Appendix A (pages 1-9)

FirstEnergy

SNEC CALCULATION COVER SHEET

CALCULATION DESCRIPTION

Calculation Number	Revision Number	Effective Date	Page Number
E900-05-017	1	6/1/05	1 of 9

Subject

Open Land FSS Design – OL13

Question 1 - Is this calculation defined as "In QA Scope"? Refer to definition 3.5. Yes ☒ No ☐

Question 2 - Is this calculation defined as a "Design Calculation"? Refer to definitions 3.2 and 3.3. Yes ☒ No ☐

NOTES: If a "Yes" answer is obtained for Question 1, the calculation must meet the requirements of the SNEC Facility Decommissioning Quality Assurance Plan. If a "Yes" answer is obtained for Question 2, the Calculation Originator's immediate supervisor should not review the calculation as the Technical Reviewer.

DESCRIPTION OF REVISION

Revision 1 – Added the DCGLw Calculation Logic cover page to Attachment 2.

APPROVAL SIGNATURES

Calculation Originator	**Tristan M. Tritch/** Tristan M. Tritch	Date	5/31/05
Technical Reviewer	**W. J. Cooper/**	Date	5/31/05
Additional Review	**A. Paynter/**	Date	31 May 2005
Additional Review		Date	

1.0 PURPOSE

1.1 The purpose of this calculation is to develop a final status survey design for open land area OL13 at the Saxton Nuclear Experimental Corporation (SNEC) facility.

1.2 Survey Area OL13 is an Impacted Class 3 area which bounds the eastern perimeter of the SNEC facility decommissioning project. It covers approximately **27,600 square meters** (269 10m x 10m grids and 15 partial grids) and is one of the largest survey areas on the project. Table 5-5 of the SNEC License Termination Plan (LTP) limits the physical size of Class 3 survey areas to 10,000 square meters. Due to this area constraint, OL13 will be subdivided into three smaller survey units, namely OL13-1 through OL13-3, containing 9800, 8800, and 9000 square meters, respectively.

1.3 Previous soil samples have indicated that no detectable activity greater than the Administrative Limit (AL) exists in this entire survey area.

1.4 OL13-3 has some concrete supports located on the eastern portion of the survey unit spanning grids AT102 and AU103. There also exists an electrical tower in grid AV100. AZ111 has an air sampling station.

1.5 OL13-1 is bounded to the south by the Power Plant Road. The general layout of the three survey units is shown on **Attachment 1-1.**

2.0 SUMMARY OF RESULTS

Below is information that should be used to develop a Survey Request (SR) for each of the three survey units.

The US NRC has reviewed and concurred with the methodology used to derive the effective DCGLw value listed below. See also **Attachments 2-1** through **2-3** from **Reference 3.13.**

Table 1, DCGLw Values

Volumetric DCGLw (pCi/g – Cs-137)
6.46 (4.84 A.L.)

NOTE: A.L. is the site Administrative Limit (75% of the effective DCGLw)

Of the 276 equivalent grids in OL13, 195 soil samples were taken from 82 of those grids. No sample exhibited activity greater than 30% of the A.L. The on-site sampling data was used to generate a sigma value (standard deviation) for determining the number of static measurements and soil samples to be taken during FSS. In addition, three samples were sent off site for "SNEC 11" analyses. OL4 data were used in this design because the activities of the three OL13 off-site sample analyses were so low as to produce unrealistic ratios of hard-to-detect radionuclides to Cs-137.

2.1 Survey Design

2.1.1 Scanning of open lands shall be performed using a ***2" dia. by 2" long NaI detector*** with a Cs-137 window setting **(Reference 3.1).** The window will straddle the Cs-137 662 keV full energy peak width (see typical calibration information on **Attachment 3-1).**

2.1.2 The instrument conversion factor/efficiency shall not be less than that assumed on **Attachment 4-1:** ***205.6 cpm/uR/h – Cs-137.***

2.1.3 Other instruments, of the type specified in Section 2.1.1 above, may be used during the final status survey (FSS), but they must demonstrate detection efficiencies at or above the value listed in Section 2.1.2.

Table 2, Soil Scanning Parameters

MDCscan (pCi/g) – Cs-137*	Scan Speed (cm/sec)	Maximum Distance from Surface	Action Level	% Coverage
5.67	25	4" (gap between detector face & soil surface)	> 160 ncpm	up to 10%

See Attachment 4-1 *

2.1.4 If a count rate greater than the action level in Table 2 is encountered during the scanning process, then the surveyor shall stop and locate the boundary of the elevated area. The surveyor should then mark the elevated area with stakes or other appropriate marking methods. ***Sample the elevated areas(s)*** IAW SNEC procedure E900-IMP-4520.04 **(Reference 3.2)**, Section 2.2 of this document, and the investigation design.

2.1.4.1 ***Class 3*** soils should be scanned using a serpentine pattern that is ~0.5 meters wide.

2.1.4.2 As this is a Class 3 survey area, up to 10% of all accessible surfaces are required to be scanned. See **Attachment 1-1** for grid layouts for the three survey units. **Attachment 6** shows 28 grids selected for scanning and provides the grid identification for each.

2.1.4.3 Portions of survey units which cannot be accessed should be clearly noted along with the reason for not completing the survey.

2.1.5 The minimum number of soil sampling points indicated by the COMPASS computer program **(Reference 3.3)** is ***11*** for each of the three survey units (see COMPASS output on **Attachments 7-1** to **7-7**). Sampling depth should be IAW Section 2.2. The MDCscan (soil) exceeds the effective administrative DCGLw $_{Cs-137}$ (5.67 pCi/g MDCscan @ 250 cpm background > 4.84 pCi/g AL); however, given the area factor for the assumed one meter squared elevated area, the scan MDC meets MARSSIM requirements.

2.1.6 VSP **(Reference 3.4)** is used to plot all sampling points on the included diagrams. The actual number of random start systematically spaced measurement points may be greater than that required by the Compass computer code because of any or all of the following:

- placement of the initial random starting point (edge effects),
- odd shaped diagrams, and/or
- coverage concerns

(see **Attachments 6-1** through **6-6** for VSP sampling point locations)

2.1.7 The starting points for physically locating sample sites in the survey unit are based on measurements from site grid pins (see diagram on **Attachments 6-1, 6-3,** and **6-5**). Remaining soil sampling points are positioned using coordinates developed from these markers and listed on **Attachments 6-2, 6-4,** and **6-6.**

2.1.8 Some sampling points may need to be adjusted to accommodate obstructions within the survey area. Contact the SR coordinator to report any difficulties encountered when laying out systematic grid sampling points.

2.1.9 When an obstruction is encountered that will not allow collection of a sample, ***contact the cognizant SR coordinator*** for permission to delete the sampling point.

NOTE
If remediation actions are taken as a result of this survey, this survey design must be revised or re-written entirely.

2.2 Sample fixed point and elevated areas(s) IAW SNEC procedure E900-IMP-4520.04 **(Reference 3.2)** and the following.

NOTE
Since the site surface dose model is 1 meter in depth, samples representative of the entire one meter thick dose model layer must be collected to satisfy the sampling requirements of Section 2.1.5 (of this document). This should be done by obtaining a well mixed sample of an entire one meter deep core. Sections 4.2.3, 4.2.6, or 4.2.7 of site procedure E900-IMP-4520.04 are applicable when satisfying Section 2.1.5 of this document. Sampling due to an instrument alarm condition should also be of the entire one meter of soil/material.

2.2.1 Clearly mark, identify and document all sample locations.

2.3.1 Sample any location that is above the action level cited in Table 2.

2.3.2 Maintain chain-of-custody requirements on all design fixed point and action level samples **(Reference 3.12).**

3.0 REFERENCES

3.1 SNEC Calculation No. E900-03-018, "Optimize Window and Threshold Settings for the Detection of Cs-137 Using the Ludlum 2350-1 and a 44/10 NaI Detector", 8/7/03.

3.2 SNEC Procedure E900-IMP-4520.04, "Survey Methodology to Support SNEC License Termination".

3.3 COMPASS Computer Program, Version 1.0.0, Oak Ridge Institute for Science and Education.

3.4 Visual Sample Plan, Version 3.0, Copyright 2004, Battelle Memorial Institute.

3.5 SNEC Facility License Termination Plan.

3.6 SNEC Procedure E900-IMP-4500.59, "Final Site Survey Planning and DQA".

3.7 GPU Nuclear, SNEC Facility, "Site Area Grid Map", SNECRM-020, Sheet 1, Rev 4, 1/18/05.

3.8 SNEC Calculation No. E900-03-012, Effective DCGL Worksheet Verification.

3.9 SNEC Procedure E900-IMP-4520.06, "Survey Unit Inspection in Support of FSS Design".

3.10 NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual", August, 2000.

3.11 Microsoft Office Excel, Version 11.0.5612, Microsoft Corporation Inc., 1985-2003.

3.12 SNEC Procedure E900-ADM-4500.39 "Chain of Custody for Samples"

3.13 Recent "SNEC 11" Results from OL4, E900-05-019.

3.14 Personal conversation between Tristan Tritch and with Rob Marquette, 3/24/05.

4.0 ASSUMPTIONS AND BASIC DATA

4.1 The COMPASS computer program is used to calculate the required number of random start systematic samples to be taken in the survey unit **(Reference 3.3)**.

4.2 Characterization soil samples from this area are used as the initial estimate of variability. These results are shown on **Attachments 8-1** through **8-3**.

4.3 The MARSSIM Sign Test will be applicable for this survey design. No background subtraction will be performed under this criterion during the DQA phase.

4.4 The Visual Sample Plan (VSP) computer code **(Reference 3.4)** locates the required number of fixed survey points, determined by COMPASS, on the survey map for each survey unit.

4.5 **References 3.5** and **3.6** were used as guidance during the survey design development phase.

