

APPENDIX A

**SNEC Calculation E900-05-024
Open Land FSS Design – OL3**

Original



SNEC CALCULATION COVER SHEET

CALCULATION DESCRIPTION

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Subject

Open Land FSS Design – OL3

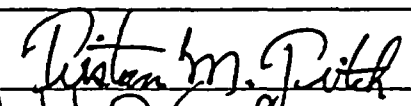
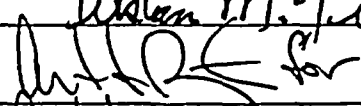
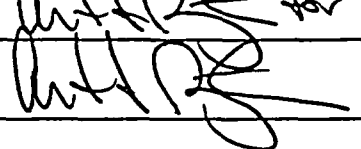
Question 1 - Is this calculation defined as "In QA Scope"? Refer to definition 3.5. Yes No


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

APPROVAL SIGNATURES

Calculation Originator	Tristan M. Tritch/ 	Date	5/26/05
Technical Reviewer	W. J. Cooper/ 	Date	27 May 2005
Additional Review	A. Paynter/ 	Date	27 May 2005
Additional Review		Date	

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1.0 PURPOSE

- 1.1 The purpose of this calculation is to develop a final status survey design for open land area OL3 (soil only) at the Saxton Nuclear Experimental Corporation (SNEC) facility. The non-soil portions of OL3 will be surveyed under Open Land FSS Design – OL3 Paved Surfaces and Concrete, E900-05-032. The OL3 fence surveys will be performed under Miscellaneous Chain Link Fences – Survey Design, E900-05-023.
- 1.2 Survey Area OL3 is an Impacted Class 1 area which encompasses the old on-site driveway, the current parking area, and the soil processing facility (SPF, also known as dirt world) on the SNEC facility decommissioning project. It covers approximately **9,400 square meters** (94 10m x 10m grids). Of that surface area, slightly more than 8180 square meters is soil, 991 square meters is concrete, and 225 square meters is asphalt. Table 5-5 of the SNEC License Termination Plan (LTP) limits the physical size of Class 1 survey areas to 2000 square meters. Due to this area constraint, OL3 will be subdivided into six smaller survey units, namely OL3-1 through OL3-6, containing 2000, 1800, 1800, 1300, 2000, and 500 square meters, respectively. The corresponding soil areas are 2000, 654, 1800, 1294, 1972, and 464 square meters.
- 1.3 Originally, OL3 contained five units; however, five grids from survey unit OL9-2 were transformed into OL3-6 because activity greater than the DCGL (requiring remediation) was detected. OL9-2 is an impacted Class 2 area.
- 1.4 All post-remediation soil samples have indicated that no detectable activity greater than the Administrative Limit (AL) exists in this entire survey area.
- 1.5 The general layout of the six 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 six 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 2-4** from **Reference 3.13**.

Table 1, DCGLw Values

Volumetric DCGLw (pCi/g – Cs-137)
5.73 (4.3 A.L.)

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

Of the 94 grids in OL3, 247 soil samples were taken from 67 of those grids. No sample exhibited activity greater than the DCGL. 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, 21 samples from survey areas OL1 and OL2 were sent off site for "SNEC 11" analyses. OL1 and OL2 data were used in this design because only one sample from OL7 was sent off-site for analysis. The expectation is that, by the very quantity of samples taken, the OL1/OL2 data would more accurately represent the ratios of radionuclides present in the soil.

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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	100%

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 1** soils should be scanned using a serpentine pattern that is ~0.5 meters wide.
 - 2.1.4.2 As this is a Class 1 survey area, 100% of all accessible surfaces are required to be scanned. See Attachment 1-1 for grid layouts for the six survey units.
 - 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 all six units (see COMPASS output on Attachments 7-1 to 7-13). Sampling depth should be IAW Section 2.2. The MDCscan (soil) is less than the effective administrative DCGLw Cs-137 (5.67 pCi/g MDCscan @ 250 cpm background < 5.73 pCi/g DCGLw), therefore 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),

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- odd shaped diagrams, and/or
- coverage concerns

(see Attachments 6-1 through 6-12 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, 6-5, 6-7, 6-9, and 6-11). Remaining soil sampling points are positioned using coordinates developed from these markers and listed on Attachments 6-2, 6-4, 6-6, 6-8, 6-10, and 6-12.
- 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.

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- 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 DCGL Calculation Logic – CV Yard Soil & Boulders, E900-04-006.
- 3.14 Personal conversation between Tristan Tritch and with Rob Marquette, 3/24/05.
- 3.15 1994 Saxton Soil Remediation Project Report, May 11, 1995.

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 8-5**.
- 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**).
- 4.7 The determination of the physical extent of this area is based on the drawing **Reference 3.7**.
- 4.8 OL3 has been subjected to extensive remediation.
 - 4.8.1 OL3-3 was previously designated as residing in OL-1. Grids AQ127, AQ128, and AR127 had Cs-137 up to 5 pCi/g. Subsequently, the soil was removed, the area was rescanned, and additional samples were taken. Post-remediation samples showed Cs-137 at levels no greater than 1.7 pCi/g.
 - 4.8.2 Contamination was detected in the "burn area" in OL3-4 and southern portion of OL3-5. Soil was removed, the area was rescanned and additional soil samples were taken.

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- 4.8.3 Soil from the northernmost portion of OL3-5 was removed. See Figures 1 and 3 of the 1994 Saxton Soil Remediation Project Report (Reference 3.15). Soil activity as high as 38 pCi/g was removed from this area. Grids were not designated the way they are in 2005, but one can get an idea of the area remediated when referencing to the location of the Penelec Line Shack.
- 4.8.4 One grid adjacent to the former SSGS cooling water intake, in OL3-6, was subject to recent remediation when activity was found during an FSS survey of OL9-2. The highest activity found was 14.4 pCi/g. Sampling, following removal of approximately 18 inches of soil, produced no activity greater than the DCGL.
- 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 The sample database contained only one sample, which was assayed both on site and off site, with which to determine the effective radionuclide mix for Area OL3. In order to obtain a more representative mix of expected radionuclides, data from OL1 and OL2 were used instead. This list is shown on Attachments 2-1 through 2-3 and includes 21 analyses.
- The decayed set of sample results were input to the spreadsheet titled "Effective DCGL Calculator for Cs-137" (Reference 3.8) to determine the effective volumetric DCGLw values for the three survey units. The output of this spreadsheet is shown on Attachment 2-4 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 3.14) for most locations in OL3.
- 4.11 The survey units described in this survey design were inspected. A copy of the OL3 specific portion of the SNEC facility post-remediation inspection report (Reference 3.9) is included as Attachment 9-1.
- 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.

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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.

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 OL3-1 through OL3-6.
- 6.2 **Attachments 2-1** through **2-4** show the DCGL Calculation Logic – CV Yard Soil & Boulders (**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/cm³ Cs-137 source term in an end-cylinder geometry.
- 6.6 **Attachments 6-1** through **6-12** show both the random soil sampling points and the biased scan locations and reference coordinates for Survey Units OL3-1 through OL3-6.
- 6.7 **Attachments 7-1** through **7-13** are COMPASS outputs for Survey Units OL3-1 through OL3-6 showing area factors, the number of sampling points in each survey unit, and prospective power.
- 6.8 **Attachments 8-1** through **8-5** show the soil variability results for samples from OL3 based on all available data taken from the area.
- 6.9 **Attachment 9-1** is a copy of the inspection report for OL3.

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Exhibit 1

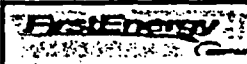
SNEC Facility Individual Radionuclide DCGL Values ^(a)

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).



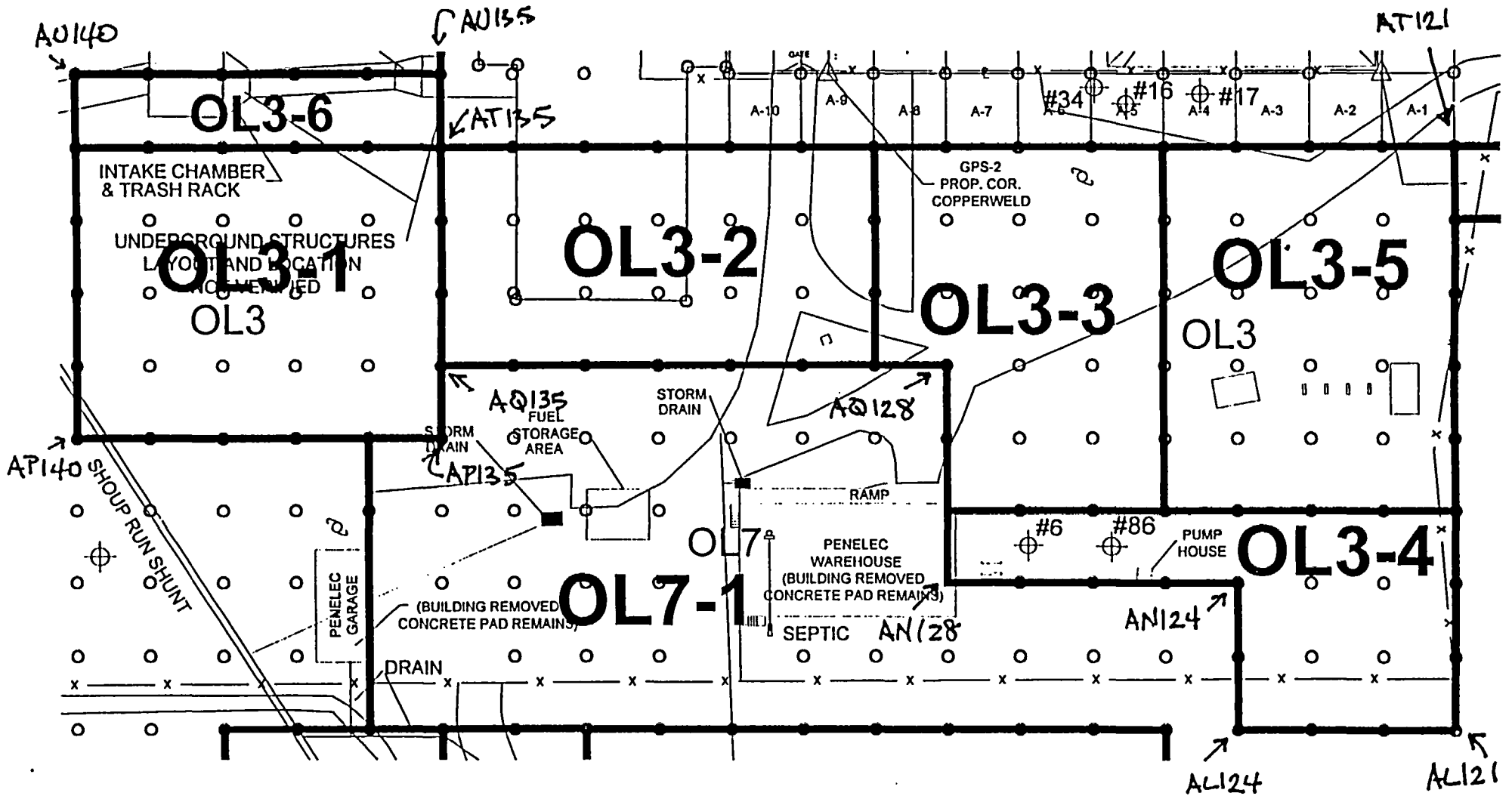
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Exhibit 2 Survey Design Checklist

Calculation No. E900-05-024		Location Codes OL3	
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	22 5/31/05
2	Are drawings/diagrams adequate for the subject area (drawings should have compass headings)?	(Yes) N/A	22 5/31/05
3	Are boundaries properly identified and is the survey area classification clearly indicated?	(Yes) N/A	22 5/31/05
4	Has the survey area(s) been properly divided into survey units IAW EXHIBIT 10	(Yes) N/A	22 5/31/05
5	Are physical characteristics of the area/location or system documented?	(Yes) N/A	22 5/31/05
6	Is a remediation effectiveness discussion included?	(Yes) N/A	22 5/31/05
7	Have characterization survey and/or sampling results been converted to units that are comparable to applicable DCGL values?	(Yes) N/A	22 5/31/05
8	Is survey and/or sampling data that was used for determining survey unit variance included?	(Yes) N/A	22 5/31/05
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	22 5/31/05
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	22 5/31/05
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	22 5/31/05
14	Has an effective DCGLw been identified for the survey unit(s)?	(Yes) N/A	22 5/31/05
15	Was the appropriate DCGL _{EMC} included in the survey design calculation?	(Yes) N/A	22 5/31/05
16	Has the statistical tests that will be used to evaluate the data been identified?	(Yes) N/A	22 5/31/05
17	Has an elevated measurement comparison been performed (Class 1 Area)?	(Yes) N/A	22 5/31/05
18	Has the decision error levels been identified and are the necessary justifications provided?	(Yes) N/A	22 5/31/05
19	Has scan instrumentation been identified along with the assigned scanning methodology?	(Yes) N/A	22 5/31/05
20	Has the scan rate been identified, and is the MDCscan adequate for the survey design?	(Yes) N/A	22 5/31/05
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	22 5/31/05
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	22 5/31/05
24	Are investigation levels and administrative limits adequate, and are any associated actions clearly indicated?	(Yes) N/A	22 5/31/05
25	For sample analysis, have the required MDA values been determined?	(Yes) N/A	22 5/31/05
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.



ATTACHMENT 1-1

DCGL Calculation Logic-CV Yard Soil & Boulders

- I. **Survey Unit:** SNEC Containment Vessel (CV) Yard Soil and Boulders
- II. **Description:** The purpose of this calculation is to determine a representative isotopic mix for the CV Yard Soil and associated Boulders from available sample analyses. The effective volumetric DCGL_ws are then determined from the mean percent of applicable samples.
- III. **Data Selection Logic Tables:** The radionuclide selection logic and subsequent DCGL calculations are provided in six (6) tables. These tables were developed using Microsoft Excel. Table explanation is as follows.

Table 1: Data Listing – This table, which has been extracted from a larger database, provides a list of the most representative sample analyses. Results are from scoping, characterization, and pre/post remediation surveys. The samples consist of soil media that was taken in support of the aforementioned surveys. As applicable, a sample number, sample location/description, radionuclide concentration, analysis date are provided for each sample. Positive nuclide concentrations are noted with yellow/shaded background fields while MDA values are noted in the gray shaded fields.

Table 2: Decayed Listing – This table decays the data from Table 1. Half-life values (days) are listed above each respective nuclide column. Samples are decayed from the respective analysis date to January 15, 2004. Positive results are denoted in a yellow background field while MDA values are noted in the gray shaded fields.

Table 3: Decayed Listing of Positive Nuclides & MDAs Removed – This table provides the best overall representation of the data. Non-positive nuclide columns have been removed as well as all the MDA values. Therefore, 11 nuclides have been reduced to four (4).

