.0064

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 # 06C,1 QC Package # 06C,1

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 #12 = QA/QC Split; Sample #14 & #16 = Recounts.

Reviews:

Jodie L. Read — Evaluator — 10/23/06 — Date

D. E. [illegible] — Technical Review — 10/23/06 — Date

QA Verification
Split Sample Analysis

Date: 9/14/2006

QA: 06C$_1$1 South Central Protected 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)**
12	Co-60	<	0.0624	n/a	n/a	n/a	<	0.0638	1.02	YES
12	Cs-137	<	0.0612	n/a	n/a	n/a	<	0.0622	1.02	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: 9/14/2006

QA: 06C,1 South Central Protected 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)**
14	Co-60	<	0.0639	n/a	n/a	n/a	<	0.0749	1.17	YES
14	Cs-137		0.0417	38.44	2.60	n/a		0.0671	1.61	YES
16	Co-60	<	0.0612	n/a	n/a	n/a	<	0.0479	0.78	YES
16	Cs-137	<	0.0598	n/a	n/a	n/a		0.0506	0.85	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.*

Tritium in Soil
Data Results
Final Status Survey $06C_1 1$

Sample Number	Tritium in Soil pCi/g
12	0.007
14	0.015
16	0.024

Mean:	0.0153
Median:	0.0150
St. Dev:	0.0085

Note: The DCGL for Tritium is 327 pCi/g.
Sample results are less than 0.02% of the DCGL

Environmental, Inc.
Midwest Laboratory
an Allegheny Technologies Co.

700 Landwehr Road • Northbrook, IL 60062-2310
ph. (847) 564-0700 • fax (847) 564-4517

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

LABORATORY REPORT NO. 8022-100-230
DATE: 09-22-2006
SAMPLES RECEIVED: 09-19-2006
PURCHASE ORDER NO:

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

Excavated Soil Survey 06C$_1$1

Sample Description	Collection Date	Lab Code	Concentration (pCi/g of soil) H-3	MDA (pCi/g of soil)
12	09-14-06	BRSO-6372	0.007 ± 0.006	< 0.011
14	09-14-06	BRSO-6373	0.015 ± 0.008	< 0.014
16	09-14-06	BRSO-6374	0.024 ± 0.007	< 0.013

The error given is the probable counting error at 95 % confidence level. The less than, (<), value is based on 4.66 sigma counting error for background sample.

Sincerely,

Bronia Grob,
Laboratory Manager

APPROVED BY Tony Coorlim /bmo

Tony Coorlim,
Quality Assurance

ATTACHMENT 5

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 RELOCATED SOIL RELEASE RECORD, $TBC_{X15}1$,
RELOCATED SOILS FROM TURBINE BUILDING/CONTAINMENT DEMOLITION

October 24, 2006

38 Pages

Supporting Survey, Relocated Soil
Release Record $TBC_{x15}1$

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: 10/23/06
(ESSG Supervisor)

Signed: _____ Date: 10/23/06
(ES Superintendent)

Signed: _____ Date: 10-23-06
(RP & ES Manager)

Survey Requirements

Release Record $TBC_{X15}1$
Relocated Soils From Turbine Building/Containment Demolition Area

Survey Description

Supporting survey $TBC_{x15}1$ 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 1800 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 $TBC_{x15}1$ will be performed in the following activity sequence:

1. Walkdown: Environmental Services Survey Group (ESSG) 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 $TBC_{x15}1$ 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 $TBC_{X15}1$
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 1800 m^2.