4.6 Background has been measured in the area and is approximately ***250 cpm*** **(Reference 3.14)**. The number of sample points was increased by almost 30% to account for swampy areas and other conditions which may cause some sample locations to be inaccessible.

4.7 The determination of the physical extent of this area is based on the drawing **Reference 3.7**.

4.8 There has been no known remediation in Area OL13.

4.9 This survey design uses Cs-137 as a surrogate for all SNEC facility related radionuclides in the survey unit. The effective DCGLw is the Cs-137 DCGLw from the SNEC LTP (6.6 pCi/g) adjusted (lowered) to compensate for the presence (or potential presence) of other SNEC-related radionuclides. In addition, an administrative limit (75%) has been set that further lowers the permissible Cs-137 concentration to an effective surrogate DCGLw for this survey area.

4.10 Samples, drawn from the sample database, typically would be used to determine the effective radionuclide mix for Area OL13; however, one sample from OL4 was used instead. Data from OL4 was used because it is immediately adjacent to OL13 and the sample has a sufficient amount of activity in it to produce meaningful ratios. The OL4 sample was assayed on site and at an off-site laboratory. **Attachments 2-1** through **2-3** show the radionuclide analysis and the Effective DCGL Calculator.

The undecayed sample results were input to the spreadsheet titled "Effective DCGL Calculator for Cs-137" (**Reference 3.8**) to determine the effective volumetric DCGLw value for the three survey units. The output of this spreadsheet is shown on **Attachment 2-2** which is copied from **Reference 3.13**. The spreadsheet was previously reviewed.

The NaI detector scan MDC calculation is determined based on a 25 cm/sec scan rate, a 1.38 index of sensitivity (95% correct detection probability and 60% false positive) and a detector sensitivity of 205.6 cpm/uR/h for Cs-137. Additionally, the detection system incorporates a Cs-137 window that lowers sensitivity to background in the survey unit. The resulting background is approximately ***250 cpm*** **(Reference 14)** for most locations in OL13.

4.11 The survey units described in this survey design were inspected. A copy of the OL13 specific portion of the SNEC facility post-remediation inspection report **(Reference 3.9)** is included as **Attachments 9-1** through **9-3**.

4.12 No special area characteristics including any additional residual radioactivity (not previously noted during characterization) have been identified in this survey area.

4.13 The decision error for this survey design is 0.05 for the α value and 0.1 for the β value.

4.14 "Special measurements", as described in the SNEC LTP sec 5.5.3.4, are not included in this survey design.

4.15 No additional sampling will be performed IAW this survey design beyond that described herein.

4.16 SNEC site radionuclides and their individual DCGLw values are listed on **Exhibit 1** of this calculation.

4.17 The survey design checklist is listed in **Exhibit 2**.

4.18 Area factors are shown as part of COMPASS output (see **Attachment 7-1**) and are based on the Cs-137 area factors from the SNEC LTP.

4.19 Since this is a Class 3 open land area, the few existing concrete monoliths, spanning grids AT102 and AU103, have not been selected for survey.

5.0 CALCULATIONS

5.1 All calculations are performed internal to applicable computer codes or within an Excel spreadsheet.

6.0 APPENDICES

6.1 **Attachment 1-1** is a diagram of survey units OL13-1 through OL13-3.

6.2 **Attachments 2-1** through **2-3** show the DCGL Calculation Logic – OL4 (Reference 3.13).

6.3 **Attachment 3-1** is a copy of the calibration data from typical NaI radiation detection instrumentation that will be used in this survey area.

6.4 **Attachment 4-1** is the MDCscan calculation sheet for volumetric materials in pCi/g.

6.5 **Attachment 5-1** is the MicroShield dose rate calculation results for 6" thick soil used to determine the exposure rate from a 1 pCi/cm^3 Cs-137 source term in an end-cylinder geometry.

6.6 **Attachments 6-1** through **6-6** show the randomly picked scan locations (from VSP) and reference coordinates for Survey Units OL13-1 through OL13-3.

6.7 **Attachments 7-1** through **7-7** are COMPASS outputs for Survey Units OL13-1 through OL13-3 showing area factors, the number of sampling points in each survey unit, and prospective power.

6.8 **Attachments 8-1** through **8-3** show the soil variability results for samples from OL13 based on all available data taken from the area.

6.9 **Attachments 9-1** through **9-3** are copies of the inspection report for OL13.

Exhibit 1

SNEC Facility Individual Radionuclide DCGL Values [a]

Radionuclide	25 mrem/y Limit Surface Area ($dpm/100cm^2$)	25 mrem/y Limit (All Pathways) Open Land Areas (Surface & Subsurface) (pCi/g)	4 mrem/y Goal (Drinking Water) Open Land Areas [b] (Surface & Subsurface) (pCi/g)
Am-241	2.7E+01	9.9	2.3
C-14	3.7E+06	2	5.4
Co-60	7.1E+03	3.5	67
Cs-137	2.8E+04	6.6	397
Eu-152	1.3E+04	10.1	1440
H-3	1.2E+08	132	31.1
Ni-63	1.8E+06	747	1.9E+04
Pu-238	3.0E+01	1.8	0.41
Pu-239	2.8E+01	1.6	0.37
Pu-241	8.8E+02	86	19.8
Sr-90	8.7E+03	1.2	0.61

NOTES:

(a) While drinking water DCGLs will be used by SNEC to meet the drinking water 4 mrem/y goal, only the DCGL values that constitute the 25 mrem/y regulatory limit will be controlled under this LTP and the NRC's approving license amendment.

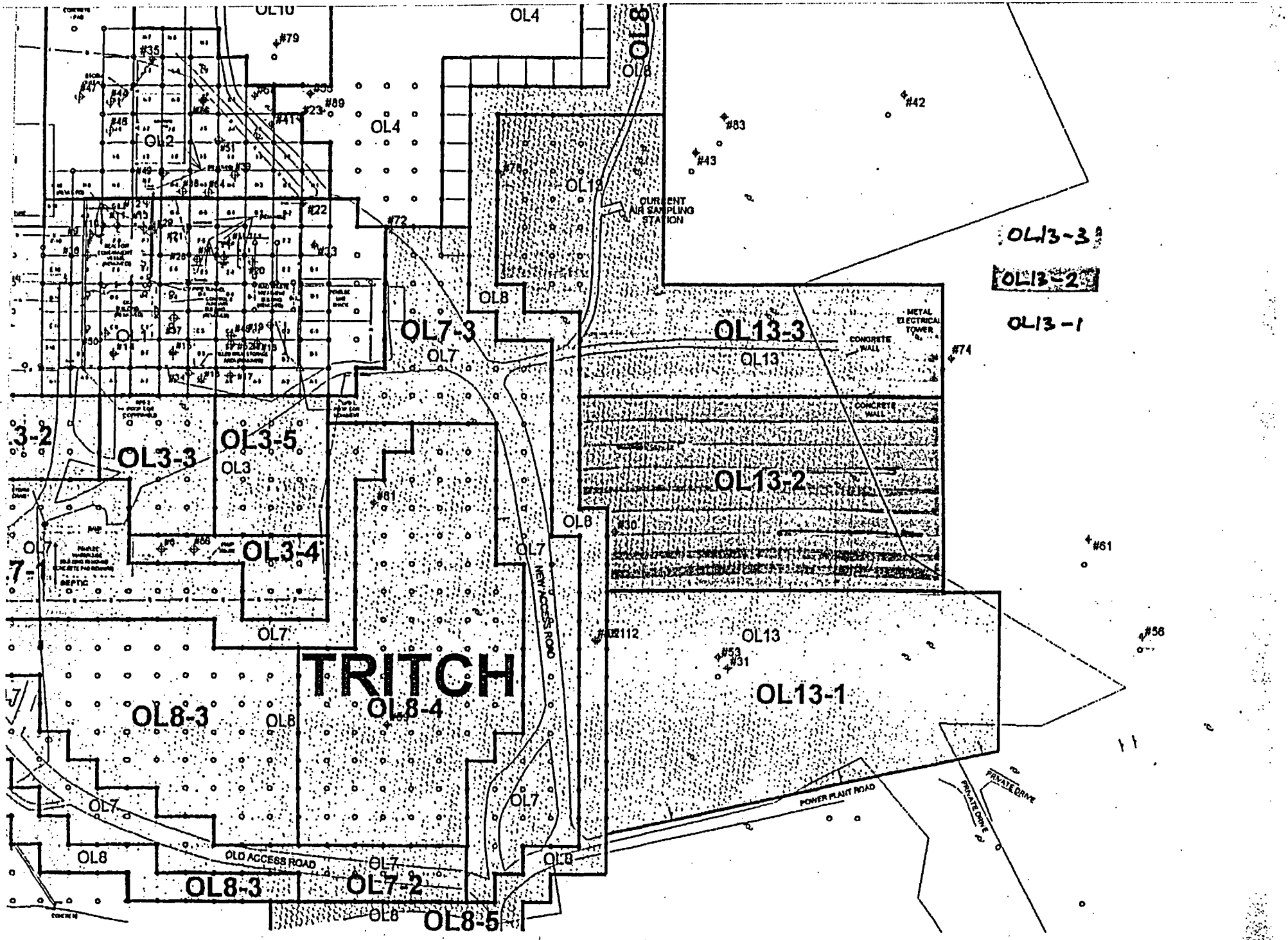
(b) Listed values are from the subsurface model. These values are the most conservative values between the two models (i.e., surface & subsurface).