Table 4: Ratio to Cs-137 for Positive Nuclides – This table provides the calculation methodology for determining the surrogate ratio to Cs-137 for each radionuclide. From this information the mean, sigma, and mean % of total are calculated. The mean % of total values is used to calculate the volumetric DCGL_w per MARSSIM equation I-14. See Table 5. Note that the mean percent values were averaged using only the positive sample results in each column. In some cases only a single nuclide value (e.g. Sr-90) had a positive result. This value is listed as the value in the mean result field. This results in higher “mean percent of total” values in the mix, which are conservative.

Note: From Table 4 only the “mean % of total” values are used as input to the “Effective DCGL Calculation Spreadsheet” as illustrated in Table 5.

Table 5: Effective DCGL Calculator for Cs-137 (in pCi/g) – This table provides the surrogate volumetric modified Cs-137 DCGL_w calculation results from data derived from Table 4.

- IV. **Summary** – Since the CV Yard and Boulders are volumes of soil or rock material, existing in place or in a pile, the release limit is primarily based on the volumetric DCGL_w. Using the above data selection logic tables the calculated Cs-137 volumetric DCGL_w is 5.73 pCi/g. This value will be reduced by 25% as part of SNEC’s requirement to apply an administrative limit as discussed in the License Termination Plan (LTP).

SNEC Sample No	Location/Description	H-3	Sr-90	Co-60	Cs-137	Am-241	Pu-238	Pu-239	Pu-241	C-14	III-63	Eu-152
1	CV Tunnel CV Tunnel Sediment Composite, OL1	9.40E+00	9.67E+00	1.26E+00	1.25E+03	1.80E-01	5.50E-01	2.20E-01	4.47E+01	9.34E+00	4.02E+00	1.30E-01
2	SXSL99219 Subsurface Sample #29 (0-5'), AY-128, OL1			7.00E-02	5.90E-01							
3	SXSL1083 North CV Yard Soil BA-127, 812' El. Sample # 5, OL2	4.58E+00	5.31E-02	1.92E-02	8.86E-01	9.61E-02	4.68E-02	3.27E-02	3.77E+00	2.10E-01	1.09E+01	5.25E-02
4	SXSL1089 North CV Yard Soil AY-127, 810' El. Sample # 3, OL1	3.03E+00	6.95E-02	3.32E-02	1.29E+00	9.93E-02	1.28E-01	5.00E-02	4.97E+00	2.10E-01	7.54E+00	8.28E-02
5	SXSL1115 North CV Yard Soil AY-128, 804' El. Sample # 2, OL1	4.88E+00	5.36E-02	2.43E-02	1.80E+00	2.40E-01	1.38E-01	4.07E-02	4.21E+00	2.10E-01	7.60E+00	5.71E-02
6	SXSL1122 North CV Yard Soil AY-129, 788' El. Sample # 2, OL1	3.44E+00	5.29E-02	2.79E-02	4.77E+00	1.83E-01	8.94E-02	4.00E-02	3.68E+00	2.06E-01	8.75E+00	8.62E-02
7	SXSL1130 North CV Yard Soil AX-129, 803' El. Sample # 4, OL1	4.99E+00	6.48E-02	2.98E-02	2.26E+01	1.49E-01	8.56E-02	1.21E-02	3.55E+00	2.31E-01	1.34E+01	9.89E-02
8	SXSL1132 North CV Yard Soil AZ-130, Sample # 5, OL1	2.98E+00	7.15E-02	3.50E-02	2.59E+00	1.64E-01	7.46E-02	6.46E-02	5.27E+00	2.15E-01	1.26E+01	7.34E-02
9	SXSL1270 AX-129, 3-3, Soil, CV SE Side 5' From CV, 800' El., OL1	1.13E+01	2.00E-02	1.00E-02	2.31E+01	3.70E-02	7.00E-03	7.00E-03	2.10E+00	3.93E+00	8.68E+00	7.00E-02
10	SXSL1281 AX-128, 3-1, Soil, CV Tunnel East 5' From CV, 800' El., OL1	1.15E+01	3.00E-02	1.00E-02	4.38E+00	3.10E-02	1.60E-02	7.00E-03	1.91E+00	4.00E+00	7.78E+00	4.00E-02
11	SXSL2848 Annulus Well, A-2, 5 to 10' Depth, OL1	2.00E+00	3.14E-02	1.00E-01	6.00E-01	9.78E-03	1.33E-02	1.10E-02	1.87E+00	1.83E-01	1.75E+00	
13	SXSL2871 CV Area - East Yard Dirt Pile - Middle, 1/2 Way Up, OL1		3.00E-02	7.00E-02	5.60E-01							
14	SXSL2872 CV Area - East Yard Dirt Pile - Bottom (also top center), OL1		3.00E-02	6.00E-02	1.00E-01							
15	SXSL3140 East CV Yard, Soil Pile @ 5' on West Side (6' Depth), OL1	1.89E+00	1.20E-02	1.40E-02	8.25E-01	7.00E-03	5.00E-03	5.00E-03	3.69E-01	8.60E-02	3.41E+00	3.00E-02
16	SXSL3142 Soil Pile, CV Yard, Three Feet on East Side, SR-37, OL1		2.95E-02	7.00E-02	6.00E-01							
17	SXSL3145 East CV Yard, Soil Pile @ 3' on East Side (6' Depth), OL1	1.90E+00	1.70E-02	1.30E-02	1.26E+00	4.00E-03	5.00E-03	5.00E-03	3.76E-01	8.30E-02	3.69E+00	3.80E-02
18	SXSL3148 Soil Pile, CV Yard, Six Feet on East Side, SR-37, OL1		2.97E-02	8.00E-02	3.00E-01							
19	SXSL3153 East CV Yard, Soil Pile @ Top (6' Depth), OL1	1.94E+00	4.30E-02	2.30E-02	3.00E-01	3.00E-03	5.00E-03	5.00E-03	3.43E-01	8.70E-02	4.18E+00	5.10E-02
21	SXSL4142 CV Yard Soil - West Side, AP1-7, OL1	2.22E+00	3.25E-02	5.00E-02	9.00E-01	1.76E-02	6.71E-02	2.02E-02				
22	SXSL4143 CV Yard Soil - West Side, AP1-7, OL1	2.23E+00	3.16E-02	5.00E-02	5.00E-01	2.21E-02	6.31E-02	3.64E-02				
23	SXSL4148 CV Yard Soil - West Side, AP1-7, OL1	2.24E+00	2.77E-02	7.00E-02	3.90E+00	2.77E-02	4.30E-02	3.04E-02				

SNEC Sample No	Location/Description	T 1/2	T 1/2	T 1/2	T 1/2	T 1/2	T 1/2	T 1/2	T 1/2	T 1/2	T 1/2	T 1/2	Decay Date	ET (d)
		4485.27	10446.15	1925.23275	11019.5925	157861.05	32050.6875	8813847.75	5259.6	2092882.5	36561.525	4967.4	January 15, 2004	
1	CV Tunnel CV Tunnel Sediment Composite, OL1	7.97E+00	9.01E+00	8.59E-01	1.17E+03	1.79E-01	5.37E-01	2.20E-01	3.88E+01	9.34E+00	3.94E+00	1.12E-01	February 14, 2001	1065
2	SXSL99219 Subsurface Sample #29 (0-5'), AY-128, OL1			4.05E-02	5.36E-01								November 17, 1999	1520
3	SXSL1083 North CV Yard Soil BA-127, 812' El. Sample # 5, OL2	4.20E+00	5.11E-02	1.57E-02	8.55E-01	9.59E-02	4.62E-02	3.27E-02	3.50E+00	2.10E-01	1.08E+01	4.85E-02	June 27, 2002	567
4	SXSL1089 North CV Yard Soil AY-127, 810' El. Sample # 3, OL1	2.78E+00	6.69E-02	2.71E-02	1.24E+00	9.91E-02	1.26E-01	5.00E-02	4.61E+00	2.10E-01	7.46E+00	7.65E-02	June 28, 2002	566
5	SXSL1115 North CV Yard Soil AY-128, 804' El. Sample # 2, OL1	4.47E+00	5.16E-02	1.98E-02	1.74E+00	2.39E-01	1.36E-01	4.07E-02	3.91E+00	2.10E-01	7.52E+00	5.28E-02	June 29, 2002	565
6	SXSL1122 North CV Yard Soil AY-129, 788' El. Sample # 2, OL1	3.15E+00	5.10E-02	2.28E-02	4.60E+00	1.83E-01	8.83E-02	4.00E-02	3.42E+00	2.06E-01	8.66E+00	7.97E-02	June 29, 2002	565
7	SXSL1130 North CV Yard Soil AX-129, 803' El. Sample # 4, OL1	4.58E+00	6.24E-02	2.44E-02	2.18E+01	1.49E-01	8.46E-02	1.21E-02	3.30E+00	2.31E-01	1.33E+01	9.15E-02	July 3, 2002	561
8	SXSL1132 North CV Yard Soil AZ-130, Sample # 5, OL1	2.73E+00	6.89E-02	2.86E-02	2.50E+00	1.64E-01	7.37E-02	6.46E-02	4.89E+00	2.15E-01	1.25E+01	6.79E-02	July 3, 2002	561
9	SXSL1270 AX-129, 3-3, Soil, CV SE Side 5' From CV, 800' El., OL1	9.84E+00	1.88E-02	7.22E-03	2.18E+01	3.69E-02	6.86E-03	7.00E-03	1.87E+00	3.93E+00	8.53E+00	6.17E-02	July 26, 2001	903
10	SXSL1281 AX-128, 3-1, Soil, CV Tunnel East 5' From CV, 800' El., OL1	1.00E+01	2.83E-02	7.22E-03	4.14E+00	3.09E-02	1.57E-02	7.00E-03	1.69E+00	4.00E+00	7.65E+00	3.53E-02	July 26, 2001	903
11	SXSL2848 Annulus Well, A-2, 5 to 10' Depth, OL1	1.79E+00	3.00E-02	7.77E-02	5.74E-01	9.75E-03	1.31E-02	1.10E-02	1.71E+00	1.83E-01	1.73E+00		February 13, 2002	701
13	SXSL2871 CV Area - East Yard Dirt Pile - Middle, 1/2 Way Up, OL1		2.87E-02	5.48E-02	5.37E-01								March 6, 2002	680
14	SXSL2872 CV Area - East Yard Dirt Pile - Bottom (also top center), OL1		2.87E-02	4.70E-02	9.58E-02								March 6, 2002	680
15	SXSL3140 East CV Yard, Soil Pile @ 5' on West Side (6' Depth), OL1	1.75E+00	1.16E-02	1.17E-02	7.99E-01	6.98E-03	4.95E-03	5.00E-03	3.45E-01	8.60E-02	3.37E+00	2.80E-02	August 30, 2002	503
16	SXSL3142 Soil Pile, CV Yard, Three Feet on East Side, SR-37, OL1		2.85E-02	5.81E-02	5.81E-01								August 13, 2002	520
17	SXSL3145 East CV Yard, Soil Pile @ 3' on East Side (6' Depth), OL1	1.76E+00	1.64E-02	1.08E-02	1.22E+00	3.99E-03	4.95E-03	5.00E-03	3.52E-01	8.30E-02	3.65E+00	3.54E-02	August 30, 2002	503
18	SXSL3148 Soil Pile, CV Yard, Six Feet on East Side, SR-37, OL1		2.87E-02	6.63E-02	2.90E-01								August 13, 2002	520
19	SXSL3153 East CV Yard, Soil Pile @ Top (6' Depth), OL1	1.79E+00	4.16E-02	1.92E-02	2.91E-01	2.99E-03	4.95E-03	5.00E-03	3.21E-01	8.70E-02	4.14E+00	4.75E-02	August 30, 2002	503
21	SXSL4142 CV Yard Soil - West Side, AP1-7, OL1	2.18E+00	3.23E-02	4.81E-02	8.94E-01	1.76E-02	6.69E-02	2.02E-02					October 2, 2003	105
22	SXSL4143 CV Yard Soil - West Side, AP1-7, OL1	2.19E+00	3.14E-02	4.81E-02	4.97E-01	2.21E-02	6.30E-02	3.64E-02					October 2, 2003	105
23	SXSL4148 CV Yard Soil - West Side, AP1-7, OL1	2.20E+00	2.75E-02	6.74E-02	3.87E+00	2.77E-02	4.29E-02	3.04E-02					October 2, 2003	105

KEY	
	Yellow Shaded Background = Positive Result
	Gray Shaded Background = MDA

TABLE 3 - Decayed Listing of Positive Nuclides & MDAs Removed (pCi/g)						
SHEC Sample No	Location/Description	H-3	Sr-90	Co-60	Cs-137	Total pCi/g
1	CV Tunnel		9.01E+00	8.59E-01	1.17E+03	1178.89
2	SX9SL99219				5.36E-01	0.54
3	SXSL1063	North CV Yard Soil BA-127, 812' El, Sample # 5, OL2	4.20E+00		8.55E-01	5.05
4	SXSL1089	North CV Yard Soil AY-127, 810' El, Sample # 3, OL1	2.78E+00		1.24E+00	4.02
5	SXSL1115	North CV Yard Soil AY-128, 804' El, Sample # 2, OL1	4.47E+00		1.74E+00	6.21
6	SXSL1122	North CV Yard Soil AY-129, 798' El, Sample # 2, OL1	3.15E+00		4.60E+00	7.76
7	SXSL1130	North CV Yard Soil AX-129, 803' El, Sample # 4, OL1	4.58E+00	2.44E-02	2.18E+01	26.42
8	SXSL1132	North CV Yard Soil AZ-130, Sample # 5, OL1	2.73E+00		2.50E+00	5.23
9	SXSL1270	AX-129, 3-3, Soil, CV SE Side 5' From CV, 800' El., OL1			2.18E+01	21.82
10	SXSL1281	AX-128, 3-1, Soil, CV Tunnel East 5' From CV, 800' El, OL1			4.14E+00	4.14
11	SXSL2649	Anulus Well, A-2, 5 to 10' Depth, OL1			5.74E-01	0.57
13	SXSL2871	CV Area - East Yard Dirt Pile - Middle, 1/2 Way Up, OL1			5.37E-01	0.54
14	SXSL2872	CV Area - East Yard Dirt Pile - Bottom (also top center), OL1			9.58E-02	0.10
15	SXSL3140	East CV Yard, Soil Pile @ 6' on West Side (6" Depth), OL1			7.99E-01	0.80
16	SXSL3142	Soil Pile, CV Yard, Three Feet on East Side, SR-37, OL1			5.81E-01	0.58
17	SXSL3145	East CV Yard, Soil Pile @ 3' on East Side (6" Depth), OL1			1.22E+00	1.22
18	SXSL3149	Soil Pile, CV Yard, Six Feet on East Side, SR-37, OL1			2.90E-01	0.29
19	SXSL3153	East CV Yard, Soil Pile @ Top (6" Depth), OL1			2.91E-01	0.29
21	SXSL4142	CV Yard Soil - West Side, AP1-7, OL1			8.94E-01	0.89
22	SXSL4143	CV Yard Soil - West Side, AP1-7, OL1			4.97E-01	0.50
23	SXSL4149	CV Yard Soil - West Side, AP1-7, OL1		6.74E-02	3.87E+00	3.94

