Appendix A

FirstEnergy

SNEC CALCULATION COVER SHEET

CALCULATION DESCRIPTION

Calculation Number	Revision Number	Effective Date	Page Number
E900-05-020	0	30 March 2005	1 of 9

Subject

OL9 Open Land Area - Survey Design

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

Revised 6-7-05 DHB
(Cover sheet only)
(and 5-1, 5-2, 7-1 = 7-2)
4/7/05

APPROVAL SIGNATURES

Calculation Originator	B. Brosey/ B. Brosey	Date	3/25/05
Technical Reviewer	W. Cooper/	Date	3/28/05
Additional Review	A. Paynter/	Date	30 March 2005
Additional Review		Date	

FirstEnergy

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CALCULATION DESCRIPTION

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Subject

OL9 Open Land Area – Survey Design

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

Minor revision of Attachments 5-1, 7-1 & 7-2. The "North" indicator was added to the diagrams and the grid outlines were included. In addition, grid markers were added to Attachment 7-1 and 7-2. The originals have been left in place IAW the SNEC Facility Calculations procedure, and the new sheets have an "A" included with the Attachment number (example = 5-1A). No other changes have been included and there is no change to the calculations presented herein.

BHB

APPROVAL SIGNATURES

Calculation Originator	B. Brosey/ B. Brosey	Date	6/7/05
Technical Reviewer	W. Cooper/	Date	6/7/05
Additional Review	A. Paynter/	Date	6/7/05
Additional Review		Date	

APPENDIX A OL9

1.0 PURPOSE

1.1 The purpose of this calculation is to develop a survey design for the SNEC site open land area designated "OL9", which is located in the south west sector of the site. The OL9 area is ***~13,300 square*** meters, and is a Class 2 survey area. OL9 is shown on **Attachment 1-1**. This design applies only to open land areas within the OL9 site location.

1.2 OL9 is sub-divided into two (2) survey units with the following approximate surface areas:

- OL9-1, ~5,800 square meters, and
- OL9-2, ~7,500 square meters

2.0 SUMMARY OF RESULTS

The following information should be used to develop a survey request for these survey units.

The effective DCGLw value is listed below for each survey unit. The US NRC has reviewed and concurred with the methodology used to derive these values. See **Attachment 2-1** to **2-6** (OL9-1) and **2-7** to **2-10** (from OL1/OL2 – used for OL9-2).

Table 1, DCGLw Values

Survey Unit	Volumetric DCGLw (pCi/g – Cs-137)
OL9-1	3.76 (2.82 A.L.)
OL9-2	5.73 (4.3 A.L.)

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

2.1 Survey Design

2.1.1 Scanning of soil (and fill materials) shall be performed using a ***2" D by 2" L NaI detector*** with a Cs-137 window setting **(Reference 3.1)**. The window shall straddle the Cs-137 662 keV peak width (see typical calibration information on **Attachment 3-1**).

2.1.2 The instrument conversion factor/efficiency shall not be less than ***206 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 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
5.97	25	4" (gap between detector face & soil surface)	> 350 gcpm	100% of Designated Grids

See Attachment 4-1 through 4-4 for actual calculations*

2.1.4 If a count rate greater than the action level of Table 2 is encountered during the scanning process, the surveyor should stop and locate the boundary of the elevated area. The surveyor should then mark the elevated area with stakes and/or other appropriate marking methods. To complete the investigation, sample elevated

areas(s) IAW SNEC procedure E900-IMP-4520.04 (**Reference 3.2**), and Section 2.2 of this calculation.

2.1.4.1 *Class 2* soil should be scanned using a serpentine pattern that is ~0.5 meters wide.

2.1.4.2 Scanning locations are randomly chosen on a per grid basis. Grids that can not be accessed should be clearly noted along with the reason for not completing the scan in that area. Scanning of partial grid areas is permitted with proper documentation.

2.1.4.3 The minimum number of scan locations (~50% of each survey unit) are identified by the VSP computer program (**Reference 3.3**), and are listed in Table 3 (see **Attachment 5-1** and **5-2**). Additional randomly chosen grids are provided so that a 50% scanning goal can be reached if some grids are deemed inaccessible. There is no need to scan these extra grid areas if the minimum scanning goal is attained in each survey unit.

Table 3, Randomly Located Grids for Scanning

Survey Unit	Number of Grids
OL9-1	29 min. (32 provided)
OL9-2	38 min. (39 provided)

See Attachment 5-1 and 5-2

2.1.5 The minimum number of randomly located *sample points* required for these survey units are listed in the following Table (see Compass output on **Attachment 6-1** through **6-8**). The surveyor should attempt to collect all samples listed below, but must collect the minimum values listed for each survey unit.