Exhibit 2
Survey Design Checklist

Calculation No. E900-05-017, Rev. 1	Location Codes OL13		
ITEM	REVIEW FOCUS	Status (Circle One)	Reviewer Initials & Date
1	Has a survey design calculation number been assigned and is a survey design summary description provided?	Yes, N/A	
2	Are drawings/diagrams adequate for the subject area (drawings should have compass headings)?	Yes, N/A	
3	Are boundaries properly identified and is the survey area classification clearly indicated?	Yes, N/A	
4	Has the survey area(s) been properly divided into survey units IAW EXHIBIT 10	Yes, N/A	
5	Are physical characteristics of the area/location or system documented?	Yes, N/A	
6	Is a remediation effectiveness discussion included?	Yes, N/A	
7	Have characterization survey and/or sampling results been converted to units that are comparable to applicable DCGL values?	Yes, N/A	5/31/05
8	Is survey and/or sampling data that was used for determining survey unit variance included?	Yes, N/A	
9	Is a description of the background reference areas (or materials) and their survey and/or sampling results included along with a justification for their selection?	Yes, N/A	
10	Are applicable survey and/or sampling data that was used to determine variability included?	Yes, N/A	
11	Will the condition of the survey area have an impact on the survey design, and has the probable impact been considered in the design?	Yes, N/A	
12	Has any special area characteristic including any additional residual radioactivity (not previously noted during characterization) been identified along with its impact on survey design?	Yes, N/A	
13	Are all necessary supporting calculations and/or site procedures referenced or included?	Yes, N/A	5/31/05
14	Has an effective DCGLw been identified for the survey unit(s)?	Yes, N/A	5/31/05
15	Was the appropriate $DCGL_{EMC}$ included in the survey design calculation?	Yes, N/A	
16	Has the statistical tests that will be used to evaluate the data been identified?	Yes, N/A	
17	Has an elevated measurement comparison been performed (Class 1 Area)?	Yes, N/A	
18	Has the decision error levels been identified and are the necessary justifications provided?	Yes, N/A	
19	Has scan instrumentation been identified along with the assigned scanning methodology?	Yes, N/A	
20	Has the scan rate been identified, and is the MDCscan adequate for the survey design?	Yes, N/A	
21	Are special measurements e.g., in-situ gamma-ray spectroscopy required under this design, and is the survey methodology, and evaluation methods described?	Yes, N/A	
22	Is survey instrumentation calibration data included and are detection sensitivities adequate?	Yes, N/A	
23	Have the assigned sample and/or measurement locations been clearly identified on a diagram or CAD drawing of the survey area(s) along with their coordinates?	Yes, N/A	
24	Are investigation levels and administrative limits adequate, and are any associated actions clearly indicated?	Yes, N/A	5/31/05
25	For sample analysis, have the required MDA values been determined.?	Yes, N/A	
26	Has any special sampling methodology been identified other than provided in Reference 6.3?	Yes, N/A	

NOTE: a copy of this completed form or equivalent, shall be included within the survey design calculation.

Appendix A (attachments 1-1 to 5-1)



ATTACHMENT 1-1

Location	Sample#	H-3	Sr-90	Co-60	Cs-137	Am-241	Pu-238	Pu-239	Pu-241	C-14	Ni-63	Eu-152	Analysis Date
GRID BF-118	4873	< 0.606	0.0341	2.15	213	< 0.0423	0.0423	0.0695	< 1.62	< 0.184	< 27.4	< 0.657	April 28, 2004

Recent "SNEC 11" Results from OL4

ATTACHMENT 2-1

					SNEC ALI	75%	Total Activity Limit DCGLw		Administrative Limit	
Effective DCGL Calculator for Cs-137 (in pCi/g)							6.53	pCi/g	4.90	pCi/g
SAMPLE NUMBER(s)⇒ OL4 Grid BF118										
							Cs137 Limit		Cs137 Administrative Limit	
3298.22%	25.0	mrem/y TEDE Limit					6.46	pCi/g	4.84	pCi/g
91.48%	4.0	mrem/y Drinking Water (DW) Limit								
Isotope	Sample Input (pCi/g, uCi, etc.)	% of Total	25 mrem/y TEDE Limits (pCi/g)	4 mrem/y DW Limits (pCi/g)	A - Allowed pCi/g for 25 mrem/y TEDE	B - Allowed pCi/g for 4 mrem/y DW	Value Checked from Column A or B		This Sample mrem/y TEDE	This Sample mrem/y DW
Am-241		0.000%	9.9	2.3	0.00	0.00	0.00		0.00	0.00
C-14		0.000%	2.0	5.4	0.00	0.00	0.00		0.00	0.00
Co-60	2.150	0.999%	3.5	67.0	0.07	2.35	0.07		15.36	0.13
Cs-137	213.00	98.934%	6.6	397	6.46	232.84	6.46		806.82	2.15
Eu-152		0.000%	10.1	1440	0.00	0.00	0.00		0.00	0.00
H-3		0.000%	132	31.1	0.00	0.00	0.00		0.00	0.00
Ni-63		0.000%	747	19000	0.00	0.00	0.00		0.00	0.00
Pu-238	0.042	0.020%	1.8	0.41	0.00	0.05	0.00		0.58	0.41
Pu-239	0.070	0.032%	1.6	0.37	0.00	0.08	0.00		1.09	0.75
Pu-241		0.000%	86	19.8	0.00	0.00	0.00		0.00	0.00
Sr-90	0.034	0.016%	1.2	0.61	0.00	0.04	0.00		0.71	0.22
	2.15E+02	100.000%			6.53	235.35	6.53		824.555	3.659
					Maximum Permissible pCi/g (25 mrem/y)	Maximum Permissible pCi/g (4 mrem/y)			To Use This Information, Sample Input Units Must Be In pCi/g	

ATTACHMENT 2-2

DCGLw Calculation Logic

I. **Survey Unit:** First Energy – Penelec Site NE Open Land Area OL4, Class 1 Area

II. **Description:** The purpose of this calculation is to determine a representative mix from available sample analyses results for the Penelec NE Site area. The effective volumetric DCGLw is then determined in accordance with guidance provided by the SNEC License Termination Plan (LTP) and MARSSIM.

III. **Data Selection Logic Tables:** The radionuclide selection logic and subsequent DCGLw calculations are provided in the tables described below. These tables were developed using Microsoft Excel and are validated in SNEC calculation E900-03-012. Table explanations follow:

Attachment 2-1: Data Listing – This table provides a list of the most representative sample analyses from the OL4 area. Only one sample result met the combined requirements of being from the survey area, having analyses for the hard-to-detect nuclides, and with sufficient Cs137 activity to provide valid mix ratios. Results are from scoping and characterization surveys. The sample consisted of soil media that was taken in support of the aforementioned surveys. A sample number, radionuclide concentrations, and analysis date are provided for the sample.

Note 1
With respect to the survey unit, the term "soil" is a generic term that can be used to describe individually or in combination traditional soils, fly ash, building rubble, and/or rock materials.

Attachment 2-2: Effective DCGLw Calculator for Cs-137 (in pCi/g) – This table provides the surrogate Cs-137 DCGLw calculation results for data derived from Attachment 2-1. It uses the ratios between the nuclides weighted for the DCGLs to determine an effective surrogate Cs137 DCGL.

IV. **Summary** – Since the survey area is soil, coal debris, and rock materials, the existing release limit is based on the volumetric DCGLw. Using the above logic tables the calculated Cs-137 volumetric DCGLw is 6.46 pCi/g. This value would be reduced by 25% as part of the SNEC facilities requirement to apply an administrative limit of 4.84 pCi/g as discussed in the License Termination Plan (LTP).

ATTACHMENT 2-3

2350 INSTRUMENT AND PROBE EFFICIENCY CHART

7/01/04 (Typical 2" by 2" NaI (Cs-137 W) Conversion Factors)

Inst.#	Cal Due	AP #		Probe #	Cal Due	cpm/mR/h
98625	5/18/05	R & Y		211680 Pk	5/18/05	214.882
98647	5/18/05	G &Y		211667 Pk	5/18/05	218.807
129423	5/18/05	P &Y.		211687 Pk	5/18/05	213.539
117573	5/18/05	O &Y		211674 Pk	5/18/05	212.173
117566	4/9/05	G&R		185852 Pk	4/13/05	209.862
126183	11/19/04	B&R		206280 Pk	12/12/04	190,907
129429	11/3/04	Y&W		206283 Pk	10/31/04	177185
126198	11/03/04	R&W		196021Pk	5/25/05	209.194
126172	6/07/05	G&W		196022	6/07/05	208.302
129440	4/09/05	O&W		210938 Pk	4/14/05	205.603
120588	6/08/05	B&W		185844 Pk	6/09/05	216.654
95361	6.25/05	P&W		025686	6/28/05	211.799

ATTACHMENT 2-1

2350 INSTRUMENT AND PROBE EFFICIENCY CHART

7/01/04 (Typical 43-68 Beta Efficiency Factors)

Different Instrument/Probe Cal Due	Use manufacturers efficiency factor

INST #	INST C/D	43-68 PROBE #	PROBE C/D	44-10 PROBE #	PROBE C/D	BETA EFF	ALPHA EFF
79037	04/05/05	122014	04/23/05			25.2%	N/A
126188	1/27/05	099186	1/27/05			28.2%	N/A
126218	01/08/05	095080	01/09/05			27.9%	N/A

ATTACHMENT 3-1

NaI Scan MDC Calculation

MDCscan 5.6740 pCi/g for Open Land Area OL13

b = background (cpm)
bi = background counts in the observation interval (counts)
Conv = NaI detector/meter calibrated response (cpm per uR/hr)
d = index of sensitivity from MARSSIM table 6.5 based on 95% detection and 60% false positive
HSd = elevated measurement spot diameter (centimeters)
MDCscan = Minimum Detectable Concentration for scanning (pCi/g)
MDCRi = Minimum Detectable Count Rate in (ncpm)
MDCRsurv = MDCRi adjusted for the human performance factor p (ncpm)
MDER = Minimum Detectable Exposure Rate (uR/hr)
MSoutput = MicroShield derived exposure rate for 1 pCi/g of contaminant (mR/hr)
Oi = Observation interval (seconds)
p = human performance adjustment factor (unitless)
SR = Scanning movement rate (cm/sec)
DCDLeq = net count rate equivalent to the adjusted DCGL (ncpm)

b = 250 cpm p = 0.5 HSd = 56 cm

SR = 25 cm d = 1.38 Conv = 205.6 cpm/uR/hr

MSoutput = 1.369E-04 mR/hr per pCi/g DCGL = 4.84 pCi/g

$\frac{HSd}{SR}$ = 2.2400 = Oi (sec)