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 September 22, 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 $TBC_{X15}1$

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 $TBC_{x15}1$
Survey Design
Relocated Soils from Turbine Building/Containment Demolition Area

Survey Unit Description

Survey $TBC_{x15}1$ 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 1800 m^2. 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 a 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:

$$\sigma = \sqrt{\left(\frac{\sigma_{Cs137}}{DCGL_{Cs137}}\right)^2 + \left(\frac{\sigma_{Co60}}{DCGL_{Co60}}\right)^2}$$

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

$\sigma = 0.091$

Relative Shift

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

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

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
0.341663	0.184214

Survey Unit Dimensions: X = 150 meters
Y = 12 meters

Random Start Location With SW Corner Origin: X = (0.341663)(150) = 51.2 meters
Y = (0.184214)(12) = 2.2 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.

$$L = \sqrt{\frac{1800}{18}} = 10 \text{ meters}$$

With sample spacing established at 10 meters, 15 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:	2	Start Point:	8
Sample Recount:	4	Scan Toward:	2
Sample Recount:	7	Minimum Scan Area Requirement:	180 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:

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

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

[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 $TBC_{x15}1$.

Attachment 1

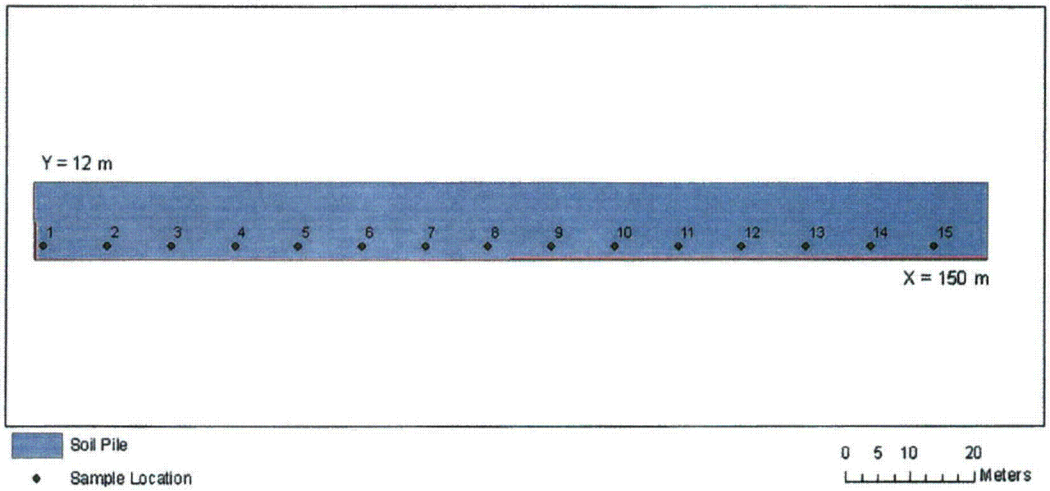
Design Data - Survey $TBC_{x15}1$
Relocated Soils From Turbine Building Demolition Area

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 $TBC_{x15}1$
Relocated Soils From Containment/Turbine Building Demolition Area



Sample No.	X Coord.	Y Coord.	Sample No.	X Coord.	Y Coord.
1	1.2	2.2	9	81.2	2.2
2	11.2	2.2	10	91.2	2.2
3	21.2	2.2	11	101.2	2.2
4	31.2	2.2	12	111.2	2.2
5	41.2	2.2	13	121.2	2.2
6	51.2	2.2	14	131.2	2.2
7	61.2	2.2	15	141.2	2.2
8	71.2	2.2			

Sample no. 6 is the random start location

Sample spacing is 10.0 meters

Attachment 3

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						

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

RM-76-5
FINAL STATUS SURVEY APPROVAL

AND AUTHORIZATION FOR IMPLEMENTATION

Survey Code $TBC_{x15}1$

Survey Area Description:

Survey $TBC_{x15}1$ is the final status evaluation of soil that was excavated from the Turbine Building/Containment demolition area. The soil has been relocated to the SVA and prepared for survey by grading to a maximum depth of 1 meter over an area of 1800 square meters.

The survey area is authorized for Final Status Survey Implementation.