Table 4, Randomly Located Sample Points

Survey Unit	Number of Samples
OL9-1	15 min. (18 provided)
OL9-2	18 min. (21 provided)

See Attachment 7-1 to 7-2.

2.1.6 Sampling depth should be IAW Section 2.2.

2.1.7 Because the MDCscan (soil) is above the $DCGLw_{Cs-137}$, these survey units are Class 2 areas but are assumed to be Class 1 areas for purposes of data entry into the Compass computer program, forcing Compass to evaluate the number of samples based on the "Hot Spot" design criteria (see **Attachment 6-4** and **6-8**).

2.1.8 VSP (**Reference 3.3**) is used to plot all scan and sample point locations in 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/Hot Spot design requirements

2.1.11 The starting points for physically locating sample sites in the survey unit are based on measurements from selected site grid pins (see diagrams on **Attachment 7-1** and **7-2**). Remaining soil sampling points are positioned using coordinates/measurements developed from these markers and the current site grid map.

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

2.1.13 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 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, 1 meter deep samples must be collected to satisfy the initial sampling requirements of Section 2.1.5 (of this calculation).
>
> Sections 4.2.3, 4.2.6 or 4.2.7 of site procedure E900-IMP-4520.04 are applicable when satisfying sampling requirements of this document.

2.2.1 Subsurface sampling in the western portion of OL9-1 where building debris may be encountered, should penetrate the building rubble depth and access the base soil below the rubble bed. Collect a sample for each meter of depth to the subsurface base depth. The base soil sample depth should be enough to collect at least one sample (~6 inches in depth) plus any QC required sample.

2.2.2 Clearly mark, identify and document all sample locations.

2.3.1 As a part of the investigation process, sample any location that is above the action level cited is Table 2.

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 Visual Sample Plan, Version 2.0 (or greater), Copyright 2002, Battelle Memorial Institute.

3.4 Compass Computer Program, Version 1.0.0, Oak Ridge Institute for Science and Education.

3.5 Plan SNEC Facility License Termination Plan.

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

3.7 SNEC Facility Survey Request No.'s SR-133 & SR-134, "Spray Pond".

3.8 GPU Nuclear, SNEC Facility, "Site Area Grid Map", SNECRM-020, Sheet 1, Rev 2, 1/29/03.

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

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

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

3.12 Microsoft Excel 97, Microsoft Corporation Inc., SR-2, 1985-1997.

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 3.4**).

4.2 Characterization soil samples from this area are used as the initial estimate of variability. These results are shown on **Attachment 8-1**. The grid locations where these samples were taken are shown on **Attachment 8-2** along with the applicable SR number.

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

4.4 The number of points chosen by Compass are located on the survey map for the survey unit by the Visual Sample Plan (VSP) computer code (**Reference 3.3**).

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

4.6 Background in the OL9 area is assumed to be similar to background in the SP1 area. Background has been measured in the SP1 area, and ranges from ~100 cpm to ~300 cpm (**Reference 3.7**). The dominant area background is about 200 cpm. Therefor, the MDCscan value is calculated using this value.

4.7 The site area drawing used to determine the physical extent of this area is listed as **Reference 3.8**.

4.8 Remediation History

No significant remediation has occurred in the OL9 area regarding the open land area itself. Removal of a small garage facility in the OL9-2 area left only a small concrete slab which was surveyed by SRA. The rake and screen areas were opened as a result of efforts to provide access to the Intake Tunnel area. Miscellaneous concrete structures in the OL9 area will be addressed in a separate survey design as deemed appropriate by SNEC management.

4.9 This survey design uses Cs-137 as a surrogate to bound the average concentration for all SNEC facility related radionuclides in the survey unit. The effective DCGLw is just the permitted Cs-137 concentration (6.6 pCi/g) 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 DCGLw for this radionuclide.

4.10 The sample database used to determine the effective radionuclide mix for the OL9 area has been drawn from samples that were assayed at off-site laboratories. This list is shown on **Attachment 2-1** through **2-10**, and includes Spray Pond samples for OL9-1. OL9-2 is assumed to contain the same radionuclide mix as the OL1/OL2 areas. The data shows Cs-137 to be the predominant radioactive contaminant found in both survey units.

The decayed set of sample results were input to the spreadsheet titled "Effective DCGL Calculator for Cs-137" (**Reference 3.9**) to determine the effective volumetric DCGLw values. The output of this spreadsheet is shown on **Attachment 2-6** (OL9-1) and **2-10** (OL9-2).

4.11 The NaI 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 206 cpm/uR/h for Cs-137. Additionally, the detection system incorporates a Cs-137 window that lowers sensitivity to background in the survey unit. For purposes of calculating the MDCscan value used for planning purposes, background is assumed to be ~200 cpm.