$\frac{b*Oi}{60\ sec/min}$ = 9.3333 = bi (counts)

$\frac{d*sqrt(bi)*60}{Oi}$ = 112.9278 = MDCRi (ncpm)

$\frac{MDCRi}{sqrt(p)}$ = 159.7040 = MDCRsurv (ncpm)

$\frac{MDCRsurv}{Conv}$ = 0.7768 = MDER (uR/hr)

$\frac{MDER}{MSoutput*1000\ uR/mR}$ = 5.6740 = MDCscan (pCi/g)

$\frac{MDCsurv*DCGL}{MDCscan}$ = 136.2297 = DCGLeq (ncpm)

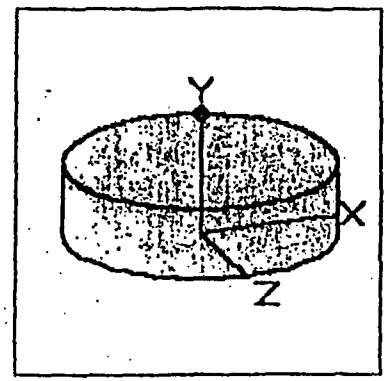
ATTACHMENT 4-1

MicroShield v5.05 (5.05-00121)
GPU Nuclear

Page	: 1
DOS File	: MODEL.MS5
Run Date	: September 23, 2003
Run Time	: 2:43:26 PM
Duration	: 00:00:02

File Ref:	
Date:	
By:	
Checked:	

Case Title: Cs-137 Soil
Description: Model for Scanning
Geometry: 8 - Cylinder Volume - End Shields



Source Dimensions

Height	15.24 cm	6.0 in
Radius	28.0 cm	11.0 in

Dose Points

A	X	Y	Z
# 1	0 cm	25.4 cm	0 cm
	0.0 in	10.0 in	0.0 in

Shields

Shield Name	Dimension	Material	Density
Source	3.75e+04 cm³	Concrete	1.6
Air Gap		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	µCi/cm³	Bq/cm³
Ba-137m	5.6815e-008	2.1022e+003	1.5136e-006	5.6003e-002
Cs-137	6.0058e-008	2.2221e+003	1.6000e-006	5.9200e-002

Buildup
The material reference is : Source

Integration Parameters

Radial	50
Circumferential	50
Y Direction (axial)	50

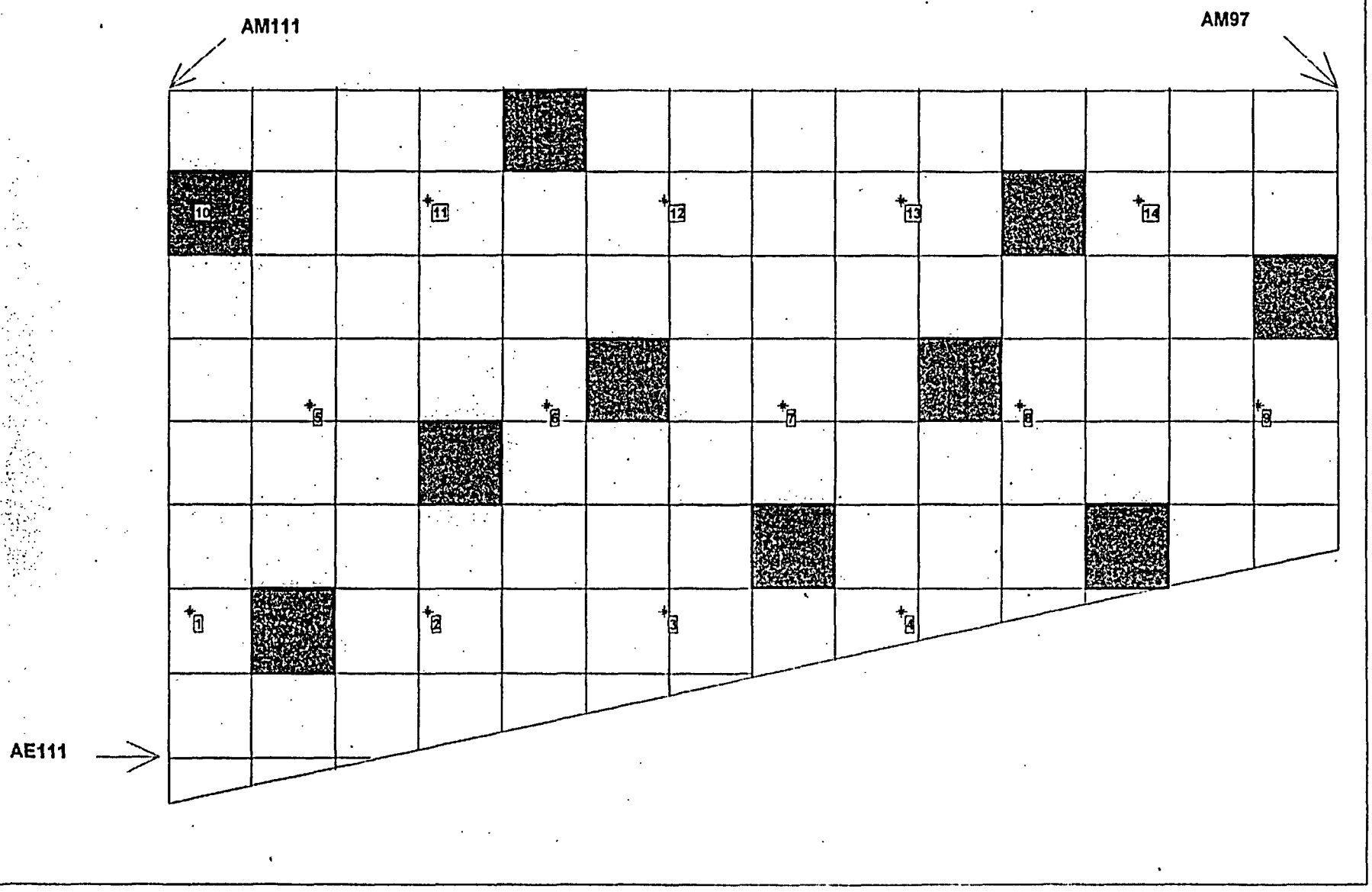
Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	4.352e+01	7.617e-06	9.220e-06	6.345e-08	7.680e-08
0.0322	8.030e+01	1.465e-05	1.784e-05	1.179e-07	1.436e-07
0.0364	2.922e+01	8.118e-06	1.060e-05	4.613e-08	6.024e-08
0.6616	1.892e+03	7.060e-02	1.260e-01	1.369e-04	2.443e-04
TOTALS:	2.045e+03	7.063e-02	1.261e-01	1.371e-04	2.446e-04

ATTACHMENT 5-1

Appendix A (attachments 6-1 to 6-6)

Survey Unit OL13-1



ATTACHMENT 6-1

Soil Sample Locations and Scan Survey Grids for Survey Unit OL13-1

VSP provides survey points using a scale relative to the southwestern corner of the survey unit. This is cumbersome as field personnel must measure over large distances (sometimes hundreds of meters) from the single reference point. To remedy this situation, this spreadsheet provides the VSP survey points based on the actual location within each grid.

To identify soil sample locations, start at the grid identifier below left. Go east the number of meters under the "E" column and then move north the number of meters in the "N" column. For simplicity, all measurements have been rounded to the nearest tenth of a meter.