TABLE 4 - Ratio To Cs-137 for Positive Nuclides						
SHEC Sample No	Location/Description	H-3	Sr-90	Co-60	Cs-137	Total
1	CV Tunnel		7.71E-03	7.35E-04	1.00E+00	1.01
2	SX9SL99219				1.00E+00	1.00
3	SXSL1063	North CV Yard Soil BA-127, 812' El, Sample # 5, OL2	4.91E+00		1.00E+00	5.91
4	SXSL1089	North CV Yard Soil AY-127, 810' El, Sample # 3, OL1	2.23E+00		1.00E+00	3.23
5	SXSL1115	North CV Yard Soil AY-128, 804' El, Sample # 2, OL1	2.57E+00		1.00E+00	3.57
6	SXSL1122	North CV Yard Soil AY-129, 798' El, Sample # 2, OL1	6.85E-01		1.00E+00	1.68
7	SXSL1130	North CV Yard Soil AY-129, 803' El, Sample # 4, OL1	2.10E-01	1.12E-03	1.00E+00	1.21
8	SXSL1132	North CV Yard Soil AZ-130, Sample # 5, OL1	1.09E+00		1.00E+00	2.09
9	SXSL1270	AX-129, 3-3, Soil, CV SE Side 5' From CV, 800' El., OL1			1.00E+00	1.00
10	SXSL1281	AX-128, 3-1, Soil, CV Tunnel East 5' From CV, 800' El, OL1			1.00E+00	1.00
11	SXSL2649	Anulus Well, A-2, 5 to 10' Depth, OL1			1.00E+00	1.00
13	SXSL2871	CV Area - East Yard Dirt Pile - Middle, 1/2 Way Up, OL1			1.00E+00	1.00
14	SXSL2872	CV Area - East Yard Dirt Pile - Bottom (also top center), OL1			1.00E+00	1.00
15	SXSL3140	East CV Yard, Soil Pile @ 6' on West Side (6" Depth), OL1			1.00E+00	1.00
16	SXSL3142	Soil Pile, CV Yard, Three Feet on East Side, SR-37, OL1			1.00E+00	1.00
17	SXSL3145	East CV Yard, Soil Pile @ 3' on East Side (6" Depth), OL1			1.00E+00	1.00
18	SXSL3149	Soil Pile, CV Yard, Six Feet on East Side, SR-37, OL1			1.00E+00	1.00
19	SXSL3153	East CV Yard, Soil Pile @ Top (6" Depth), OL1			1.00E+00	1.00
21	SXSL4142	CV Yard Soil - West Side, AP1-7, OL1			1.00E+00	1.00
22	SXSL4143	CV Yard Soil - West Side, AP1-7, OL1			1.00E+00	1.00
23	SXSL4149	CV Yard Soil - West Side, AP1-7, OL1		1.74E-02	1.00E+00	1.02
	Mean⇒	1.95E+00	7.71E-03	6.42E-03	1	2.96
	Sigma⇒	1.708		0.010	0.000	
	Mean % of Total⇒	65.79%	0.26%	0.22%	33.74%	100.00%

Table 5

Effective DCGL Calculator for Cs-137 (In pCi/g)							SNEC/AL	75%	Total Activity Limit DCGLw	Administrative Limit
							16.98	pCi/g	12.74	pCi/g
SAMPLE NUMBER(s) ⇒ CV YARD SOIL & BOULDER SAMPLES							Cs-137 Limit		Cs-137 Administrative Limit	
17.45%	25.0	mrem/y TEDE Limit				5.73	pCi/g	4.30	pCi/g	
7.79%	4.0	mrem/y Drinking Water (DW) Limit		<input checked="" type="checkbox"/> Check for 25 mrem/y						
Isotope	Sample Input (pCi/g, uCi, % of Total, etc.)	% of Total	25 mrem/y TEDE Limits (pCi/g)	4 mrem/y DW Limit (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	
1 Am-241		0.000%	9.9	2.3	0.00	0.00	0.00	0.00	0.00	Am-241
2 C-14		0.000%	2.0	0.4	0.00	0.00	0.00	0.00	0.00	C-14
3 Co-60	0.0064	0.216%	3.5	0.7	0.04	0.08	0.04	0.05	0.00	Co-60
4 Cs-137	1.0000	33.738%	6.6	1.6	5.73	1.28	5.73	3.79	0.01	Cs-137
5 Eu-152		0.000%	10.1	2.4	0.00	0.00	0.00	0.00	0.00	Eu-152
6 H-3	1.9499	65.786%	132	31.1	11.17	25.02	11.17	0.37	0.25	H-3
7 Ni-63		0.000%	747	180.0	0.00	0.00	0.00	0.00	0.00	Ni-63
8 Pu-238		0.000%	1.8	0.4	0.00	0.00	0.00	0.00	0.00	Pu-238
9 Pu-239		0.000%	1.6	0.37	0.00	0.00	0.00	0.00	0.00	Pu-239
10 Pu-241		0.000%	86	19.8	0.00	0.00	0.00	0.00	0.00	Pu-241
11 Sr-90	0.0077	0.260%	1.2	0.61	0.04	0.10	0.04	0.16	0.05	Sr-90
2.96E+00		100.000%			16.98	38.03	16.98	4.364	0.312	
					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 <i>not</i> % of Total.			

Attachment 2-4

2350 INSTRUMENT AND PROBE EFFICIENCY CHART
7/01/04 (Typical 2" by 2" Nal (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

2350 INSTRUMENT AND PROBE EFFICIENCY CHART
7/01/04 (Typical 43-68 Beta Efficiency Factors)

Different Instrument/Probe Cal. Due	Cesium only instruments (10mV to 100)
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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 OL3

- 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 = 4.3 pCi/g

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

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

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

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

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

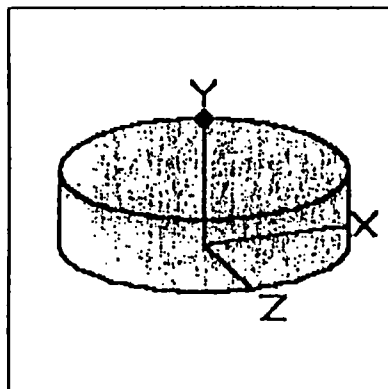
$$\frac{MDER}{MSoutput \cdot 1000 \text{ uR/mR}} = 5.6740 = MDCscan \text{ (pCi/g)}$$

$$\frac{MDCsurv \cdot DCGL}{MDCscan} = 121.0306 = DCDLeq \text{ (ncpm)}$$

Page : 1
 DNS File : MODEL.M55
 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 cm ³	Concrete	1.6
Air Gap		Air	0.00122

Source Input

Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	μCi/cm ³	Bq/cm ³
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

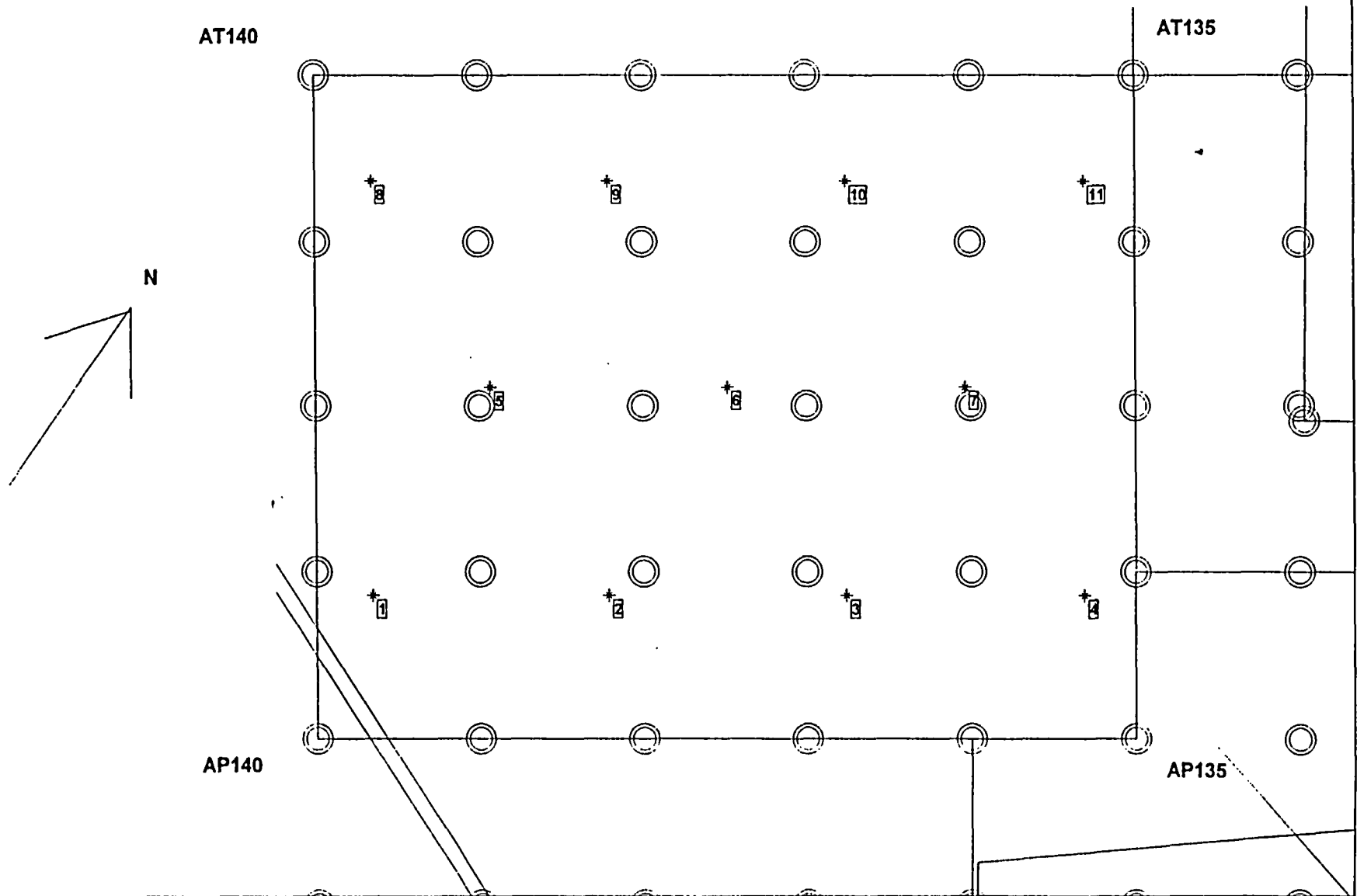
Radial	50
Circumferential	50
Y Direction (axial)	50

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm ² /sec No Buildup	Fluence Rate MeV/cm ² /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	1.251e-01	1.371e-04	2.446e-04

ATTACHMENT 5-1

Survey Unit OL3-1 (soil)



Sample Locations and Scan Survey Grids for Survey Unit OL3-1 (soil)

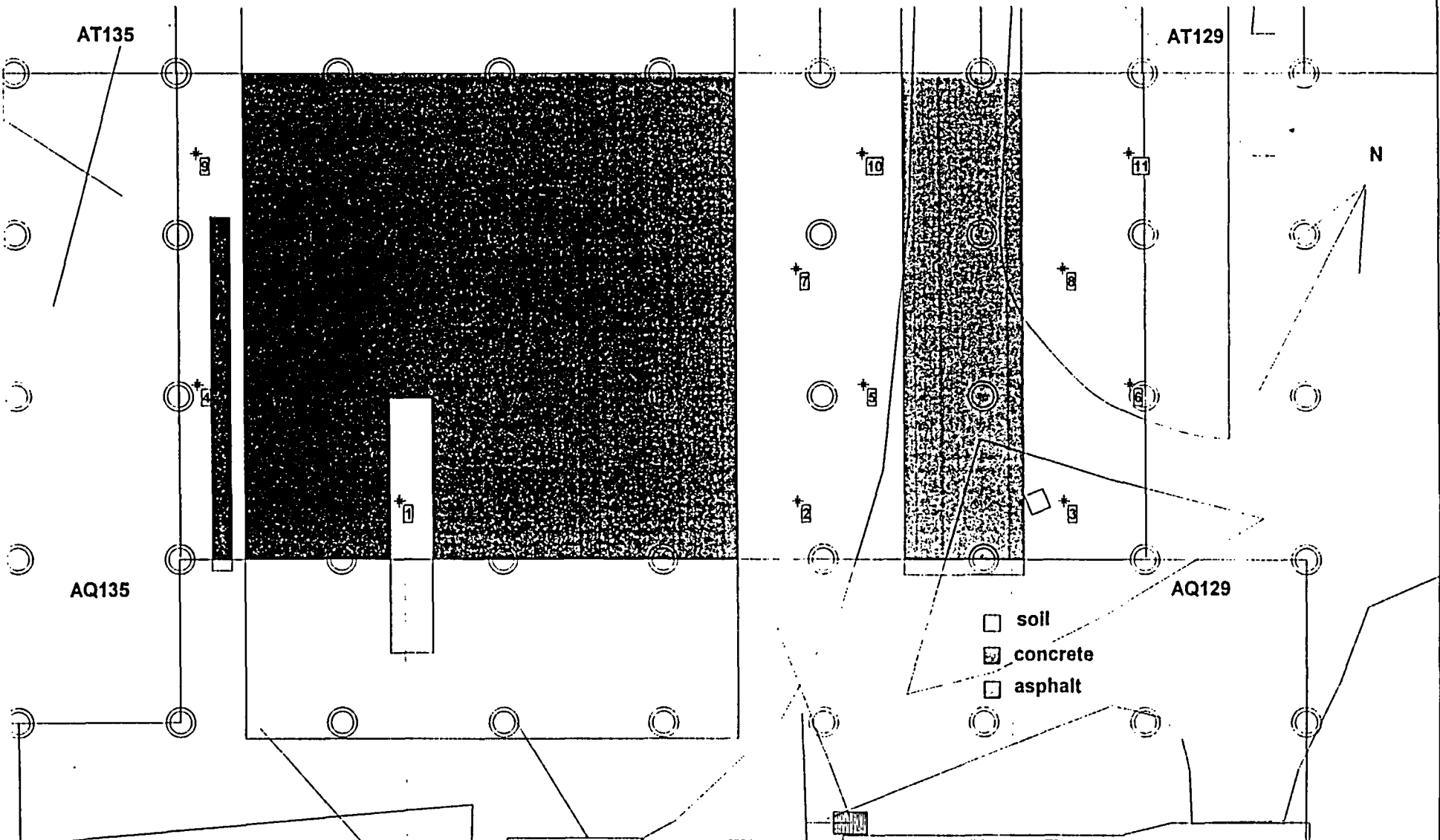
VSP provides survey points using a scale relative to the southwestern corner of the survey unit. This is cumbersome as field personnel must measure over large distances (sometimes hundreds of meters) from the single reference point. To remedy this situation, this spreadsheet provides the VSP survey points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

All grids must be surveyed 100% as this is a Class 1 survey unit.

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.