4.12 The survey unit described in this survey design was inspected by site personnel. A copy of portions of the SNEC facility post-remediation inspection report (**Reference 3.10**), is included as **Attachment 9-1**.

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

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

4.15 "Special measurements" (as described in the SNEC LTP) are not included in this survey design.

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

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

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

4.19 Area factors are shown as part of Compass output (see **Attachment 6-1** and **6-5**).

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 area OL9 (in southwest quadrant of SNEC site).

6.2 **Attachment 2-1** to **2-10** is the sample results from the south west site area including the Spray Pond. In addition, the DCGL calculation sheets have been included.

6.3 **Attachment 3-1**, is a copy of calibration data from typical NaI radiation detection instrumentation that may be used in this survey area (IAW Section 2.1.2).

6.4 **Attachment 4-1** and **4-4**, is the MDCscan calculation and supporting MicroShield output for volumetric materials.

6.5 **Attachment 5-1** and **5-2**, are the scan locations for the OL9 survey units.

6.6 **Attachment 6-1** through **6-8**, are Compass output for the OL9 areas showing the number of required sampling points for these survey units.

6.7 **Attachment 7-1** to **7-2**, is the sample point locations with dimensions for each survey unit.

6.8 **Attachment 8-1** to **8-2**, is the soil variability results for selected soil samples from the OL9 area.

6.9 **Attachment 9-1**, is a copy of part of the inspection report for the OL9 area.

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).