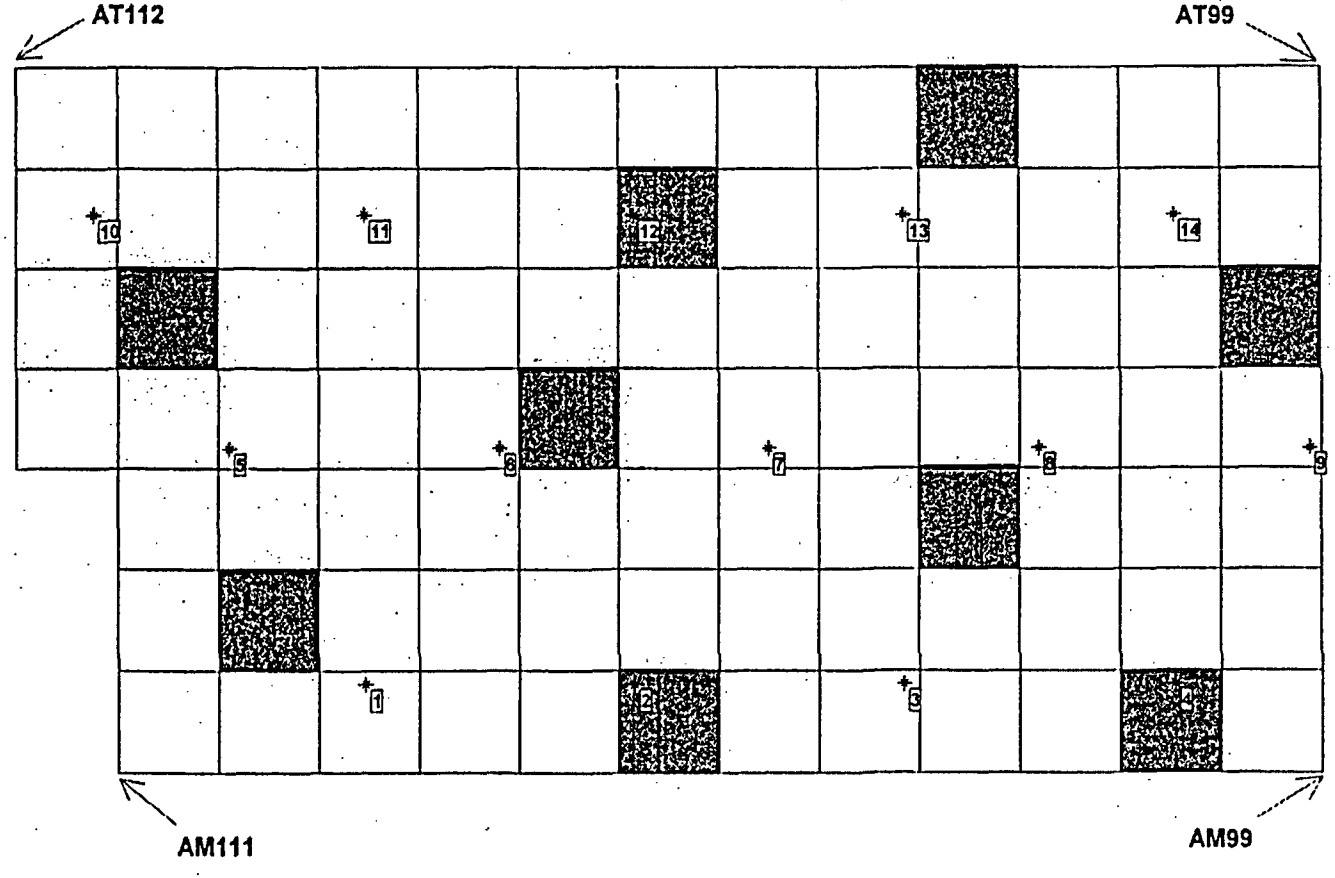
To complete scan surveys, use the 10 scan locations below right. These grids should be scanned 100%.

Location	Grid ID	E (meters)	N (meters)	X coordinate (meters)	Y coordinate (meters)
1	AF111	2.5	7.3	2.5303	17.2511
2	AF108	1	7.3	30.9607	17.2511
3	AF106	9.4	7.3	59.3912	17.2511
4	AF103	7.8	7.3	87.8216	17.2511
5	AI110	6.7	1.9	16.7455	41.8726
6	AI107	5.2	1.9	45.176	41.8726
7	AI104	3.6	1.9	73.6064	41.8726
8	AI101	2	1.9	102.0369	41.8726
9	AI98	0.5	1.9	130.4673	41.8726
10	AK111	2.5	6.5	2.5303	66.4941
11	AK108	1	6.5	30.9607	66.4941
12	AK106	9.4	6.5	59.3912	66.4941
13	AK103	7.8	6.5	87.8216	66.4941
14	AK100	6.3	6.5	116.2521	66.4941

Scan Location	Grid ID
1	AF110
2	AG104
3	AG100
4	AH108
5	AI106
6	AI102
7	AJ98
8	AK111
9	AK101
10	AL107

ATTACHMENT 6-2

Survey Unit OL13-2



ATTACHMENT 6-3

Soil Sample Locations and Scan Survey Grids for Survey Unit OL13-2

VSP provides survey points using a scale relative to the southwestern corner of the survey unit. This is cumbersome as field personnel must measure over large distances (sometimes hundreds of meters) from the single reference point. To remedy this situation, this spreadsheet provides the VSP survey points based on the actual location within each grid.

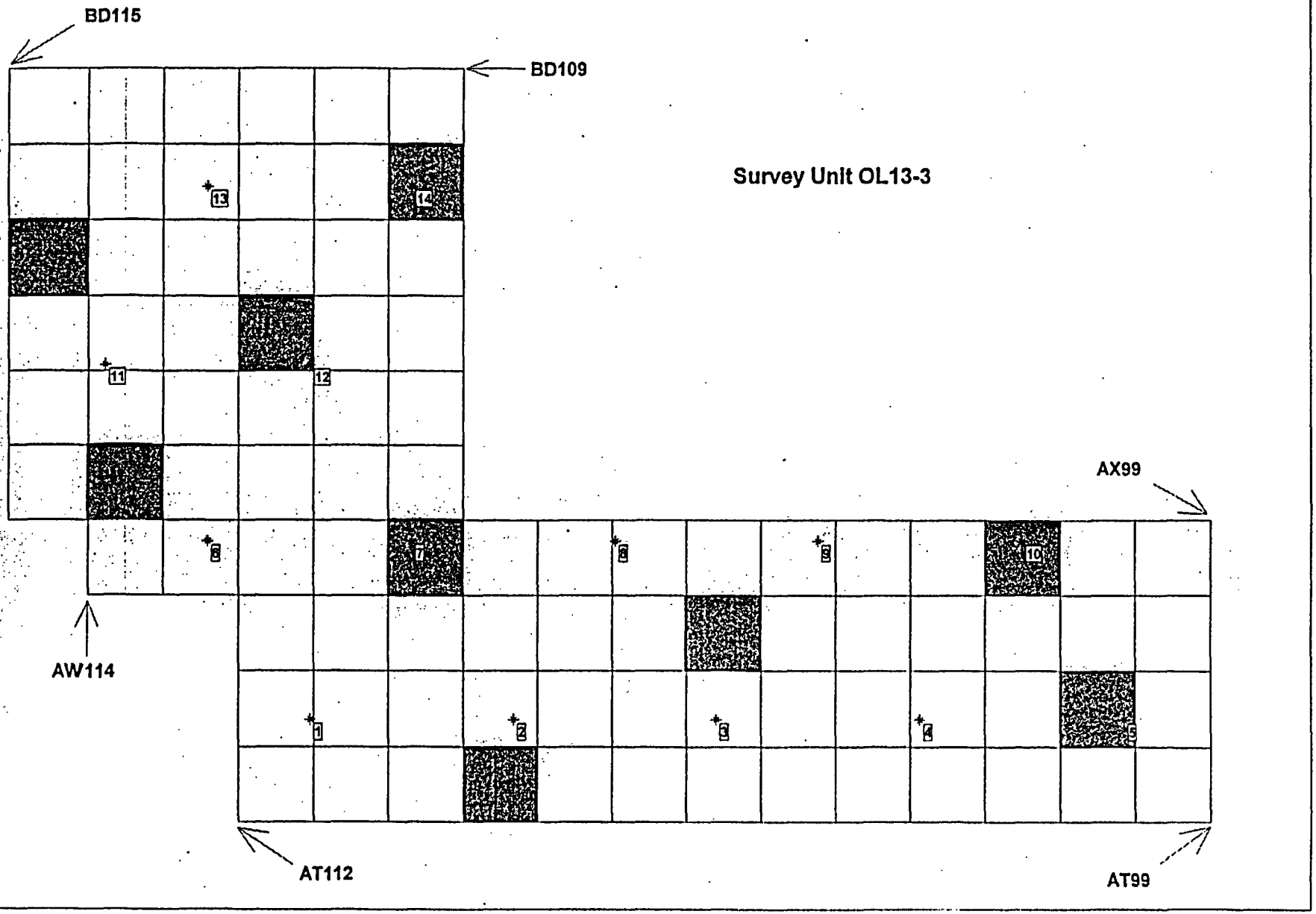
To identify soil sample locations, start at the grid identifier below left. Go east the number of meters under the "E" column and then move north the number of meters in the "N" column. For simplicity, all measurements have been rounded to the nearest tenth of a meter.

To complete scan surveys, use the 9 scan locations below right. These grids should be scanned 100%.

Location	Grid ID	E (meters)	N (meters)	X coordinate (meters)	Y coordinate (meters)
1	AM109	4.7	8.6	34.7012	8.5565
2	AM106	1.6	8.6	61.6421	8.5565
3	AM104	8.6	8.6	88.583	8.5565
4	AM101	5.5	8.6	115.5239	8.5565
5	AP110	1.2	1.9	21.2308	31.888
6	AP108	8.2	1.9	48.1717	31.888
7	AP105	5.1	1.9	75.1126	31.888
8	AP102	2.1	1.9	102.0535	31.888
9	AP100	9	1.9	128.9944	31.888
10	AR112	7.8	5.2	7.7603	55.2195
11	AR109	4.7	5.2	34.7012	55.2195
12	AR106	1.6	5.2	61.6421	55.2195
13	AR104	8.6	5.2	88.583	55.2195
14	AR101	5.5	5.2	115.5239	55.2195

Scan Location	Grid ID
1	AM106
2	AM101
3	AN110
4	AO103
5	AP107
6	AQ111
7	AQ100
8	AR106
9	AS103

ATTACHMENT 6-4



ATTACHMENT 6-5

Soil Sample Locations and Scan Survey Grids for Survey Unit OL13-3

VSP provides survey points using a scale relative to the southwestern corner of the survey unit. This is cumbersome as field personnel must measure over large distances (sometimes hundreds of meters) from the single reference point. To remedy this situation, this spreadsheet provides the VSP survey points based on the actual location within each grid.

To identify soil sample locations, start at the grid identifier below left. Go east the number of meters under the "E" column and then move north the number of meters in the "N" column. For simplicity, all measurements have been rounded to the nearest tenth of a meter.

To complete scan surveys, use the 9 scan locations below right. These grids should be scanned 100%.