Location	Grid ID	E (meters)	N (meters)	X coordinate (meters)	Y coordinate (meters)
1	AP140	3.4	8.6	3.4233	8.5697
2	AP139	7.9	8.6	17.9136	8.5697
3	AP137	2.4	8.6	32.4038	8.5697
4	AP136	6.9	8.6	46.894	8.5697
5	AR139	0.7	1.1	10.6684	21.1186
6	AR138	5.2	1.1	25.1587	21.1186
7	AR137	9.6	1.1	39.6489	21.1186
8	AS140	3.4	3.7	3.4233	33.6675
9	AS139	7.9	3.7	17.9136	33.6675
10	AS137	2.4	3.7	32.4038	33.6675
11	AS136	6.9	3.7	46.894	33.6675

Survey Unit OL3-2 (soil)



Sample Locations and Scan Survey Grids for Survey Unit OL3-2 (soil)

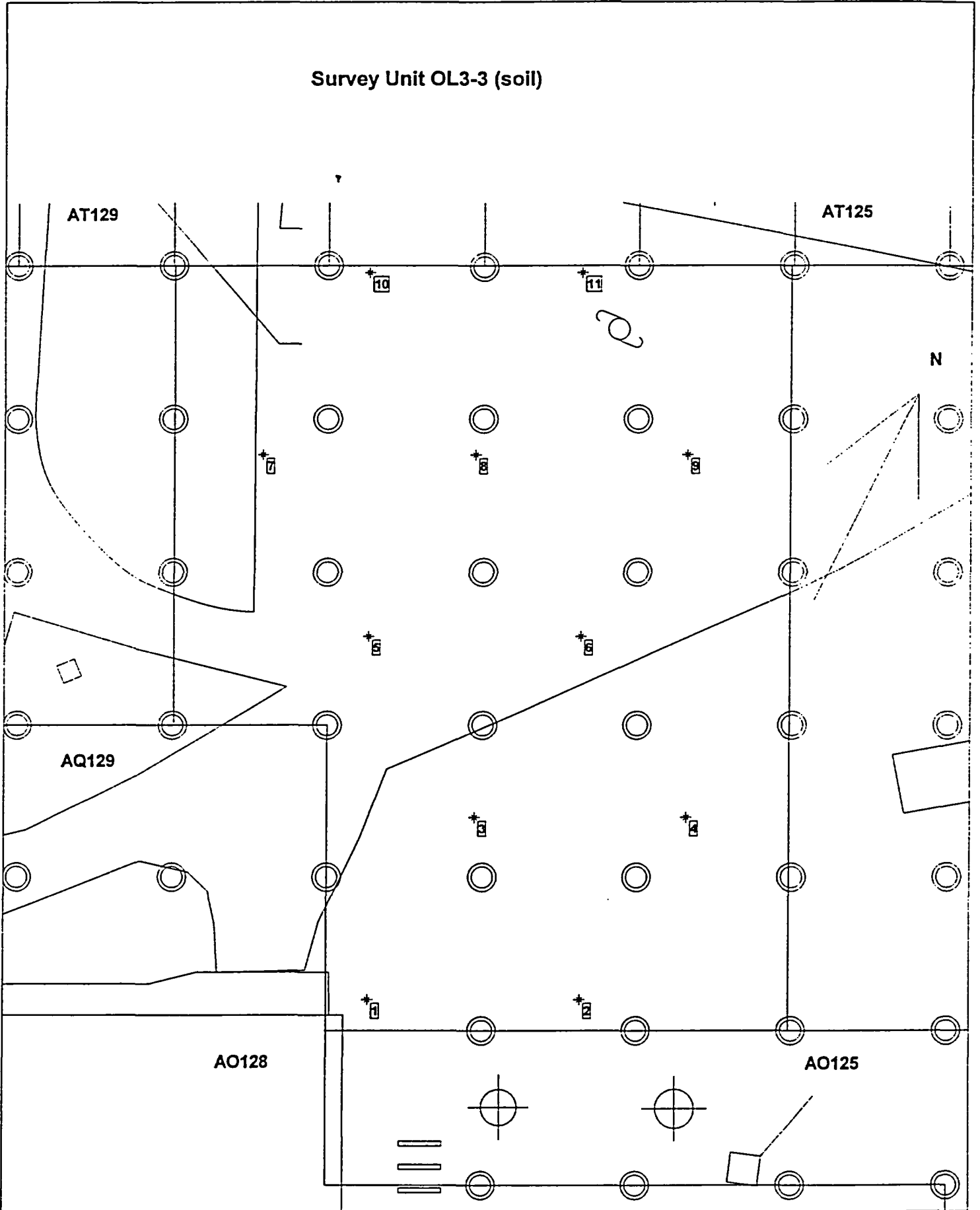
VSP provides survey points using a scale relative to the southwestern corner of the survey unit. This is cumbersome as field personnel must measure over large distances (sometimes hundreds of meters) from the single reference point. To remedy this situation, this spreadsheet provides the VSP survey points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

All grids must be surveyed 100% as this is a Class 1 survey unit.

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.

Location	Grid ID	E (meters)	N (meters)	X coordinate (meters)	Y coordinate (meters)
1	AQ134	3.6	3.6	13.5892	3.5561
2	AQ132	8.4	3.6	38.4206	3.5561
3	AQ130	4.9	3.6	54.9749	3.5561
4	AR135	1.2	0.7	1.1734	10.7243
5	AR131	2.6	0.7	42.5592	10.7243
6	AR130	9.1	0.7	59.1135	10.7243
7	AR132	8.4	7.9	38.4206	17.8925
8	AR130	4.9	7.9	54.9749	17.8925
9	AS135	1.2	5.1	1.1734	25.0608
10	AS131	2.6	5.1	42.5592	25.0608
11	AS130	9.1	5.1	59.1135	25.0608

Survey Unit OL3-3 (soil)



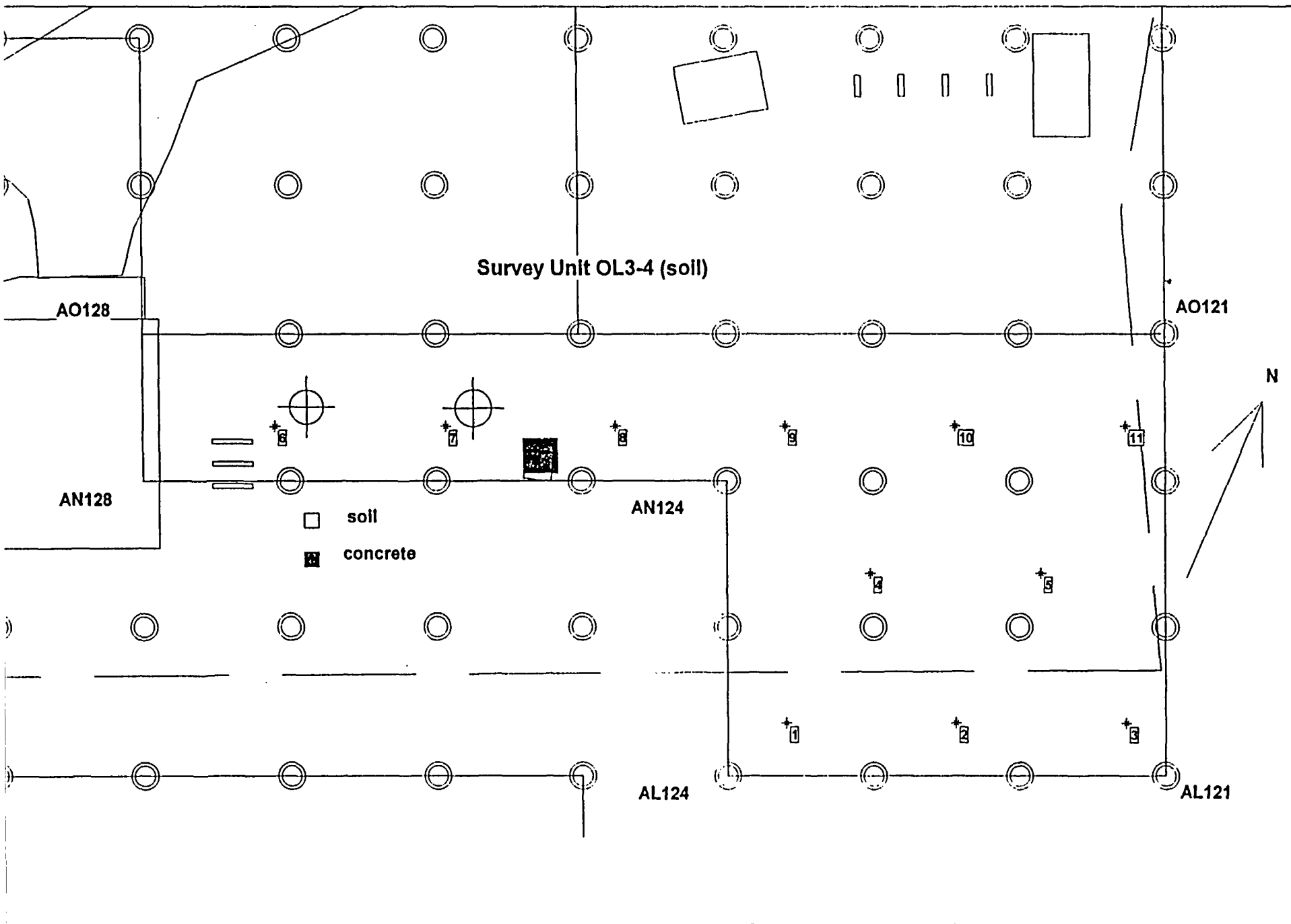
Sample Locations and Scan Survey Grids for Survey Unit OL3-3 (soil)

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.

All grids must be surveyed 100% as this is a Class 1 survey unit.

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.

Location	Grid ID	E (meters)	N (meters)	X coordinate (meters)	Y coordinate (meters)
1	AO128	2.6	2	12.5927	1.9993
2	AO127	6.3	2	26.3057	1.9993
3	AP128	9.4	3.9	19.4492	13.8751
4	AP126	3.2	3.9	33.1623	13.8751
5	AQ128	2.6	5.8	12.5927	25.751
6	AQ127	6.3	5.8	26.3057	25.751
7	AR129	5.7	7.6	5.7361	37.6269
8	AR128	9.4	7.6	19.4492	37.6269
9	AR126	3.2	7.6	33.1623	37.6269
10	AS128	2.6	9.5	12.5927	49.5027
11	AS127	6.3	9.5	26.3057	49.5027



Sample Locations and Scan Survey Grids for Survey Unit OL3-4 (soil)

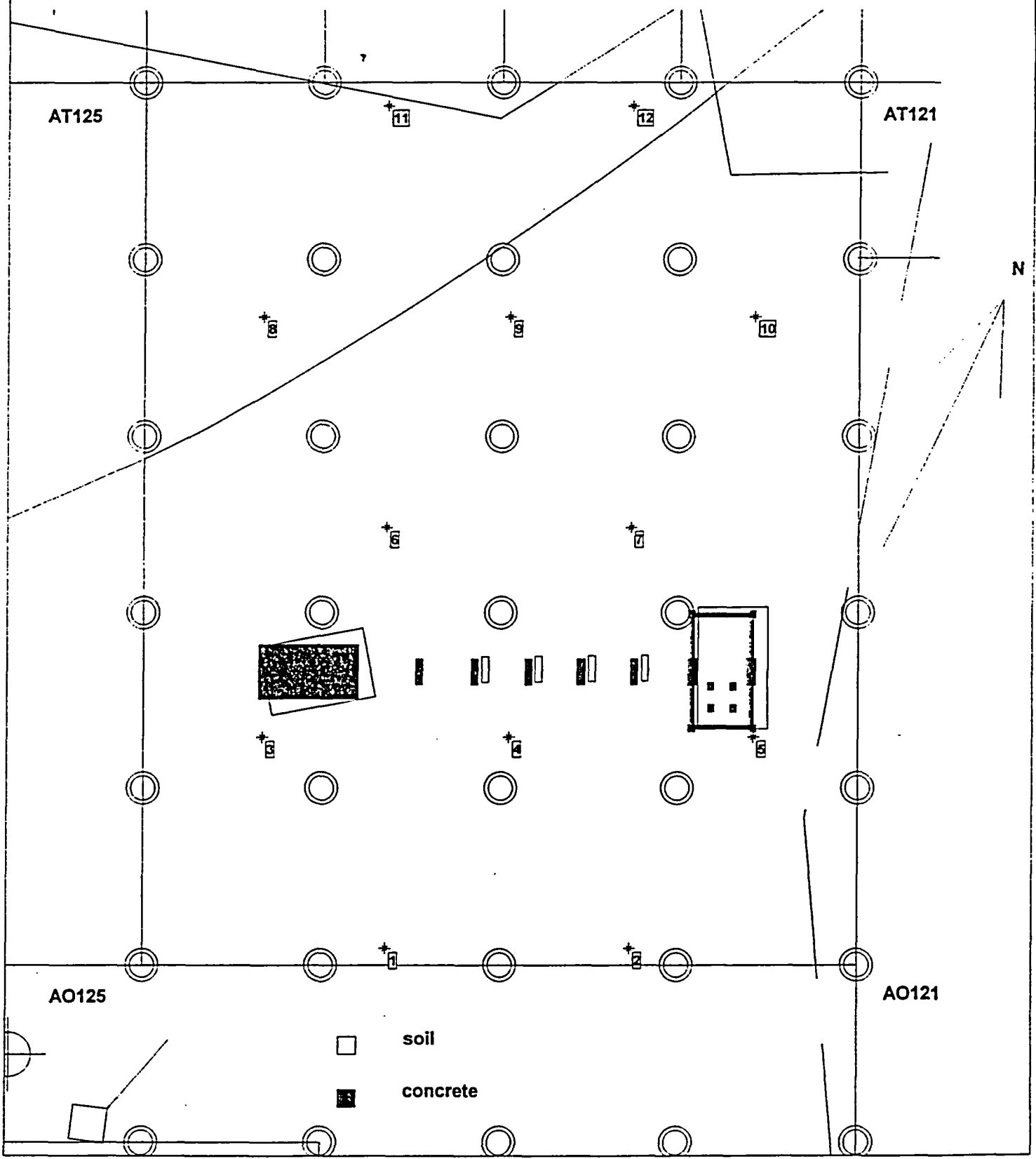
VSP provides survey points using a scale relative to the southwestern corner of the survey unit. This is cumbersome as field personnel must measure over large distances (sometimes hundreds of meters) from the single reference point. To remedy this situation, this spreadsheet provides the VSP survey points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

All grids must be surveyed 100% as this is a Class 1 survey unit.

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.