Jodie L. Reed — Designed by — 09-14-2006 — Date

Technical Review by — 09-14-2006 — Date

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

Step (+)		Initial	Date
1.0	PREPARATION FOR SURVEY TBC x151 (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	09/14/06
✓	b. Survey area has been turned over to the Environmental Services Survey Group (ESSG) in acceptable condition for FSS.	JAR ESSG	09/14/06
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	09/22/06

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).	ESSG	09/25/06
2.2	Surface Scan:		
✓	Surface Scan complete. Action response requirements have been conducted on any identified areas exceeding the investigation level (Step 6.3).	ESSG	09/22/06
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).	ESSG	09/25/06
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.	ESSG	09/28/06

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	09/29/06
3.3	Sample Control and Documentation:		
✓	Chain of custody documentation exhibits control of soil samples (Step 6.4.3).	ESSG	09/29/06

Joshua L. Reed — Reviewed by
10-20-06 — Date

ATTACHMENT RM-59-1
SAMPLING AND ANALYSIS REPORT

Date: 09-22-06	Time: 1600	Location: $TBC_{x15}1$	Tech:WMH/LED/JHW/JNS

SURVEY IDENTIFICATION / DESCRIPTION

Survey $TBC_{x15}1$ consists of excavated soils removed from the Turbine/ Containment Building demolition area and the removal of subsurface piping and components. The physical size of the survey area is 1800

SURVEY TYPE

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

SURVEY DESIGN

Sample Collection: ____ Judgmental ____ Random __X__ Systematic ____ Large Container Assay
Scan Coverage: 100 %

ANALYSIS

Inst.SN/Cal Due 186194/02-08-2007	DAILY CHECK:	X	SAT	____ UNSAT	INIT: WMH
Inst.SN/Cal Due 186192/03-14-2007	DAILY CHECK:	X	SAT	____ UNSAT	INIT: WMH
Inst.SN/Cal Due 201195/02-10-2007	DAILY CHECK:	X	SAT	____ UNSAT	INIT: WMH
Inst.SN/Cal Due 189086/01-26-2007	DAILY CHECK:	X	SAT	____ UNSAT	INIT: WMH
Inst.SN/Cal Due Det #6	DAILY CHECK:	X	SAT	____ UNSAT	INIT: JP
Investigation of Unidentified Peaks:		X	SAT	____ UNSAT	INIT: JLR
Minimum Detectable Activity (Section 5.3.2)		X	SAT	____ UNSAT	INIT: JLR

COMMENTS

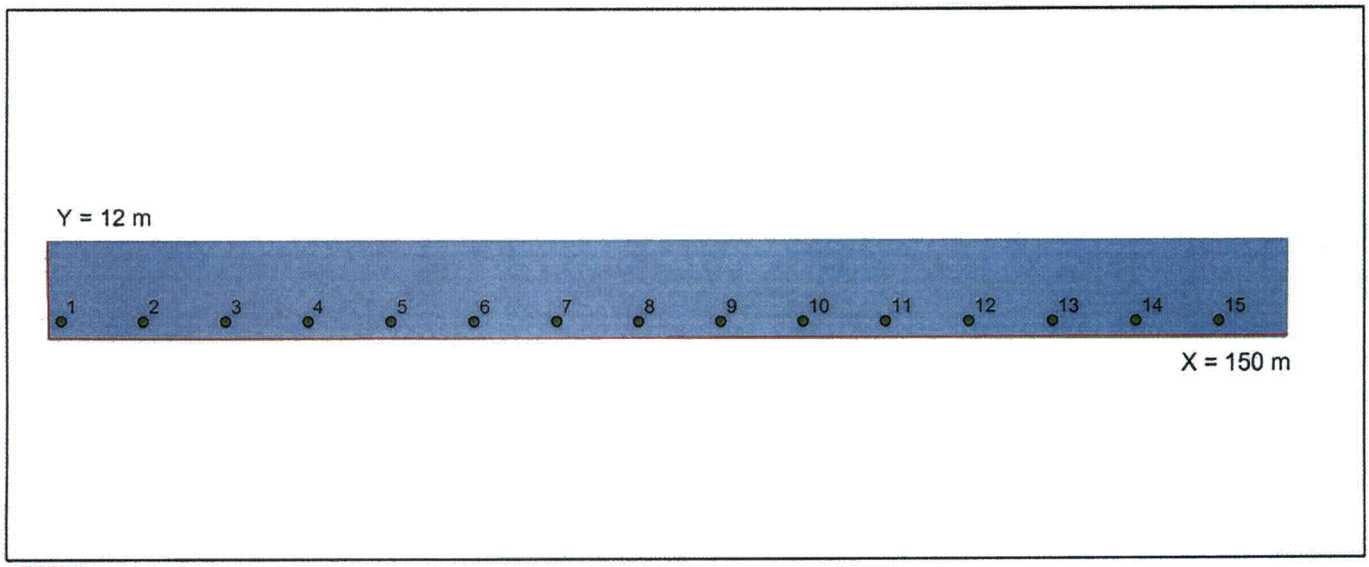
Survey $TBC_{x15}1$ was performed in a random start, square grid, systematic sampling pattern with samples Collected at 15 data point locations. Laboratory analyses did not identify residual radioactivity above trace Levels of the DCGL value. Surface scanning at 100% coverage identified no areas of elevated residual Radioactivity. The results of QA/QC verification scanning (10% coverage) were consistent with the scan values identified in the survey.