Location	Grid ID	E (meters)	N (meters)	X coordinate (meters)	Y coordinate (meters)
1	AU112	9.5	3.6	39.543	13.589
2	AU109	6.8	3.6	66.7883	13.589
3	AU106	4	3.6	94.0336	13.589
4	AU103	1.3	3.6	121.2789	13.589
5	AU101	8.5	3.6	148.5243	13.589
6	AW113	5.9	7.2	25.9203	37.1841
7	AW110	3.2	7.2	53.1656	37.1841
8	AW107	0.4	7.2	80.411	37.1841
9	AW105	7.7	7.2	107.6563	37.1841
10	AW102	4.9	7.2	134.9016	37.1841
11	AZ114	2.3	0.8	12.2977	60.7793
12	AZ112	9.5	0.8	39.543	60.7793
13	BB113	5.9	4.4	25.9203	84.3744
14	BB110	3.2	4.4	53.1656	84.3744

Scan Location	Grid ID
1	AT109
2	AU101
3	AV106
4	AW110
5	AW102
6	AX114
7	AZ112
8	BA115
9	BB110

ATTACHMENT 6-6

Appendix A (attachments 7-1 to 9-3)

Site Report

Site Summary

Site Name: OL13

Planner(s): Tristan M. Tritch

Contaminant Summary

NOTE: Surface soil DCGLw units are pCi/g.
Building surface DCGLw units are dpm/100 cm².

Contaminant	Type	DCGLw	Screening Value Used?	Area (m²)	Area Factor
Cs-137	Surface Soil	4.84	No	1	28.7
				25	4.7
				100	3.6
				400	3
				2,500	2.3
				10,000	1

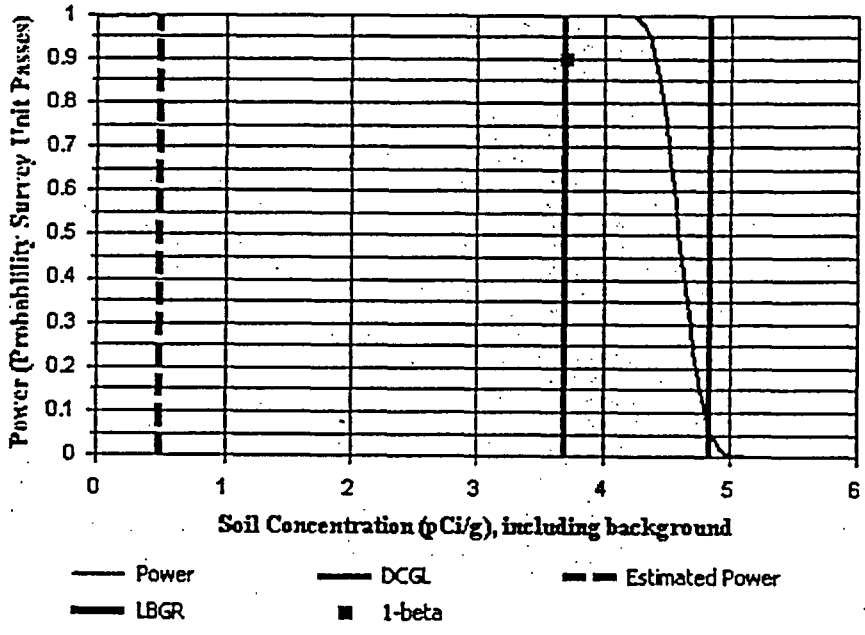
ATTACHMENT 7-1

Surface Soil Survey Plan

Survey Plan Summary

Site:	OL13		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL13-1A		
Comments:	Southernmost survey unit in OL13		
Area (m²):	9,800	Classification:	3
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.3999
DCGL (pCi/g):	4.84	Sample Size (N):	11
LBGR (pCi/g):	3.7	Estimated Conc. (pCi/g):	0.5
Alpha:	0.050	Estimated Power:	1
Beta:	0.100		

Prospective Power Curve



ATTACHMENT 9-2

Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.84	N/A	N/A	N/A	N/A

Contaminant	Survey Unit Estimate (Mean ± 1-Sigma) (pCi/g)	Reference Area Estimate (Mean ± 1-Sigma) (pCi/g)
Cs-137	0.4975 ± 0.3999	0.28 ± 0.39

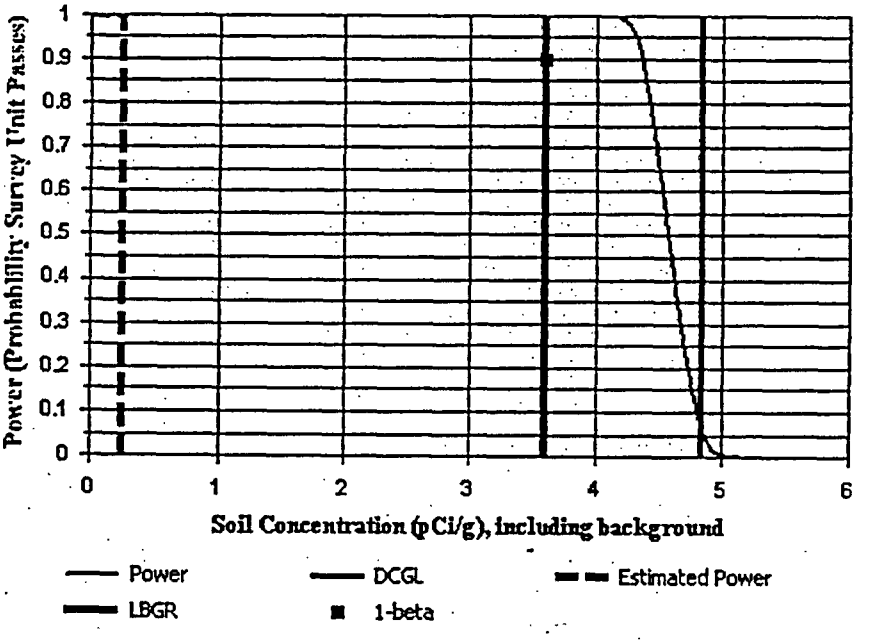
ATTACHMENT 7-3

Surface Soil Survey Plan

Survey Plan Summary

Site:	OL13		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL13-2A		
Comments:	Middle surveyunit of OL13		
Area (m^2):	8,800	Classification:	3
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.4365
DCGL (pCi/g):	4.84	Sample Size (N):	11
LBGR (pCi/g):	3.6	Estimated Conc. (pCi/g):	0.2
Alpha:	0.050	Estimated Power:	1
Beta:	0.100		

Prospective Power Curve



ATTACHMENT 7-4

Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.84	N/A	N/A	N/A	N/A

Contaminant	Survey Unit Estimate (Mean ± 1-Sigma) (pCi/g)	Reference Area Estimate (Mean ± 1-Sigma) (pCi/g)
Cs-137	0.2489 ± 0.4365	0.28 ± 0.39

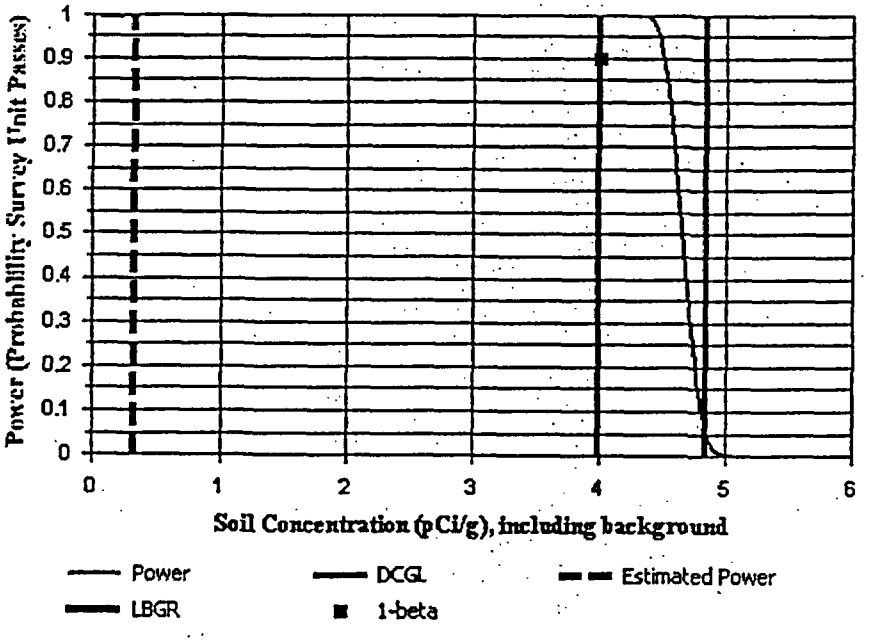
ATTACHMENT 7-5

Surface Soil Survey Plan

Survey Plan Summary

Site:	OL13		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL13-3A		
Comments:	Northernmost survey unit in OL13		
Area (m²):	9,000	Classification:	3
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.3063
DCGL (pCi/g):	4.84	Sample Size (N):	11
LBGR (pCi/g):	4	Estimated Conc. (pCi/g):	0.3
Alpha:	0.050	Estimated Power:	1
Beta:	0.100		

Prospective Power Curve



ATTACHMENT 7-6

Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.84	N/A	N/A	N/A	N/A

Contaminant	Survey Unit Estimate (Mean ± 1-Sigma) (pCi/g)	Reference Area Estimate (Mean ± 1-Sigma) (pCi/g)
Cs-137	0.3313 ± 0.3063	0.28 ± 0.39

ATTACHMENT 7-7

OL13-1			OL13-2		
SR	GRID	Cs-137 pCi/g	SR	GRID	Cs-137 pCi/g
63	AF104	1.1	63	AM100	0.27
	AG99	0.07		AM110	0.1
	AG101	0.92		AO111	0.06
	AG102	1.1		AP102	0.09
	AG107	0.08		AR103	0.06
	AG110	0.07		AR110	0.06
	AI97	0.43	145	AS100-1	1.4
	AI99	0.27		AS100-L2	0.1
	AJ98	0.7		AS100-L2	0.1
	AJ111	0.08			
	AK97	0.45			
	AK99	0.7			
TOTAL		5.9700	TOTAL		2.2400
MAX		1.10	MAX		1.40
MIN		- 0.07	MIN		0.06
MEDIAN		0.4400	MEDIAN		0.1000
AVG		0.4975	AVG		0.2489
STD DEV		0.3999	STD DEV		0.4365
	<MDA			<MDA	