Location	Grid ID	E (meters)	N (meters)	X coordinate (meters)	Y coordinate (meters)
1	AL124	4.0	3.5	44.0037	3.5275
2	AL123	5.7	3.5	55.6674	3.5275
3	AL122	7.3	3.5	67.3311	3.5275
4	AM124	9.8	3.6	49.8356	13.6286
5	AM122	1.5	3.6	61.4993	13.6286
6	AN128	9.0	3.7	9.0126	23.7296
7	AN126	0.7	3.7	20.6763	23.7296
8	AN125	2.3	3.7	32.34	23.7296
9	AN124	4.0	3.7	44.0037	23.7296
10	AN123	5.7	3.7	55.6674	23.7296
11	AN122	7.3	3.7	67.3311	23.7296

Survey Unit OL3-5 (soil)



Sample Locations and Scan Survey Grids for Survey Unit OL3-5 (soil)

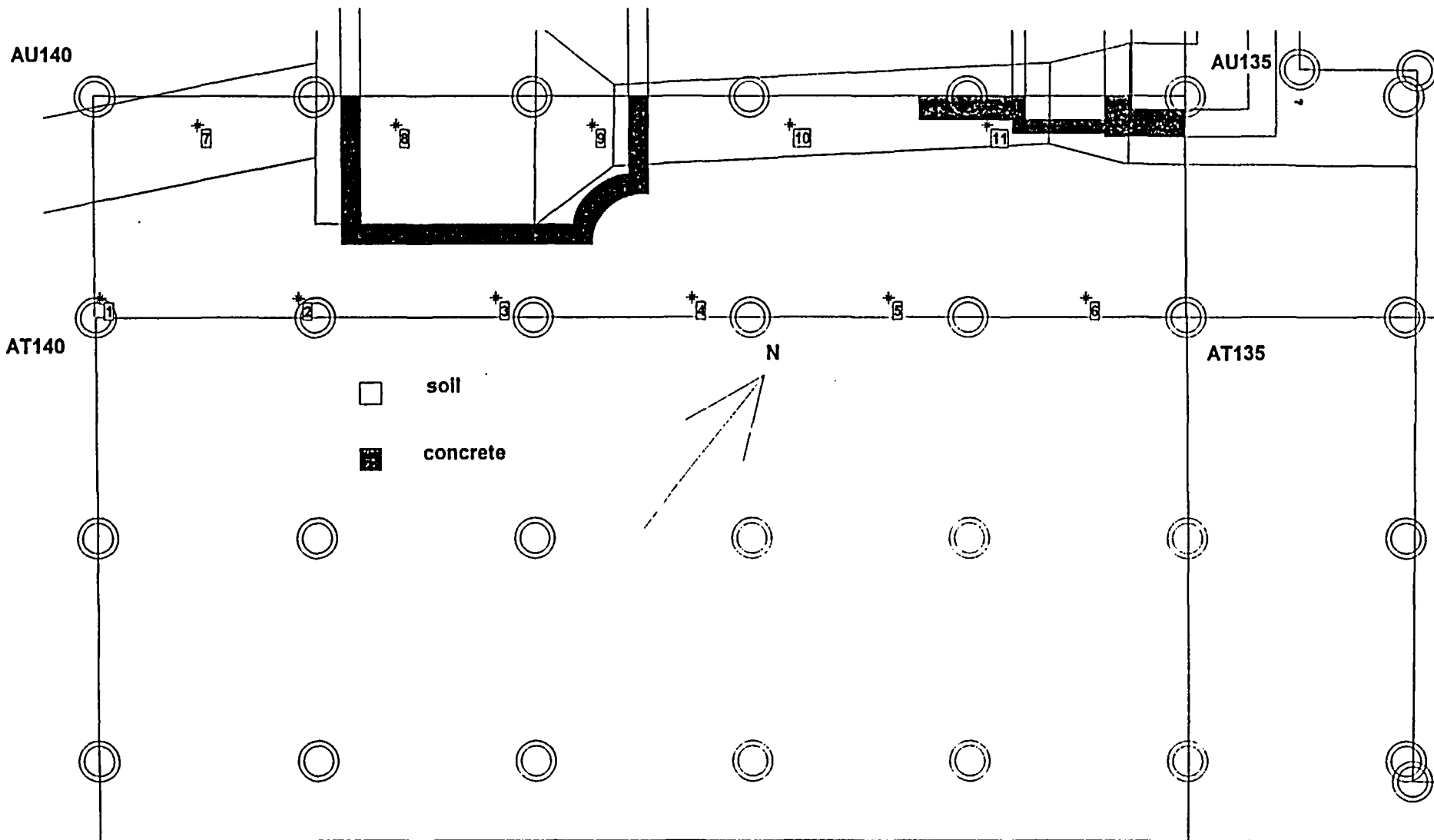
VSP provides survey points using a scale relative to the southwestern corner of the survey unit. This is cumbersome as field personnel must measure over large distances (sometimes hundreds of meters) from the single reference point. To remedy this situation, this spreadsheet provides the VSP survey points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

All grids must be surveyed 100% as this is a Class 1 survey unit.

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.

Location	Grid ID	E (meters)	N (meters)	X coordinate (meters)	Y coordinate (meters)
1	AO124	3.6	0.9	13.5768	0.944
2	AO123	7.4	0.9	27.3564	0.944
3	AP125	6.7	2.9	6.687	12.8775
4	AP123	0.5	2.9	20.4666	12.8775
5	AP122	4.2	2.9	34.2462	12.8775
6	AQ124	3.6	4.8	13.5768	24.8109
7	AQ123	7.4	4.8	27.3564	24.8109
8	AR125	6.7	6.7	6.687	36.7444
9	AR123	0.5	6.7	20.4666	36.7444
10	AR122	4.2	6.7	34.2462	36.7444
11	AS124	3.6	8.7	13.5768	48.6778
12	AS123	7.4	8.7	27.3564	48.6778

Survey Unit OL3-6 (soil and concrete)



Sample Locations and Scan Survey Grids for Survey Unit OL3-6 (soil)

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.

All grids must be surveyed 100% as this is a Class 1 survey unit.

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.

Location	Grid ID	E (meters)	N (meters)	X coordinate (meters)	Y coordinate (meters)
1	AT140	0.2	0.9	0.185	0.8589
2	AT140	9.2	0.9	9.2374	0.8589
3	AT139	8.3	0.9	18.2898	0.8589
4	AT138	7.3	0.9	27.3421	0.8589
5	AT137	6.4	0.9	36.3945	0.8589
6	AT136	5.4	0.9	45.4469	0.8589
7	AT140	4.7	8.7	4.7112	8.6985
8	AT139	3.8	8.7	13.7636	8.6985
9	AT138	2.8	8.7	22.8159	8.6985
10	AT137	1.9	8.7	31.8683	8.6985
11	AT136	0.9	8.7	40.9207	8.6985



Site Report

Site Summary

Site Name: OL3
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 (m ²)	Area Factor
Cs-137	Surface Soil	4.30	No	10,000	1
				2,500	2.3
				400	3
				100	3.6
				25	4.7
				1	28.7

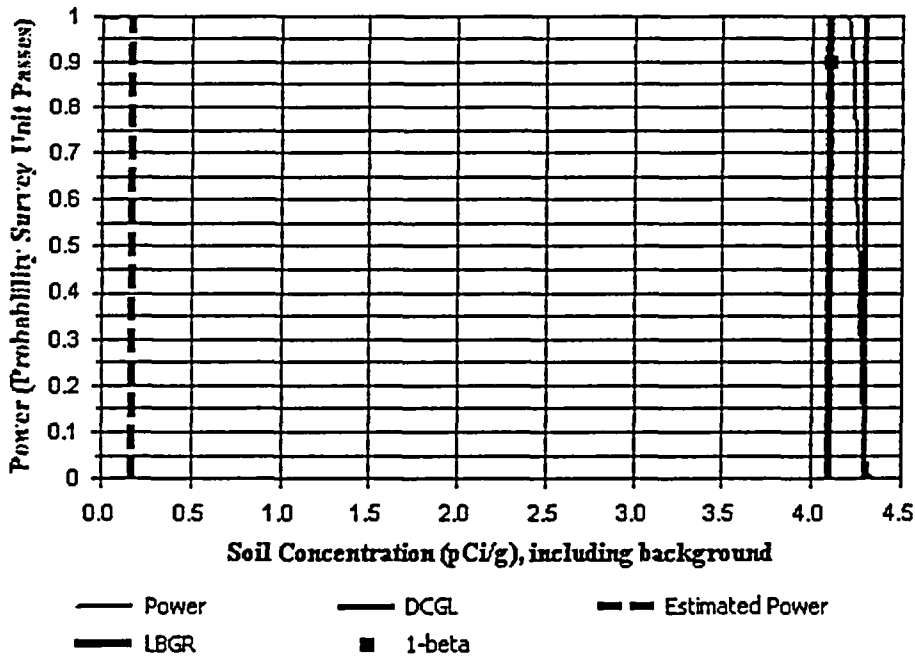


Surface Soil Survey Plan

Survey Plan Summary

Site:	OL3		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL3-1, rev 1		
Comments:	2000 sq m of soil		
Area (m ²):	2,000	Classification:	1
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.0667
DCGL (pCi/g):	4.30	Sample Size (N):	11
LBGR (pCi/g):	4.1	Estimated Conc. (pCi/g):	0.2
Alpha:	0.050	Estimated Power:	1
Beta:	0.100	EMC Sample Size (N):	11
Scanning Instrumentation:	2" x 2" Sodium Iodide		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.30	N/A	N/A	N/A	5.674

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Cs-137	0.1635 \pm 0.0667	0.28 \pm 0.39

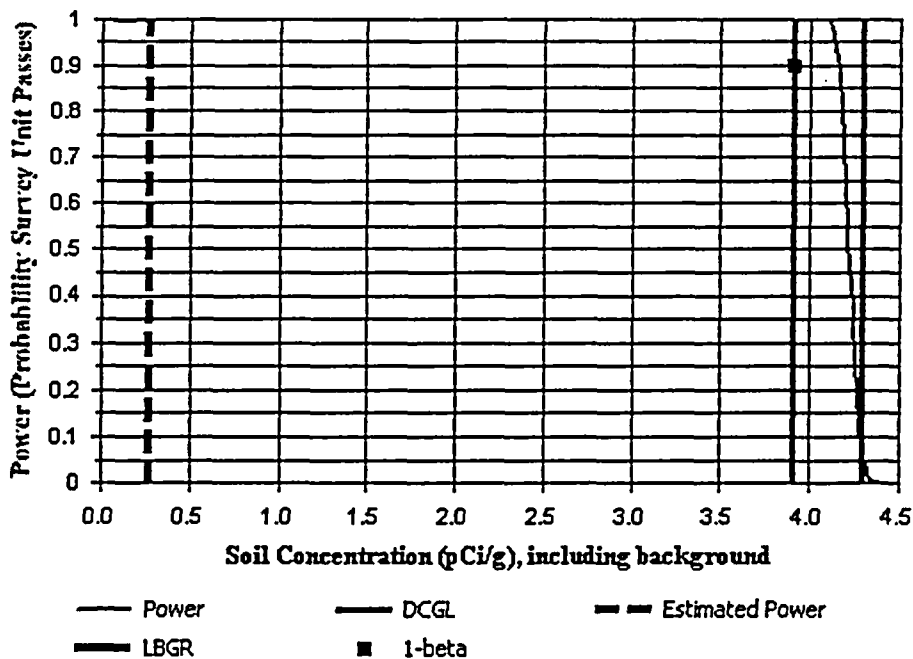


Surface Soil Survey Plan

Survey Plan Summary

Site:	OL3		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL3-2		
Comments:	654 sq m soil, remainder concrete and asphalt		
Area (m ²):	1,800	Classification:	1
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.1329
DCGL (pCi/g):	4.30	Sample Size (N):	11
LBGR (pCi/g):	3.91	Estimated Conc. (pCi/g):	0.3
Alpha:	0.050	Estimated Power:	1
Beta:	0.100	EMC Sample Size (N):	11
Scanning Instrumentation:	2" x 2" Sodium Iodide		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.30	N/A	N/A	N/A	5.674

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Cs-137	0.27 \pm 0.1329	0.28 \pm 0.39

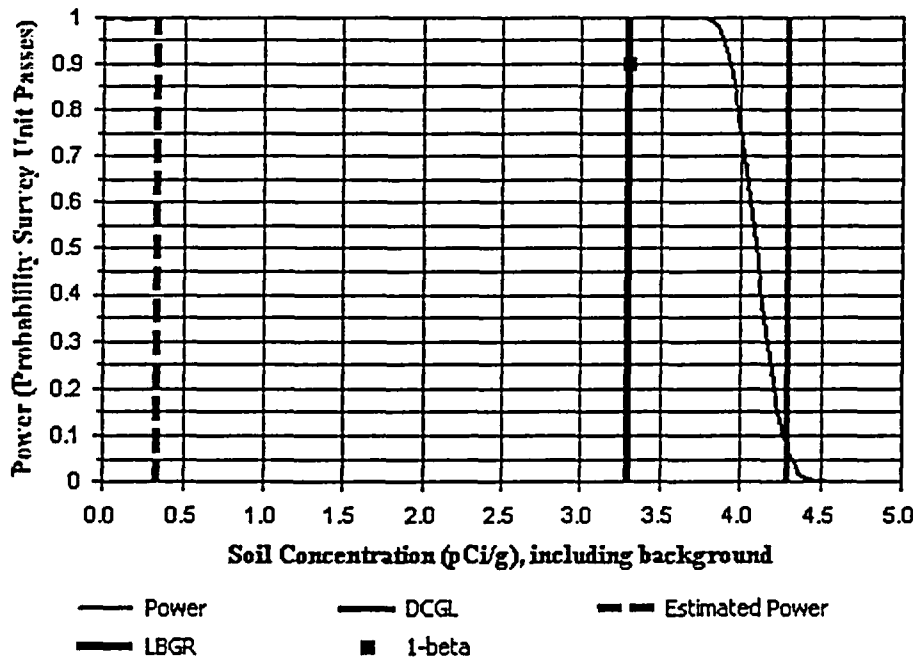


Surface Soil Survey Plan

Survey Plan Summary

Site:	OL3		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL3-3y		
Comments:	1800 sq m soil		
Area (m ²):	1,800	Classification:	1
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.3431
DCGL (pCi/g):	4.30	Sample Size (N):	11
LBGR (pCi/g):	3.3	Estimated Conc. (pCi/g):	0.3
Alpha:	0.050	Estimated Power:	1
Beta:	0.100	EMC Sample Size (N):	11
Scanning Instrumentation:	2" x 2" Sodium Iodide		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.30	N/A	N/A	N/A	5.574

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Cs-137	0.3445 \pm 0.3431	0.28 \pm 0.39