Technician Signature: [signature] for LED, JNS Date: 9/28/06

Second Level Review Signature: [signature] Date: 10/20/06

Soil Sample Activity Summary

Release Record $TBC_{X15}1$
Relocated Soil from Containment/Turbine Building Demolition Area



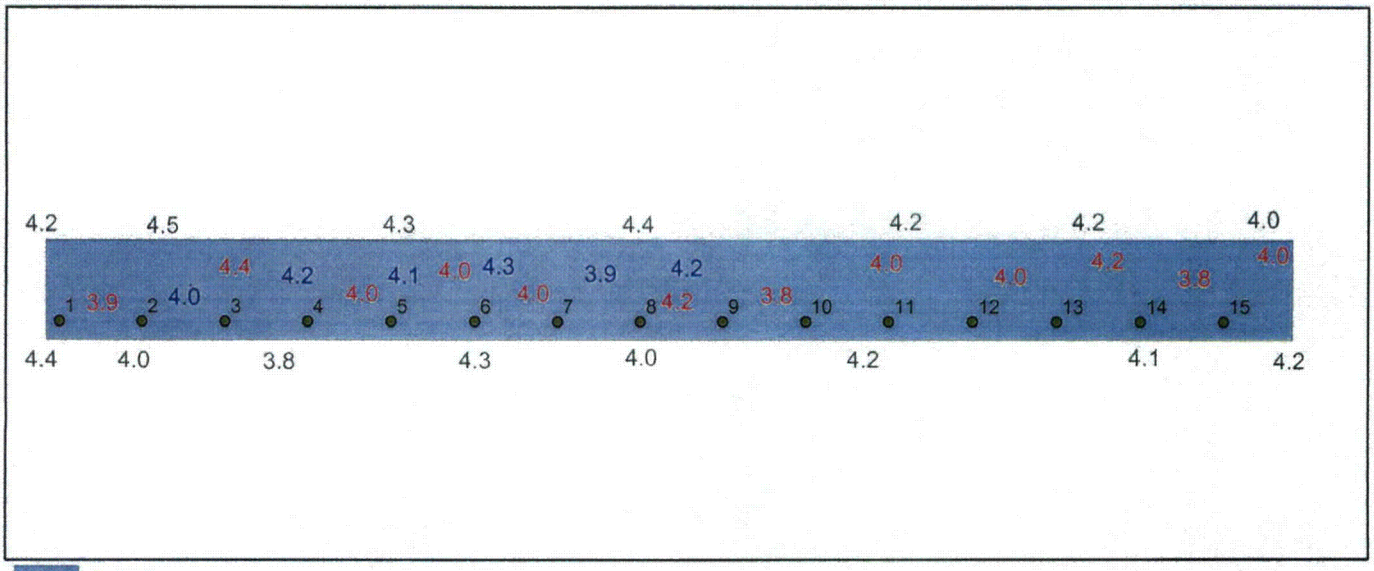
Sample No.	X Coord.	Y Coord.	Cs-137 (pCi/g)		Co-60 (pCi/g)	
			Cs-137 (pCi/g)	MDA	Activity	MDA
1	1.2	2.2	0.0694		*0.0121	0.0552
2	11.2	2.2	0.0431		*0.0065	0.0754
3	21.2	2.2	0.0391		*0.0283	0.0689
4	31.2	2.2	*0.0299	0.0568	*-0.0181	0.0387
5	41.2	2.2	*0.0190	0.0480	*-0.0144	0.0441
6	51.2	2.2	*0.0256	0.0508	*0.0002	0.0603
7	61.2	2.2	0.0332		*0.0000	0.0541
8	71.2	2.2	0.0442		*-0.0209	0.0412
9	81.2	2.2	*0.0183	0.0507	*0.0151	0.0512
10	91.2	2.2	*-0.0020	0.0335	*-0.0016	0.0503
11	101.2	2.2	*0.0212	0.0559	*0.0003	0.0599
12	111.2	2.2	*0.0312	0.0542	*0.0206	0.0568
13	121.2	2.2	0.0706		*0.0144	0.0583
14	131.2	2.2	*0.0427	0.0622	*0.0319	0.0612
15	141.2	2.2	*0.0458	0.0584	*-0.0087	0.0534