ATTACHMENT 8-1

OL13-3			OL13-3 CONTINUED		
SR	GRID	Cs-137 pCi/g	SR	GRID	Cs-137 pCi/g
72	AX111-1	0.06	145	AU107-1	0.3
	AX111-2	0.4		AU107-2	0.12
	AX111-3	0.06		AU108-1	0.15
	BA110-1	1.1		AU108-2	0.2
	BA110-2	0.37		AU109-1	0.15
	BA110-3	0.06		AU109-2	0.13
	BC111-1	0.66		AU110-1	0.13
	BC111-2	0.09		AU110-2	0.1
	BC111-3	0.06		AU111-1	0.13
111	AX112-1	0.1		AU111-2	0.13
	AX112-2	0.08		AU112-1	0.6
	AX112-3	0.1		AU112-2	0.1
	AX112-4	0.08		AU112-L2	0.3
	AX114-1	0.8		AU112-L3	0.08
	AX114-2	0.05		AU112-L4	0.1
	AX114-3	0.1		AU112-L4	0.08
	AZ113-1	0.4		AV101-1	0.8
	AZ113-2	0.08		AV101-2	0.8
	AZ113-3	0.1		AV102-1	0.15
	AZ115-1	0.08		AV102-2	0.7
	AZ115-2	0.06		AV103-1	0.1
	AZ115-3	0.1		AV103-2	0.1
	BB112-1	0.7		AV104-1	0.3
	BB112-2	0.16		AV104-2	0.1
	BB112-3	0.1		AV105-1	1.1
	BB114-1	0.2		AV105-2	0.75
	BB114-2	0.1		AV106-1	0.5
	BB114-3	0.08		AV106-2	0.4
	BB114-4	0.09		AV107-1	0.43
145	AT101-1	0.4		AV107-2	0.16
	AT101-2	0.2		AV108-1	0.13
	AT101-3	0.5		AV108-2	0.4
	AT101-4	0.36		AV109-1	0.13
	AT101-5	1		AV109-2	0.14
	AT101-6	0.2		AV110-1	0.09
	AT101-L1	0.16		AV110-2	0.09
	AT101-L1	0.15		AV111-1	0.13
	AT101-L2	0.1		AV111-2	0.12
	AT101-L2	0.1		AV112-1	0.1
	AT102-1	0.3		AV112-2	0.28
	AT102-2	0.14	149	AW101-1	0.8
	AT102-3	0.13		AW101-2	0.54
	AT102-4	0.15	152	BC115-1	0.64
	AT102-5	0.17		BC115-2	0.14
	AT103-1	0.14	162	AW112-1	0.13
	AT103-2	0.2		AW112-2	0.14
	AT103-3	0.45		AY111-1	0.28
	AT103-L1	0.5		AY111-2	0.4
	AT103-L2	0.1		AY112-1	0.17

ATTACHMENT 8-2

AT103-L3	0.1		AY112-2	0.16
AT104-1	0.97		AY112-L2	0.46
AT104-2	0.07		AY112-L3	0.17
AT104-3	0.15		AY112-L4	0.14
AT105-1	0.14		AZ111-1	0.82
AT105-2	0.23		AZ111-2	0.7
AT105-L1	0.9		AZ112-1	0.19
AT105-L2	0.1		AZ112-2	0.62
AT105-L3	0.14		BA111-1	0.8
AT105-L4	0.06		BA111-2	0.82
AT105-L5	0.1		BA112-1	0.6
AT105-L6	0.09		BA112-2	0.64
AT105-L6	0.1		BB111-1	0.35
AT106-1	0.8		BB111-2	0.74
AT106-2	0.8		BC110-1	0.42
AT107-1	1		BC110-2	0.85
AT107-2	1	172	AY110-1	1.2
AT107-3	0.6		AY110-2	0.89
AT107-L2	0.18		AZ110-1	1.1
AT107-L2	0.13		AZ110-2	0.23
AT107-L3	0.09		AZ115-1	0.7
AT107-L4	0.1		AZ115-2	0.6
AT107-L4	0.1		BA110-1	0.83
AT108-1	0.6		BA110-2	1.1
AT108-2	0.4		BA115-1	0.4
AT109-1	0.16		BA115-2	0.4
AT109-2	0.09		BB110-1	1.2
AT110-1	0.1		BB110-2	1.1
AT110-2	0.2		BB115-1	0.42
AT111-1	0.14		BB115-2	0.35
AT111-2	0.1			
AT112-1	0.12			
AT112-2	0.16			
AU101-1	0.14			
AU101-2	0.22			
AU102-1	0.14			
AU102-2	0.17			
AU103-1	0.8			
AU103-2	0.1			
AU104-1	0.13			
AU104-2	0.2			
AU105-1	0.14			
AU105-2	0.13			
AU106-1	0.07			
AU106-2	0.15			

	TOTAL	57.3200
	MAX	1.2000
<MDA	MIN	0.0500
	MEDIAN	0.1600
	AVG	0.3313
	STD DEV	0.3063

ATTACHMENT 8-3

Exhibit 1
Survey Unit Inspection Check Sheet

ORIGINAL

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	OL13	Survey Unit Location	First Energy/Penelec Property - East Section
Date	3/21/05	Time	0945
Inspection Team Members	D.Sarge		

SECTION 2 - SURVEY UNIT INSPECTION SCOPE

Inspection Requirements (Check the appropriate Yes/No answer.)	Yes	No	N/A
1. Have sufficient surveys (i.e., post remediation, characterization, etc.) been obtained for the survey unit?	X		
2. Do the surveys (from Question 1) demonstrate that the survey unit will most likely pass the FSS?	X		
3. Is the physical work (i.e., remediation & housekeeping) in or around the survey unit complete?		X	
4. Have all tools, non-permanent equipment, and material not needed to perform the FSS been removed?	X		
5. Are the survey surfaces relatively free of loose debris (i.e., dirt, concrete dust, metal filings, etc.)?	X		
6. Are the survey surfaces relatively free of liquids (i.e., water, moisture, oil, etc.)?		X	
7. Are the survey surfaces free of all paint, which has the potential to shield radiation?	X		
8. Have the Surface Measurement Test Areas (SMTA) been established? (Refer to Exhibit 2 for instructions.)	X		
9. Have the Surface Measurement Test Areas (SMTA) data been collected? (Refer to Exhibit 2 for instructions.)	X		
10. Are the survey surfaces easily accessible? (No scaffolding, high reach, etc. is needed to perform the FSS)	X		
11. Is lighting adequate to perform the FSS?	X		
12. Is the area industrially safe to perform the FSS? (Evaluate potential fall & trip hazards, confined spaces, etc.)	X		
13. Have photographs been taken showing the overall condition of the area?	X		
14. Have all unsatisfactory conditions been resolved?	X		

NOTE: If a "No" answer is obtained above, the inspector should immediately correct the problem or initiate corrective actions through the responsible site department, as applicable. Document actions taken and/or justifications in the "Comments" section below. Attach additional sheets as necessary.

Comments:

Response to Question 3: Concrete surfaces need to be swept off prior to FSS. Notified L. Shamenek.

Response to Question 6: Water is present on East border of survey unit. Notified survey designer.

Survey Unit Inspector (print/sign)	D. Sarge /	Date	3/21/05
Survey Designer (print/sign)	Tristan M. Tritch	Date	3/31/05

ATTACHMENT 9-1

ORIGINAL

EXHIBIT 3
Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION					
SMTA Number	SMTA-OL13-1	Survey Unit Number	OL13		
SMTA Location	First Energy/Penelec Property East Section				
Survey Unit Inspector	D. Sarge	Date	3/21/05	Time	1400

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED					
Caliper Manufacturer	Mitotoyo	Caliper Model Number	CD-6" CS		
Caliper Serial Number	763893	Calibration Due Date (as applicable)	N/A		
Rad Con Technician	D. Sarge	Date	3/21/05	Time	1400
Survey Unit Inspector Approval	D. Sarge / Dafg	Date	3/21/05		

SECTION 3 - MEASUREMENT RESULTS

SMTA Grid Map & Measurement Results in Units of mm
(Insert Results in White Blocks Below)

1 4.0	7 0.3	13 0.4	19 0.9	25 0.3	31 0.4
2 0.7	8 0.5	14 1.1	20 4.1	26 3.5	32 8.0
3 4.3	9 1.3	15 0.7	21 3.4	27 2.2	33 1.7
4 0.6	10 0.74	16 0.6	22 0.7	28 0.8	34 0.8
5 12.1	11 15	17 10	23 14	29 5	35 4
6 4.5	12 4.0	18 2.0	24 1.7	30 0.8	36 2.3

Average Measurement - 3.3 mm

Comments

- Concrete slabs (see accompanying photos)
- Measurement was obtained on slab exhibiting worse surface degradation.