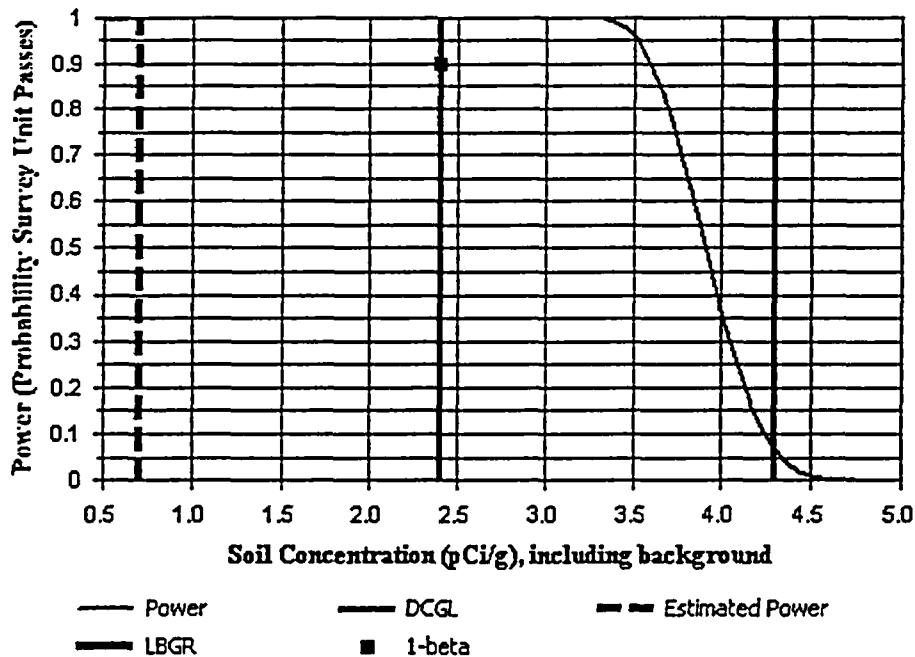


Surface Soil Survey Plan

Survey Plan Summary

Site:	OL3		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL3-4		
Comments:	1294 sq m soil, remainder concrete		
Area (m ²):	1,300	Classification:	1
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.6485
DCGL (pCi/g):	4.30	Sample Size (N):	11
LBGR (pCi/g):	2.4	Estimated Conc. (pCi/g):	0.7
Alpha:	0.050	Estimated Power:	1
Beta:	0.100	EMC Sample Size (N):	11
Scanning Instrumentation:	2" x 2" Sodium Iodide		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.30	N/A	N/A	N/A	5.674

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Cs-137	0.7087 \pm 0.6485	0.28 \pm 0.39

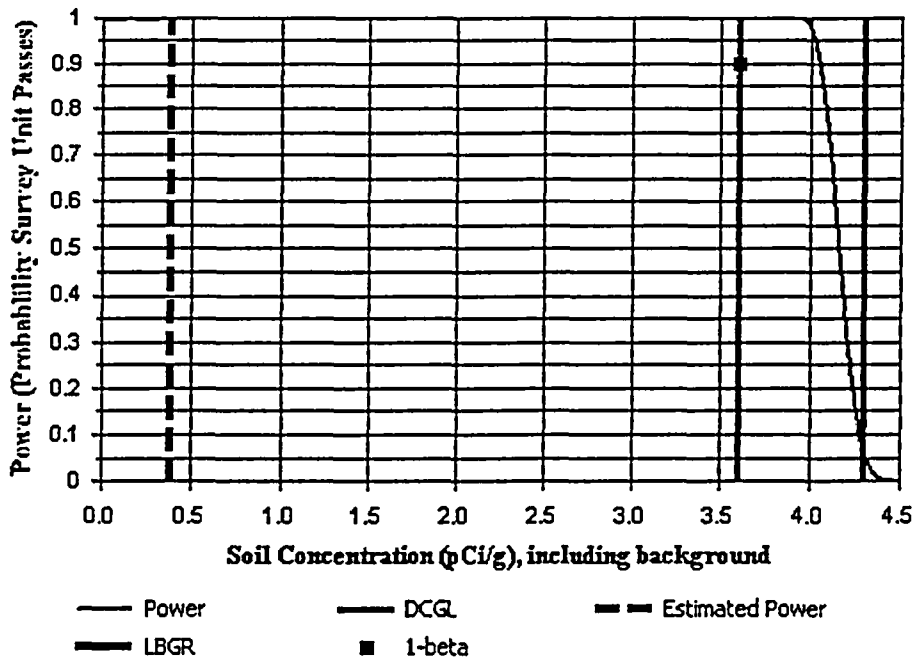


Surface Soil Survey Plan

Survey Plan Summary

Site:	OL3		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL3-5x		
Comments:	1972 sq m soil, remainder concrete		
Area (m ²):	2,000	Classification:	1
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.2349
DCGL (pCi/g):	4.30	Sample Size (N):	11
LBGR (pCi/g):	3.6	Estimated Conc. (pCi/g):	0.4
Alpha:	0.050	Estimated Power:	1
Beta:	0.100	EMC Sample Size (N):	11
Scanning Instrumentation:	2" x 2" Sodium Iodide		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.30	N/A	N/A	N/A	5.674

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Cs-137	0.3902 \pm 0.2349	0.28 \pm 0.39

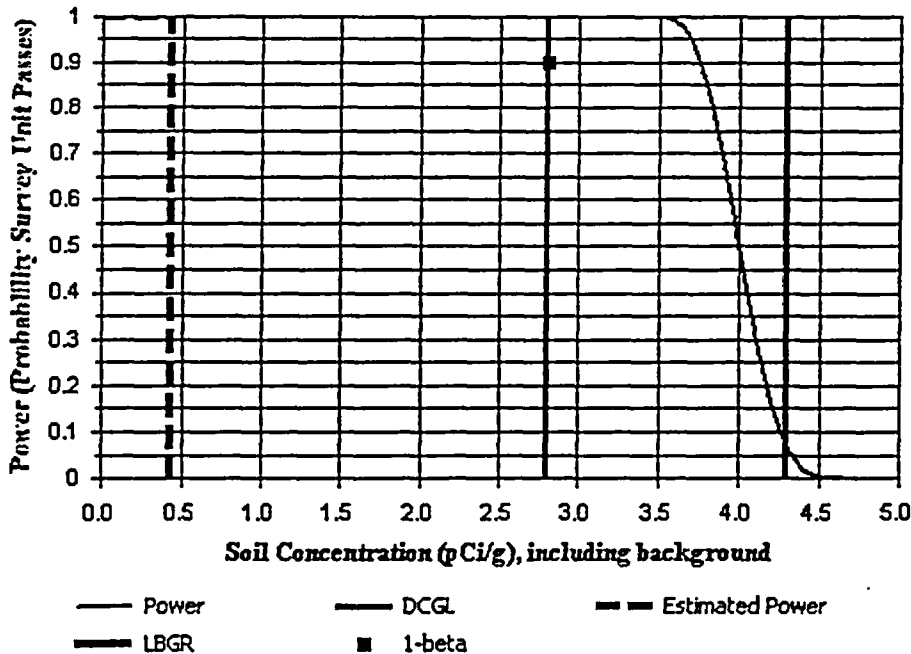


Surface Soil Survey Plan

Survey Plan Summary

Site:	OL3		
Planner(s):	Tristan M. Tritch		
Survey Unit Name:	OL3-6		
Comments:	464 sq m soil, remainder concrete		
Area (m ²):	500	Classification:	1
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.5065
DCGL (pCi/g):	4.30	Sample Size (N):	11
LBGR (pCi/g):	2.8	Estimated Conc. (pCi/g):	0.4
Alpha:	0.050	Estimated Power:	1
Beta:	0.100	EMC Sample Size (N):	11
Scanning Instrumentation:	2" x 2" Sodium Iodide		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.30	N/A	N/A	N/A	5.674

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Cs-137	0.4236 \pm 0.5065	0.28 \pm 0.39

OL3-1			OL3-2		
SR	GRID	Cs-137 pCi/g	SR	GRID	Cs-137 pCi/g
166	AP137SP1	0.09	181	AQ130SD7	0.26
	AP137SP2	0.16		AQ130SD7B	0.33
	AP138SP1	0.2		AQ130SD8	0.4
	AP138SP2	0.19		AQ130SD8B	0.09
	AR136SP1	0.16			
	AR136SP2	0.15			
	AR137SP1	0.3			
	AR137SP2	0.08			
	AR138SP1	0.1			
	AR138SP2	0.15			
180	AP139SP1	0.12			
	AP139SP2	0.12			
	AP140SP1	0.26			
	AP140SP2	0.1			
	AQ139SP2	0.14			
	AQ140SP1	0.29			
	AQ140SP2	0.17			
TOTAL		2.78	TOTAL		1.08
MAX		0.3	MAX		0.4
MIN		0.08	MIN		0.09
MEDIAN		0.1500	MEDIAN		0.2950
AVG		0.1635	AVG		0.2700
STD DEV		0.0667	STD DEV		0.1329

<MDA

<MDA

OL3-3			OL3-3 continued		
SR	GRID	Cs-137 pCi/g	SR	GRID	Cs-137 pCi/g
167	AO126AP1	0.67			
	AO126SP2	0.36			
171	AO127SP1	0.77			
	AO127SP2	0.9			
180	AQ126SP1	0.1			
	AQ126SP2	0.08		AQ127SP1PR	0.6
	AQ127AP1			AQ127SP2PR	0.62
	AQ127SP1	0.09		AQ127SP2PR1'	1.7
	AQ127SP2	0.17		AQ127SP2PR3'	0.1
	AQ128AP1			AQ128SP1PR	0.28
	AQ128SP1	0.08		AQ128SP2PR	0.8
	AQ128SP2	0.15		AQ128SP2PR2'	0.07
	AR126SP1	0.07		AQ128SP2PR3'	0.1
	AR126SP2	0.08			
	AR127AP1			AR127SP1PR	0.5
	AR127SP2	0.6		AR127SP2PR	1.2
	AR128SP1	0.06		AR127SP2PR1'	0.15
	AR128SP2	0.08		AR127SP2PR1.5'	0.76
	AS127SP1	0.2		AR127SP2PR3'	0.16
	AS127SP2	0.4		AR127SP3PR	0.9
	AS128SP1	0.1			
	AS128SP2	0.07			
181	AR129SD5	0.26			
	AR129SD5B	0.05			
	AR129SD6	0.06			
	AR129SD6B	0.09			
	AS129SD3	0.12			
	AS129SD3B	0.1			
	AS129SD4	0.12			
	AS129SD4B	0.12			
187	AO126SP1	0.55			
	AO126SP2	0.3			
	AO126SP3	0.6			
	AO126SP4	0.24			
	AO126SP5	0.64			
	AP126SP1	0.36			
	AP126SP2	0.25			
	AP126SP3	0.24			
	AP126SP4	0.4			
	AP126SP5	0.1			
				TOTAL	17.57
				MAX	1.7
				MIN	0.05
				MEDIAN	0.2000
				AVG	0.3445
				STD DEV	0.3431

<MDA

OL3-4			OL3-4 continued			OL3-4 continued		
SR	GRID	Cs-137 pCi/g	SR	GRID	Cs-137 pCi/g	SR	GRID	Cs-137 pCi/g
74	AN122SP1	0.87	187	AL122SP1	0.65	187	AN122SP1	0.7
	AN124SP2	0.22		AL122SP2	0.72	cont.	AN122SP2	1
167	AM122SP1	0.66		AL122SP3	0.13		AN122SP3	0.6
	AM122SP2	2.9		AL122SP4	0.1		AN122SP4	0.62
				AL122SP5	0.07		AN122SP5	0.6
				AL123SP1	1.1			
				AL123SP2	0.17			
				AL123SP3	0.13			
	AM124SP2	0.54		AL123SP5	0.14		AN123SP1	0.7
				AL124SP1	1.4		AN123SP2	0.4
171	AL122SP1	0.13		AL124SP2	1		AN123SP3	0.6
	AL122SP2	3.8		AL124SP3	0.1		AN123SP4	0.6
				AL124SP4	0.12		AN123SP5	0.87
	AL123SP2	1.8		AL124SP5	0.1		AN123SP6PR	0.5
	AL124SP1	0.76		AM122SP1	0.6		AN123SP7PR	2.25
	AL124SP2	0.17		AM122SP2	0.7		AN123SP8PR	0.7
	AN122SP1	0.66		AM122SP3	1.1		AN123SP9PR	0.14
	AN122SP2	0.68		AM122SP4	0.8		AN124SP1	0.16
				AM123SP1	0.7		AN124SP2	0.76
	AN123SP1	0.36		AM123SP2	1.2		AN124SP3	0.5
	AN124SP1	0.28		AM123SP3	1		AN124SP4	0.5
	AN124SP2	0.19		AM123SP4	0.6		AN124SP5	0.63
	AN125SP1	2.8		AM123SP5	1.3		AN125SP1	0.36
	AN125SP2	0.48		AM124SP1	0.54		AN125SP2	0.07
	AN126SP1	0.61		AM124SP2	0.55		AN125SP3	1.1
	AN126SP2	1		AM124SP3	0.5		AN125SP4	0.6
	AN126SP3	0.41		AM124SP4	0.37		AN125SP5	0.6
	AN126SP4	0.44		AM124SP5	0.44			
							AN125SP7PR	0.29
							AN125SP8PR	0.52
							AN125SP9PR	1.4
							TOTAL	53.86
							MAX	3.8
							MIN	0.07
							MEDIAN	0.6000
							AVG	0.7087
							STD DEV	0.6485

<MDA>

OL3-5			OL3-5 continued			OL3-5 continued		
SR	GRID	Cs-137 pCi/g	SR	GRID	Cs-137 pCi/g	SR	GRID	Cs-137 pCi/g
167	AO122AP1	0.55	187	AO122AP1	0.38	187 cont.	AP123SP1	0.2
	AO122AP2	0.6		AO122SP1	0.7		AP123SP2	0.4
	AO122AP3	0.74		AO122SP2	0.14		AP123SP3	0.7
	AO122AP4	0.38		AO122SP3	0.36		AP123SP4	0.5
	AO122AP5	0.47		AO122SP4	0.3		AP123SP5	0.33
AO123AP1		AO122SP5	0.6	AP124SP1	0.75			
AO123SP2	0.24	AO123SP1	0.5	AP124SP2	0.2			
AO124AP1	0.43	AO123SP2	0.4	AP124SP3	0.22			
AO124AP2	0.35	AO123SP3	1.1	AP124SP4	0.1			
AO124AP3	0.34	AO123SP4	0.7	AP124SP5	0.28			
AO125SP1	0.58	AO123SP5	0.5	AP125SP1	0.46			
AO125SP2	0.44	AO123AP1	0.53	AP125SP2	0.4			
AP122AP1	1.6	AO124AP1	0.23	AP125SP3	0.4			
AP122AP2	0.28	AO124SP2	0.3	AP125SP4	0.17			
AP122AP3	0.26	AO124SP3	0.75	AP125SP5	0.3			
AP122AP4	0.27	AO124SP4	0.25					
AP123AP1	0.19	AO124SP5	0.4					
AP123SP1	0.48	AO124AP1	0.47					
AP124SP1	0.26	AO125SP1	0.55					
AP124SP2	0.15	AO125SP2	0.3					
AQ122AP1	0.39	AO125SP3	0.7					
AQ122AP2	0.42	AO125SP4	0.34					
AQ123SP1	0.37	AO125SP5	0.5					
AQ123SP2	0.27	AP122AP1						
180 AQ125SP1	0.09	AP122SP1	0.2					
AQ125SP2	0.2	AP122SP2	0.18					
AR123SP1	0.48	AP122SP3	0.17					
AR123SP2	0.41	AP122SP4	0.26					
AR124SP1	0.24	AP122SP5	0.38					
AR124SP2	0.09	AP122SP6PR	0.44					
AR125SP1	0.16	AP122SP7PR	0.3					
AR125SP2	0.09	AP122SP8PR	0.15					
AS122SP1	0.26	AP122SP9PR	0.2					
AS123SP1	0.5							
AS123SP2	0.27							
AS124SP1	0.77							
AS124SP2	0.08							
				TOTAL	32.39			
				MAX	1.6			
				MIN	0.08			
				MEDIAN	0.3600			
				AVG	0.3902			
				STD DEV	0.2349			

<MDA

OL3-6		
SR	GRID	Cs-137 pCi/g
2	AT139-3	0.25
	AT139-6	0.3
	AT139-9	0.3
	AT139-12	0.29
	AT139-30	0.04
164	AT139-36	0.1
	AT140SP1	0.22
205	AT140SP2	0.16
	AT137SP18	0.16
188	AT138SP1	0.1
	AT138SP2	0.17
	AT138SP3	0.18
	AT139SP17	0.1
	AT138AP1	0.05
	AT138AP2	0.67
	AT138SP4	0.2
	AT138SP1	0.4
	AT138SP2	0.74
	AT138SP3	2
	AT138SP4	1.3
	AT138SP5	1.7
	AT138SP6	0.28
	AT138SP7	0.36
	AT138SP8	0.28
	AT139SP9	0.24
TOTAL		10.59
MAX		2
MIN		0.04
MEDIAN		0.2500
AVG		0.4236
STD DEV		0.5065

Sub-surface
Sub-surface
Sub-surface

<MDA

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	OL3	Survey Unit Location	Penèlec South Class I Open Land
Date	5/19/05	Time	1000
Inspection Team Members		R. Shepherd	

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 Questions 1 & 2:

Remediation and post remediation surveys not complete in OL3-6. J. Graham notified.