*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$_{x15}$1
Relocated Soil from Containment/Turbine Building Demolition Area



*No investigation levels exceeded
JJK
9/22/06

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: [signature] Date: 9-22-06
Time: 1400

QC Verification Scan: 10 %

Technician Signature: [signature] Date: 9·22·06
Time: 1515

TBC$_{x15}$1
RM-72-1
CHAIN-OF-CUSTODY RECORD

Sample Number	Sampling Location	Date	Time	Final Disposition of Sample
1	(1.2)(2.2)	9-25-06	1308	Permanent Storage
2	(11.2)(2.2)	9-25-06	1310	
2 QA Split	(11.2)(2.2)	9-25-06	1310	
3	(21.2)(2.2)	9-25-06	1314	
4 (R)	(31.2)(2.2)	9-25-06	1317	
5	(41.2)(2.2)	9-25-06	1318	
6	(51.2)(2.2)	9-25-06	1319	
7 (R)	(61.2)(2.2)	9-25-06	1321	
8	(71.2)(2.2)	9-25-06	1323	
9	(81.2)(2.2)	9-25-06	1325	
10	(91.2)(2.2)	9-25-06	1326	
11	(101.2)(2.2)	9-25-06	1328	
12	(111.2)(2.2)	9-25-06	1329	
13	(121.2)(2.2)	9-25-06	1330	
14	(131.2)(2.2)	9-25-06	1332	
15	(141.2)(2.2)	9-25-06	1333	

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

1. Relinquished by: Locked in Sealand	Date 9-25-06	Time 1358	Received in good condition by:
2. Relinquished by:	Date 9/28/06	Time 1230	Received in good condition by: Permanent Storage Sealand
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 x15 1

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 L. Reed
Assessor

10/20/06
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: 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 Read
Assessor

10/20/00
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 15

b. Calculation of the Mean 0.0043 (SOR)

c. Calculation of the Median 0.0028 (SOR)

d. Calculation Standard Deviation 0.0056 (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. JK

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.

NA 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
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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.