Additional Measurements Required

ATTACHMENT 9-2

ORIGINAL

EXHIBIT 3
Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION					
SMTA Number	SMTA-OL13-2	Survey Unit Number	OL13		
SMTA Location	First Energy/Penelec Property East Section				
Survey Unit Inspector	D. Sarge	Date	3/21/05	Time	1415

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED					
Caliper Manufacturer	Mitotoyo	Caliper Model Number	CD-6" CS		
Caliper Serial Number	763893	Calibration Due Date (as applicable)	N/A		
Rad Con Technician	D. Sarge	Date	3/21/05	Time	1415
Survey Unit Inspector Approval	D. Sarge /	Date	3/21/05		

SECTION 3 - MEASUREMENT RESULTS

SMTA Grid Map & Measurement Results in Units of mm
(Insert Results in White Blocks Below)

1 20.5	7 6.3	13 2.1	19 7.7	25 1.0	31 5.5
2 10.8	8 8.5	14 6	20 1.5	26 1.6	32 7.4
3 10.5	9 7.0	15 1.1	21 8.4	27 1.6	33 10.2
4 14	10 13.5	16 5	22 7.3	28 2.1	34 2.5
5 18.6	11 9.6	17 10.7	23 1.8	29 1.0	35 1.7
6 22.2	12 1.3	18 21.5	24 21.6	30 3.4	36 1.5

Average Measurement - 17.4 mm

Comments

- Concrete slabs (see accompanying photos)
- Measurement was obtained on slab exhibiting worse surface degradation.
- Slabs are partially embedded in earth

Additional Measurements Required

ATTACHMENT 9-3

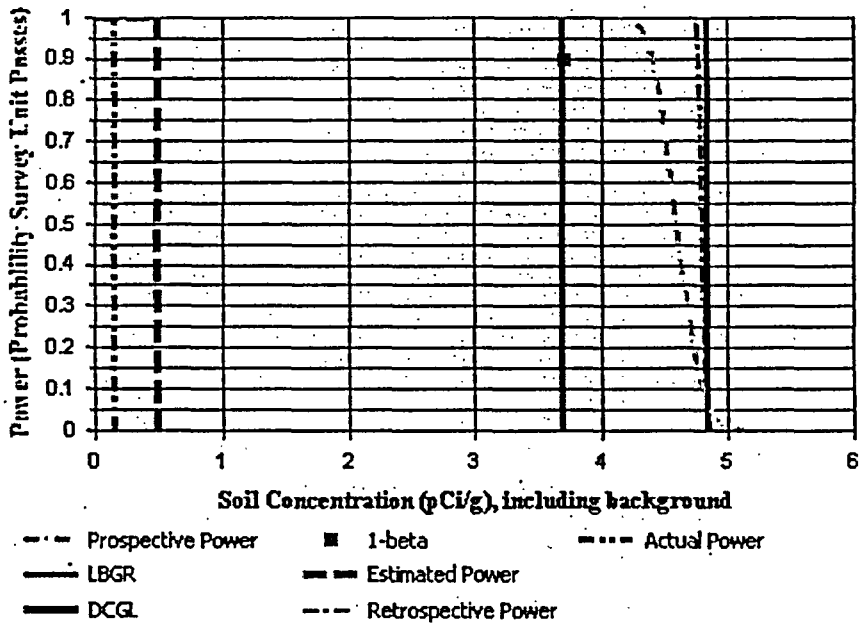
Appendix B, C, D

DQA Surface Soil Report

Assessment Summary

Site:	OL13		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL13-1A		
Report Number:	1		
Survey Unit Samples:	14		
Reference Area Samples:	0		
Test Performed:	Sign	Test Result:	Not Performed
Judgmental Samples:	0	EMC Result:	Not Performed
Assessment Conclusion:	***Reject Null Hypothesis (Survey Unit PASSES)***		

Retrospective Power Curve



Appendix B

DQA Surface Soil Report

Survey Unit Data

NOTE: Type = "S" indicates survey unit sample.
Type = "R" indicates reference area sample.

Sample Number	Type	Cs-137 (pCi/g)
AF111 SP1	S	0.14
AF108 SP2	S	0.17
AF106 SP3	S	0.18
AF103 SP4	S	0.37
AI110 SP5	S	0.14
AI107 SP6	S	0.16
AI104 SP7	S	0.25
AI101 SP8	S	0.12
AI98 SP9	S	0.2
AK111 SP10	S	0.15
AK108 SP11	S	0.16
AK106 SP12	S	0.15
AK103 SP13	S	0.16
AK100 SP14	S	0.14

Basic Statistical Quantities Summary

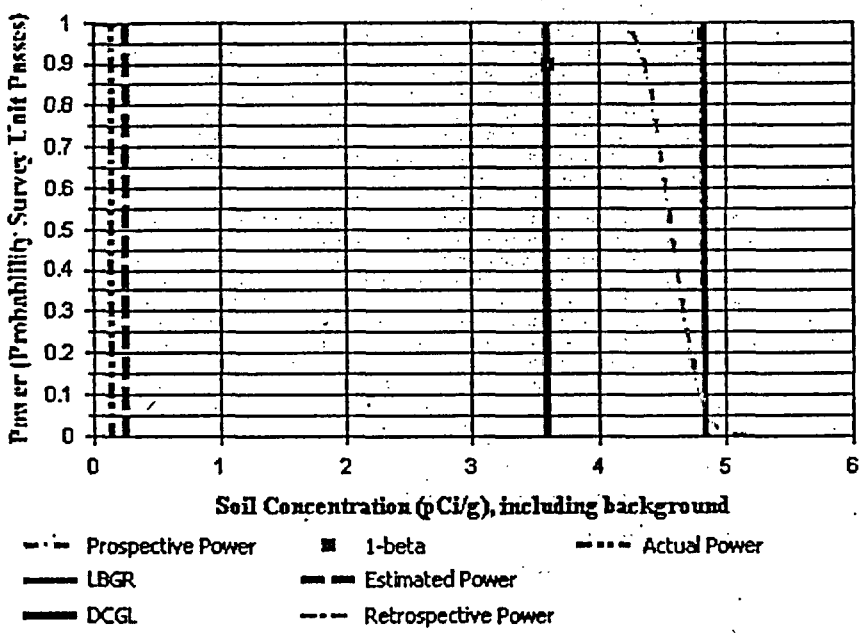
Statistic	Survey Unit	Background	DQO Results
Sample Number	14	N/A	N=11
Mean (pCi/g)	0.18	N/A	0.5
Median (pCi/g)	0.16	N/A	N/A
Std Dev (pCi/g)	0.07	N/A	0.3999
High Value (pCi/g)	0.37	N/A	N/A
Low Value (pCi/g)	0.12	N/A	N/A

DQA Surface Soil Report

Assessment Summary

Site:	OL13		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL13-2A		
Report Number:	1		
Survey Unit Samples:	13		
Reference Area Samples:	0		
Test Performed:	Sign	Test Result:	Not Performed
Judgmental Samples:	0	EMC Result:	Not Performed
Assessment Conclusion:	***Reject Null Hypothesis (Survey Unit PASSES)***		

Retrospective Power Curve



Appendix C

DQA Surface Soil Report

Survey Unit Data

NOTE: Type = "S" indicates survey unit sample.
Type = "R" indicates reference area sample.

Sample Number	Type	Cs-137 (pCi/g)
AM109 SP1	S	0.12
AM106 SP2	S	0.13
AM104 SP3	S	0.13
AM101 SP4	S	0.16
AP110 SP5	S	0.15
AP108 SP6	S	0.13
AP105 SP7	S	0.15
AP102 SP8	S	0.14
AR112 SP10	S	0.13
AR109 SP11	S	0.19
AR106 SP12	S	0.16
AR104 SP13	S	0.17
AR101 SP14	S	0.1

Basic Statistical Quantities Summary

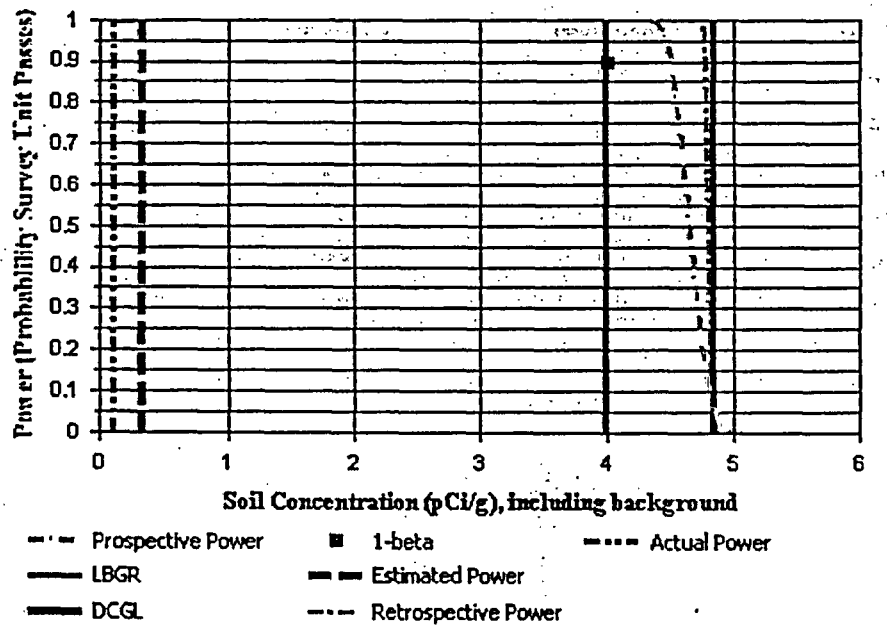
Statistic	Survey Unit	Background	DQO Results
Sample Number	13	N/A	N=11
Mean (pCi/g)	0.14	N/A	0.25
Median (pCi/g)	0.14	N/A	N/A
Std Dev (pCi/g)	0.02	N/A	0.4365
High Value (pCi/g)	0.19	N/A	N/A
Low Value (pCi/g)	0.10	N/A	N/A

DQA Surface Soil Report

Assessment Summary

Site:	OL13		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL13-3A		
Report Number:	1		
Survey Unit Samples:	14		
Reference Area Samples:	0		
Test Performed:	Sign	Test Result:	Not Performed
Judgmental Samples:	0	EMC Result:	Not Performed
Assessment Conclusion:	***Reject Null Hypothesis (Survey Unit PASSES)***		

Retrospective Power Curve



Appendix D