Response to Questions 3 & 4:

Tools, equipment and sample storage vans containing radioactive material stored on survey unit.
L. Shamenek notified.

Response to Question 5:

Dirt covers much of concrete, asphalt area. Surfaces and grid markers need to be reestablished in high traffic areas.
L. Shamenek notified.

Survey Unit Inspector (print/sign)	Ray Shepherd/ <i>R Shepherd</i>	Date	5/19/05
Survey Designer (print/sign)	Tristan M. Tritch / <i>Tristan M Tritch</i>	Date	5/19/05

APPENDIX B

**First Energy Site Report
EMC Calculator for OL3-1**



FirstEnergy
Gen

Site Report

Analysis Based on MARSSIM Equation 8-2

EMC CALCULATOR

Survey Unit Mean 0.1081 pCi/g	DCGLW Cs-137 4.3 pCi/g			
Reference Bkgnd 0.28 pCi/g	Remove Bkgnd ? No			
Mean 0.1081 pCi/g	Mean AF 1	m² 2000	EMC PASS	
EM-1 89.24 pCi/g	AF-1 28.7	1	PASS	
EM-2	AF-2		PASS	
EM-3	AF-3		PASS	
RATIO 0.75	Equation 8-2, MARSSIM			PASS

NOTE: Required Input values in RED.

ORIGINAL

SNEC FSS RADIOLOGICAL SURVEY FORM			Survey Unit #	OL3-1	Survey #	FSS-1833	
Location		OL3-1					
Grid #	AR-140, AR-139, AR-138, AR-137		Area Classification	1	SR #	246	
Reason For Survey	FSS 44-10 Scan		Date of Survey	6/08/05	Time of Survey	0805	
Technician	G. Weissenburger / <i>[Signature]</i>		Technician	N/A			
GRCS Review	R. Siegfried / <i>[Signature]</i>		Date Of Review	6-15-05			
Radiological Instrument Data		Radiological Instrument Data		Radiological Instrument Data			
Inst/Probe Type	2350	44-10	Inst/Probe Type	N/A		Inst/Probe Type	N/A
Serial Number(s)	98620	025686 Pk	Serial Number(s)			Serial Number(s)	
Cal. Due Date(s)	12/01/05	6/28/05	Cal. Due Date(s)			Cal. Due Date(s)	
Cpm / m/hr	211,799		Efficiency (%)			Efficiency (%)	
ABCR (cpm)	164		ABCR (cpm)			ABCR (cpm)	
BRA Average	N/A		BRA Average			BRA Average	
BRA Location	N/A		BRA Location			BRA Location	
Source Checks	Sat. <input checked="" type="checkbox"/>	Unsat. <input type="checkbox"/>	Source Checks	Sat. <input type="checkbox"/>	Unsat. <input type="checkbox"/>	Source Checks	Sat. <input type="checkbox"/> Unsat. <input type="checkbox"/>
Comments							
Ambient air temperature at survey location was 93 degrees Fahrenheit 44-10 scan of indicated grid with results < 160 net cpm, except where indicated on map below for Grid AR-138							
Survey Map							
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> AP-1 Bounded Area - 1 m² (X = 4.4 m, Y = 2.6 m) </div> <div style="text-align: center;"> </div> </div>							
Notes: = Area Surveyed = Alarm Point = Bounded Area							

SURVEY REQUEST CONTINUATION SHEET

SR NUMBER

246

AREA/LOCATION

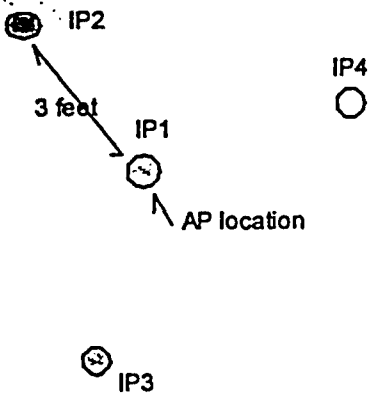
OL3-1 grid AR138

SPECIFIC SAMPLING & SURVEYING INSTRUCTIONS / COMMENTS

An AP was identified in Grid AR138 in OL3-1. This AP is in the area. It has been bounded to be about 6 feet in diameter.

Collect a 1 meter thick surface sample at the position of the AP.

Collect three 1 meter thick surface samples 3 feet from the AP in a triangular pattern around the AP, exact location at the discretion of the collector.



Dustin M. Pritch 4/9/05

SURVEY REQUEST CONTINUATION SHEET

SR NUMBER

246

AREA/LOCATION

OL3-1, grid AR138

SPECIFIC SAMPLING & SURVEYING INSTRUCTIONS / COMMENTS

An AP was identified in grid AR138 where it was subsequently determined to contain 89 pCi/g Cs-137 and 0.3 pCi/g Co-60. In addition, three soil samples were taken in close proximity (roughly three feet) to the AP in order to bound the area. All three bounding samples were 0.1 pCi/g Cs-137 with Co-60 <MDA.

This continuation sheet is for the following:

1. analyze, by gamma spectroscopy, the remainder of the 89 pCi/g sample
2. scan the hole and the immediate region around the sample point to determine if there is any remaining detectable radioactive material in the vicinity.

Done by Mr. Patel 4/15/05

OL-3-1

CC

W

AP-1 AR138

89.24

0.38

SP 1

0.104

SP 2

0.048

SP 3

0.093

DISAPL.

22.989

SURVEY REQUEST CONTINUATION SHEET

SR NUMBER

246

AREA/LOCATION

OL3-1, Grid AR138

SPECIFIC SAMPLING & SURVEYING INSTRUCTIONS / COMMENTS

Background:

Continuation Sheet 1

An AP was identified in grid AR138 where it was subsequently determined to contain 89 pCi/g Cs-137 and 0.3 pCi/g Co-60. In addition, three soil samples were taken in close proximity (roughly three feet) to the AP in order to bound the area. All three bounding samples were 0.1 pCi/g Cs-137 with Co-60 <MDA.

Continuation Sheet 2

The remainder of the 89 pCi/g sample was analyzed. It revealed 23 pCi/g Cs-137 with no Co-60. The area around the hole was scanned and no readings greater than background were detected.

This is Continuation Sheet is Continuation Sheet 3 for Grid AR138

1. Go back to the original location of the AP and collect a one meter thick surface sample.
2. Without collapsing or allowing surface soil to fall back into the hole, lower a NaI detector into the hole and document readings approximately every quarter meter of depth (0m, 0.25, 0.5m, 0.75m, and 1m).
3. Leave the sample hole open until samples and data have been analyzed. Place cones or equivalent around the hole to warn personnel of the opening.

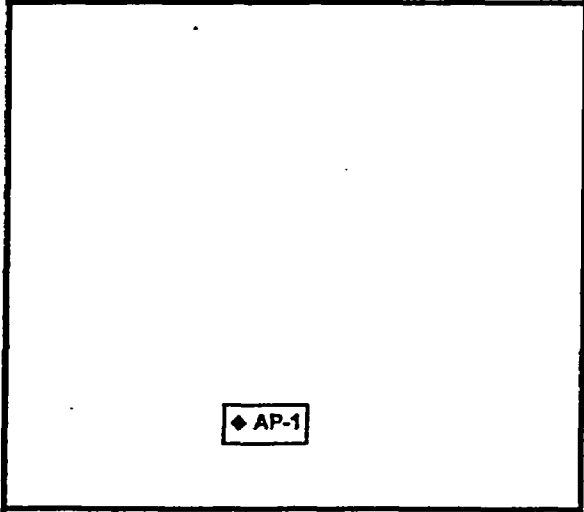
Antoine J. Payne 2/25/05
Antoine M. Payne 4/21/05

ORIGINAL

OL3-1		OL3-1	FSS-1945
AR-138		1	248
FSS - Blased Site Surface Dose Model Sample with Static Readings		6/21/05	1429
J. Shimek / <i>J. Shimek</i>		N/A	
<i>RF 12/01</i>		<i>6/23/05</i>	

2350 / 44-10	N/A	N/A
98642 / 211667 Pk		
9/28/05 / 11/02/05		
213,180		
N/A		
N/A		
N/A		
Sat. <input checked="" type="checkbox"/> Unsat. <input type="checkbox"/>	Sat. <input type="checkbox"/> Unsat. <input type="checkbox"/>	Sat. <input type="checkbox"/> Unsat. <input type="checkbox"/>

Ambient air temperature at survey location was 84 degrees Fahrenheit.
 Soil sample obtained on 6/21/05 at AP-1 in grid AR-138 in accordance with SR continuation sheet #3 for SR-246.
 Sample was dug with an auger to 1 meter in depth.
 Static readings were taken at every quarter meter of depth, see page 2 for results.



Grid # AR-138	
Location	SX-SL-#
AP-1	10841

AR-138 *9/20/05*
138

Notes: ◆ AP-1 = Sample Point Location

ORIGINAL

FSS-1945

J. Shimek

23	AR138 at 0 m	6/21/05	14:52	4	188	60	SCL	
24	AR138 at 0.25 m	6/21/05	14:54	4	212	60	SCL	
25	AR138 at 0.5 m	6/21/05	14:55	4	218	60	SCL	
26	AR138 at 0.75 m	6/21/05	14:57	4	246	60	SCL	
27	AR138 at 1 m	6/21/05	14:58	4	367	60	SCL	

AR-138 = Grid designator m = meters

BAXTON GAMMA SPECTRUM ANALYSIS ***

Report Generated On : 6/23/2005 9:27:44 AM

Original

Filename: C:\PCNT2K\CAMFILES\SOIL\SOL15356.CNF

Sample Title : Soil
Sample Description : SX-SL-10841 SR-246 AR-138 AP-1
Sample Identification : 5-24587
Sample Type : SOL
Sample Geometry : HD 1L Marinelli

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 80 - 4095
Peak Area Range (in channels) : 80 - 4095
Identification Energy Tolerance : 2.000 keV

Sample Size : 1.265E+003 GRAMS

Sample Taken On : 6/21/2005 2:35:00 PM
Acquisition Started : 6/23/2005 9:11:01 AM

Live Time : 1000.0 seconds
Dead Time : 1000.4 seconds

Lead Time : 0.04 %

Co⁶⁰
20.065

Cs¹³⁷
1.129 ± 0.136

Energy Calibration Used Done On : 6/21/2005
Efficiency Calibration Used Done On : 1/4/2005
Efficiency ID : HD 1L Marinelli

27 Cs 137
18 Co 60 6/23/05

 * INTERFERENCE CORRECTED REPORT *

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/GRAM)	Wt mean Activity Uncertainty
K-40	1.000	6.969050E+000	1.004238E+000
CS-137	1.000	1.119180E+000	1.363665E-001
PB-212	0.768	9.242758E-001	9.918791E-002
BI-214	0.374	6.455103E-001	1.113001E-001
PB-214	0.894	7.232691E-001	9.271356E-002
AC-228	0.422	7.243816E-001	1.229841E-001

? = nuclide is part of an undetermined solution
 X = nuclide rejected by the interference analysis
 @ = nuclide contains energy lines not used in Weighted Mean Activity

-- Errors quoted at 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 6/23/2005 9:27:43 AM
 Peak Locate From Channel: 80
 Peak Locate To Channel: 4095

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
9	510.69 <i>AM4</i>	6.8450E-002	44.44
10	583.23 <i>TL-20f</i>	1.8632E-001	17.32
13	727.18 <i>B₂₁₂</i>	2.7951E-002	65.63

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

APPENDIX C

COMPASS DQA Surface Soil Report OL3-1

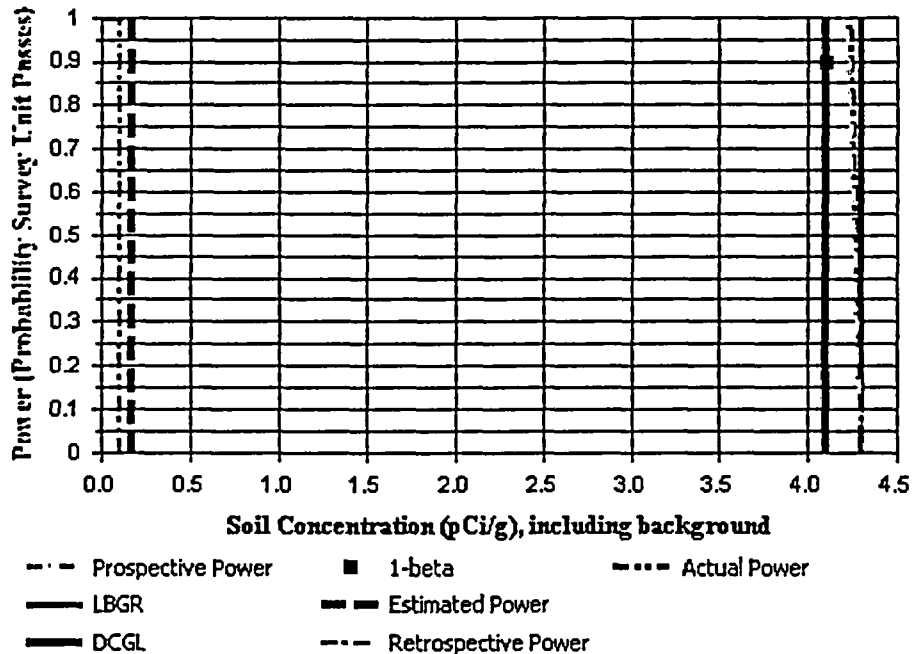


DQA Surface Soil Report

Assessment Summary

Site: OL3
Planner(s): Tristan M. Tritch
Survey Unit Name: OL3-1, rev 1
Report Number: 1
Survey Unit Samples: 11
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