Josie L Reed — Assessor — 10/20/06 — Date

Reviews:

[signature] — Technical Review — 10/23/06 — Date

[signature] — ES Superintendent — 10/23/06 — Date

[signature] — RP&ES Manager — 10-23-06 — Date

RM-78-3, Attachment 1
Statistical Quantities

Release Record $TBC_{x15}1$
Relocated Soil from Containment/Turbine Building Demolition Area

Sample Number	Cs-137 (pCi/gm)	Co-60 (pCi/gm)	Weighted Sum (SOR)	**Weighted Sum <DCGLw?	DCGL-W. Sum	Sign
1	0.0694	0.0121	0.0096	yes	0.9904	+1
2	0.0431	0.0065	0.0056	yes	0.9944	+1
3	0.0391	0.0283	0.0121	yes	0.9879	+1
4	0.0299	-0.0181	-0.0031	yes	0.9969	+1
5	0.0190	-0.0144	-0.0029	yes	0.9971	+1
6	0.0256	0.0002	0.0022	yes	0.9978	+1
7	0.0332	0.0000	0.0028	yes	0.9972	+1
8	0.0442	-0.0209	-0.0028	yes	0.9972	+1
9	0.0183	0.0151	0.0062	yes	0.9938	+1
10	-0.0020	-0.0016	-0.0007	yes	0.9993	+1
11	0.0212	0.0003	0.0019	yes	0.9981	+1
12	0.0312	0.0206	0.0090	yes	0.9910	+1
13	0.0706	0.0144	0.0104	yes	0.9896	+1
14	0.0427	0.0319	0.0135	yes	0.9865	+1
15	0.0458	-0.0087	0.0011	yes	0.9989	+1
Std. Dev	0.0189	0.0161	0.0056			
Mean	0.0354	0.0044	0.0043			
Median	0.0332	0.0003	0.0028			

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 x151 QC Package # TBC x161

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 # 2 = QA Recount; Sample # 4 & 7 = Recounts.

Reviews:

Joshua L Reed — Evaluator — 10/20/06 — Date

[signature] — Technical Review — 10/23/06 — Date

QA Verification
Split Sample Analysis

Date: 9/25/2006

QA: TBC$_{x15}$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)	Recount Result Below MDA	Recount Results (pCi/g)	Comparison Ratio F/A	Results in Agreement Compare G with D)
2	Co-60	<	0.0754	n/a	n/a	n/a	<	0.0588	0.78	YES
2	Cs-137		0.0431	46.17	2.17	n/a	<	0.0605	1.40	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: 9/25/2006

QA: TBC_{x15}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)**
4	Co-60	<	0.0387	n/a	n/a	n/a	<	0.0641	1.66	YES
4	Cs-137	<	0.0568	n/a	n/a	n/a	<	0.0568	1.00	YES
7	Co-60	<	0.0541	n/a	n/a	n/a	<	0.0442	0.82	YES
7	Cs-137		0.0332	44.44	2.25	n/a	<	0.0547	1.65	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.

Tritium in Soil
Data Results
Final Status SurveyTBC$_{x15}$1

Sample Number	Tritium in Soil pCi/g
2	0.007
4	0.006
7	0.004

Mean:	0.0060
Median:	0.0060
St. Dev:	0.0010

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

Environmental, Inc.
Midwest Laboratory
an Allegheny Technologies Co.

700 Landwehr Road • Northbrook, IL 60062-2310
ph. (847) 564-0700 • fax (847) 564-4517

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

LABORATORY REPORT NO. 8022-100-243
DATE: 10-02-2006
SAMPLES RECEIVED: 09-27-2006
PURCHASE ORDER NO:

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

Excavated Soil Survey TBC_{x15}-1

Sample Description	Collection Date	Lab Code	Concentration (pCi/g of soil) H-3	MDA (pCi/g of soil)
2	09-25-06	BRSO-6591	0.007 ± 0.006	< 0.011
4	09-25-06	BRSO-6592	0.006 ± 0.006	< 0.010
7	09-25-06	BRSO-6593	0.004 ± 0.005	< 0.010

The error given is the probable counting error at 95 % confidence level. The less than, (<), value is based on 4.66 sigma counting error for background sample.

Sincerely,

Bronia Grob

Bronia Grob,
Laboratory Manager

APPROVED BY

Tony Coorlim,
Quality Assurance