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)
AP140SP1	S	0.23
AP139SP2	S	0.09
AP137SP3	S	0.1
AP136SP4	S	0.12
AR139SP5	S	0.08
AR138SP6	S	0.1
AR137SP7	S	0.09
AS140SP8	S	0.17
AS139SP9	S	0.05
AS137SP10	S	0.1
AS136SP11	S	0.06

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	11	N/A	N=11
Mean (pCi/g)	0.11	N/A	0.16
Median (pCi/g)	0.10	N/A	N/A
Std Dev (pCi/g)	0.05	N/A	0.0667
High Value (pCi/g)	0.23	N/A	N/A
Low Value (pCi/g)	0.05	N/A	N/A

APPENDIX D

COMPASS DQA Surface Soil Report OL3-2

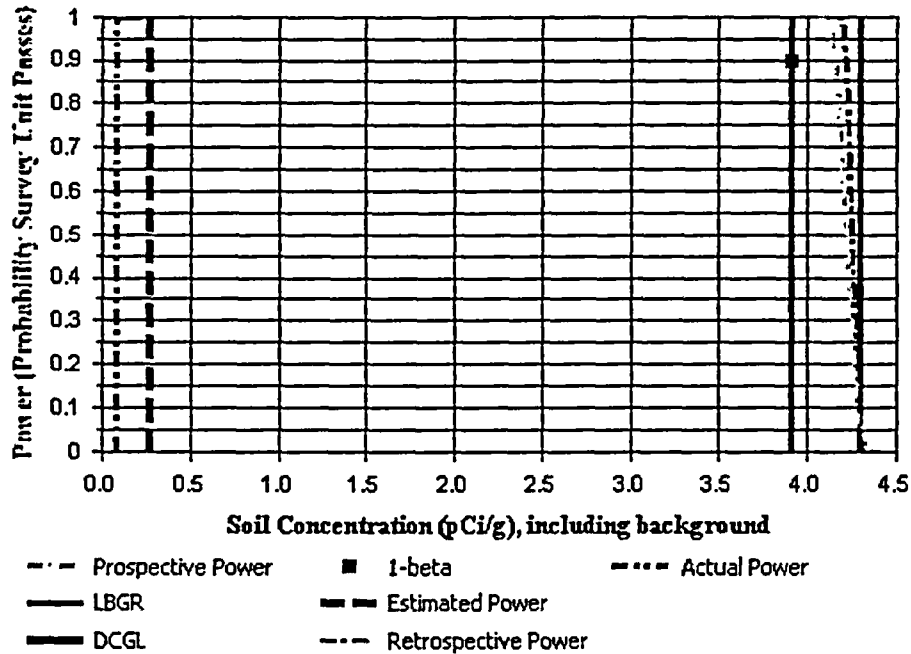


DQA Surface Soil Report

Assessment Summary

Site: OL3
Planner(s): Tristan M. Tritch
Survey Unit Name: OL3-2
Report Number: 1
Survey Unit Samples: 11
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





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)
AQ135SP1	S	0.05
AQ132SP2	S	0.14
AQ130SP3	S	0.14
AR135SP4	S	0.06
AR131SP5	S	0.31
AR130SP6	S	0.07
AR132SP7	S	0.15
AR130SP8	S	0.08
AS135SP9	S	0.08
AS131SP10	S	0.17
AS130SP11	S	0.07

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	11	N/A	N=11
Mean (pCi/g)	0.12	N/A	0.27
Median (pCi/g)	0.08	N/A	N/A
Std Dev (pCi/g)	0.08	N/A	0.1329
High Value (pCi/g)	0.31	N/A	N/A
Low Value (pCi/g)	0.05	N/A	N/A

APPENDIX E

COMPASS DQA Surface Soil Report OL3-3

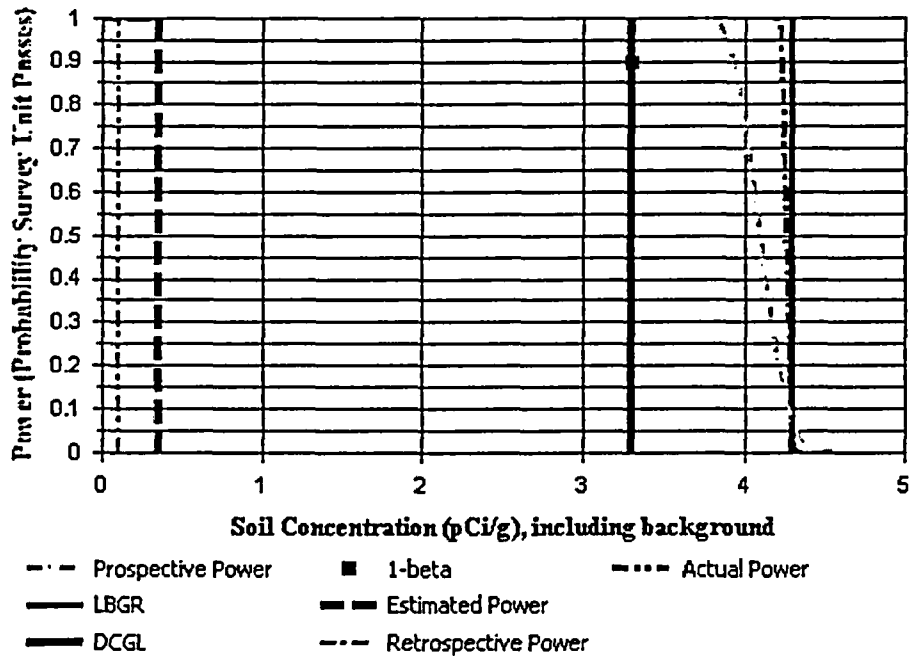


DQA Surface Soil Report

Assessment Summary

Site: OL3
Planner(s): Tristan M. Tritch
Survey Unit Name: OL3-3y
Report Number: 1
Survey Unit Samples: 11
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





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)
AO128SP1	S	0.27
AO127SP2	S	0.16
AP128SP3	S	0.08
AP126SP4	S	0.05
AQ128SP5	S	0.1
AQ127SP6	S	0.14
AR129SP7	S	0.1
AR128SP8	S	0.06
AR126SP9	S	0.14
AS128SP10	S	0.06
AS127SP11	S	0.12

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	11	N/A	N=11
Mean (pCi/g)	0.12	N/A	0.34
Median (pCi/g)	0.10	N/A	N/A
Std Dev (pCi/g)	0.06	N/A	0.3431
High Value (pCi/g)	0.27	N/A	N/A
Low Value (pCi/g)	0.05	N/A	N/A

APPENDIX F

COMPASS DQA Surface Soil Report OL3-4

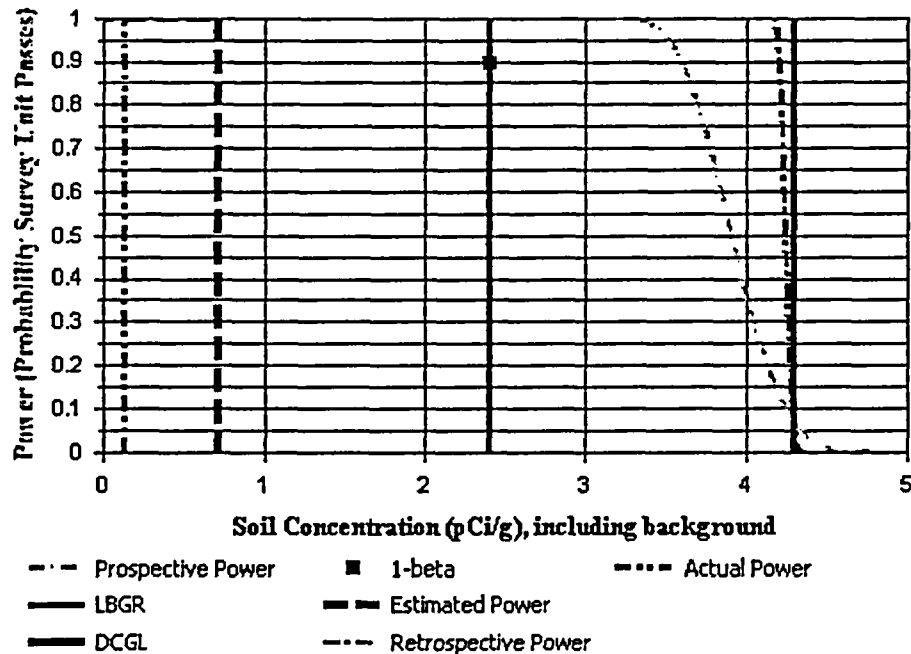


DQA Surface Soil Report

Assessment Summary

Site: OL3
Planner(s): Tristan M. Tritch
Survey Unit Name: OL3-4
Report Number: 1
Survey Unit Samples: 11
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





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)
AL124SP1	S	0.11
AL123SP2	S	0.14
AL122SP3	S	0.13
AM124SP4	S	0.2
AM122SP5	S	0.15
AN128SP6	S	0.39
AN126SP7	S	0.12
AN125SP8	S	0.16
AN124SP9	S	0.06
AN123SP10	S	0.1
AN122SP11	S	0.1

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	11	N/A	N=11
Mean (pCi/g)	0.15	N/A	0.71
Median (pCi/g)	0.13	N/A	N/A
Std Dev (pCi/g)	0.09	N/A	0.6485
High Value (pCi/g)	0.39	N/A	N/A
Low Value (pCi/g)	0.06	N/A	N/A

APPENDIX G

COMPASS DQA Surface Soil Report OL3-5

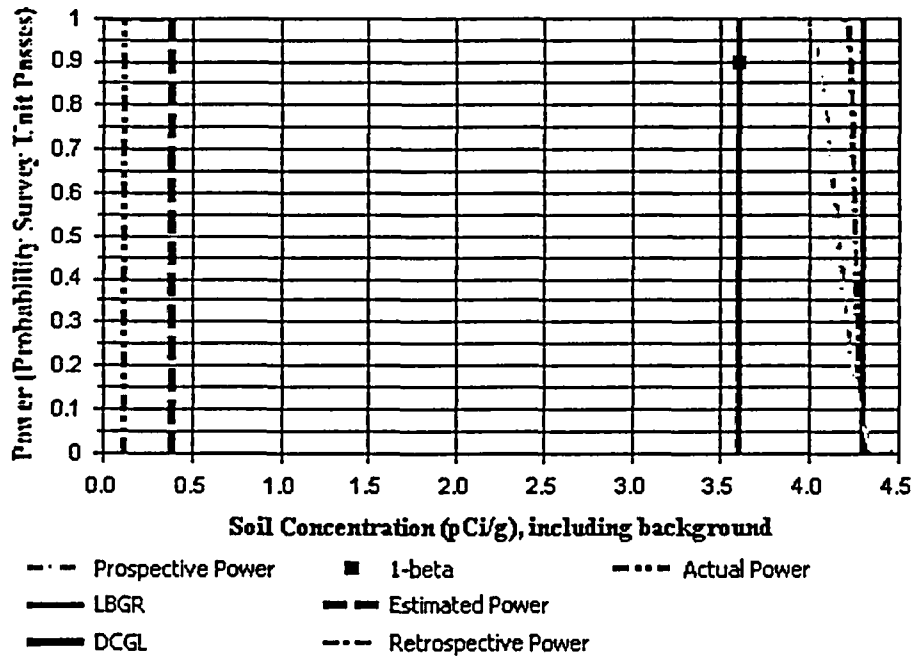


DQA Surface Soil Report

Assessment Summary

Site: OL3
Planner(s): Tristan M. Tritch
Survey Unit Name: OL3-5x
Report Number: 1
Survey Unit Samples: 12
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





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)
AO124SP1	S	0.11
AO123SP2	S	0.17
AP125SP3	S	0.1
AP123SP4	S	0.1
AP122SP5	S	0.19
AQ124SP6	S	0.13
AQ123SP7	S	0.14
AR125SP8	S	0.21
AR123SP9	S	0.1
AR122SP10	S	0.29
AS124SP11	S	0.12
AS123SP12	S	0.07

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	12	N/A	N=11
Mean (pCi/g)	0.14	N/A	0.39
Median (pCi/g)	0.12	N/A	N/A
Std Dev (pCi/g)	0.06	N/A	0.2349
High Value (pCi/g)	0.29	N/A	N/A
Low Value (pCi/g)	0.07	N/A	N/A

APPENDIX H

COMPASS DQA Surface Soil Report OL3-6

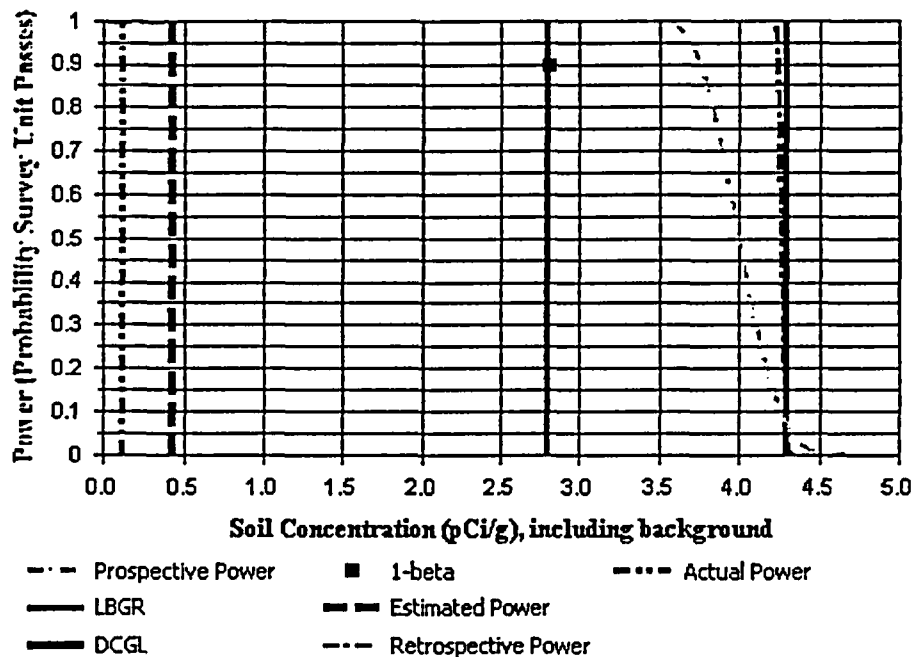


DQA Surface Soil Report

Assessment Summary

Site: OL3
Planner(s): Tristan M. Tritch
Survey Unit Name: OL3-6
Report Number: 1
Survey Unit Samples: 11
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





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)
AT140SP1	S	0.12
AT140SP2	S	0.09
AT139SP3	S	0.1
AT138SP4	S	0.04
AT137SP5	S	0.11
AT136SP6	S	0.14
AT140SP7	S	0.17
AT139SP8	S	0.08
AT138SP9	S	0.2
AT137SP10	S	0.21
AT136SP11	S	0.17

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	11	N/A	N=11
Mean (pCi/g)	0.13	N/A	0.42
Median (pCi/g)	0.12	N/A	N/A
Std Dev (pCi/g)	0.05	N/A	0.5065
High Value (pCi/g)	0.21	N/A	N/A
Low Value (pCi/g)	0.05	N/A	N/A