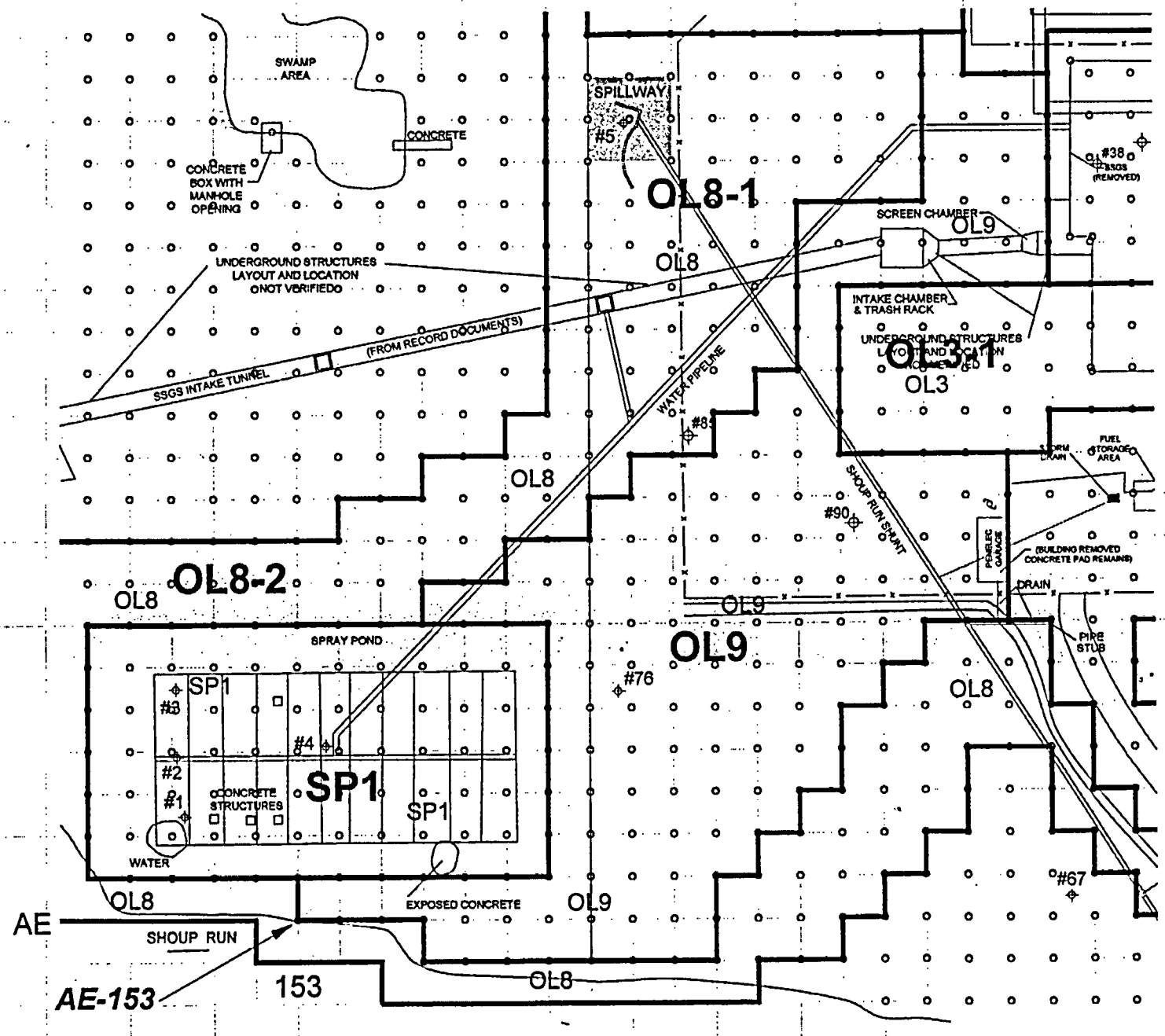
Exhibit 2

Survey Design Checklist

Calculation No. E900-05-020	Location Codes OL9 (South West Quadrant)		
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	
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	
14	Has an effective DCGLw been identified for the survey unit(s)?	Yes, N/A	
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	
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.

SNEC Site open Land Area - South West Quadrant



ATTACHMENT 1.1

DCGL Calculation Logic - SNEC Facility South West Quadrant

I. **Survey Units:** SNEC Site survey unit named OL9-1

II. **Description:** The purpose of this calculation is to determine a representative isotopic mix from available sample analyses for the OL9-1 survey unit of the SNEC site. The effective volumetric $DCGL_w$s 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 five (5) tables. These tables were developed using Microsoft Excel. Table explanation is as follows.

Table 1: Raw Data Listing – This table provides a list of twenty seven (27) representative sample analysis results. Results are from scoping, and characterization survey activities of the OL9-1, and near OL9-1 site areas such as the SP-1 area (Spray Pond). The samples consist of soil and sediment samples that were taken in support of the aforementioned activities. As applicable, a sample number, sample location/description, radionuclide concentration, and 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: Reduced Listing, Less Than Values Removed – This table provides the best overall representation of the raw data from table 1. Non-positive nuclide columns have been removed as well as all the MDA values leaving nineteen (19) sample results. Thus, eleven (11) nuclides have been reduced to four (4) in this table.

Table 3: Decayed Sample Listing – This table decays the data from Table 2. Half-life values (in days) are listed above each respective nuclide column. Samples are decayed from their respective analysis date to March 15, 2005. Only positive results were decayed.

Table 4: Decayed Values - Ratio to Cs-137 – 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 (normalized to 100%) are then used to calculate the effective 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. Am-241) had a positive result. This value is listed as the mean value in the tabulation. Therefore, this treatment results in higher "mean percent of total" values in the mix, which is considered a conservative approach.

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 South West Quadrant of the site is largely soils and or rock material, the release limit is based on a volumetric $DCGL_w$. Using the above data selection logic tables the calculated Cs-137 surrogate volumetric $DCGL_w$ is 3.76 pCi/g. This value is reduced by 25% as part of SNEC's commitment to apply an administrative limit as discussed in the License Termination Plan (LTP). Since positive sample result concentrations for Cs-137 are low in these areas, any ratios developed are influenced by background levels of other radionuclides such as C-14. Thus this methodology is considered a conservative approach.

ATTACHMENT 2.1

TABLE 1 - RAW DATA LISTING

	SHEC Sample No	LAB No.	Location/Description	H-3	Sr-90	Co-60	Cs-137	Am-241	Pu-238	Pu-239	Pu-241	C-14	Ni-63	Eu-152	Analysis Date
1	SX10SD99223	111076	Southwest Garage #4 Floor Drain Rim - OL9			< 0.3	6.4								July 22, 1999
2	SX11SD990135	110660	SW Garage - South of Fence - 12" Line, OL9			< 0.05	0.072								September 2, 1999
3	SX11SL990085	Teledyne; L20270-2	Soil, Grid AP-144, SURFA01, OL6	< 1.76	< 0.0493	< 0.0288	1.3	< 0.0797	< 0.0966	< 0.0966	< 5.84	< 0.497	< 3.03	< 0.0582	October 6, 1999
4	SXSD3240	Teledyne; L20648-8	SSGS Drain Field, OL9			< 0.03	0.4					< 0.175			October 22, 2002
5	SXSD3242	Teledyne; L20648-9	SSGS Drain Field, OL9			< 0.03	0.6					< 0.218			October 22, 2002
6	SXSD3243	Teledyne; L20648-10	SSGS Drain Field, OL9			< 0.06	0.6					< 0.246			October 22, 2002
7	SXSL5717	Teledyne, L25070-1-2	Soil, SR-132, AL-143, OL9	< 0.772	< 0.0419	< 0.0378	1.04	< 0.0894	< 0.0186	< 0.0228	< 3.27	0.28	< 2.59	< 0.114	June 16, 2004
8	SX11SL99230	111082	Subsurface Sample #4 (0-4') AI-153, SP1			< 0.3	0.21								November 18, 1999
9	SX11SL990128	110653	Spray Pond - Sample #5, SP1			< 0.02	0.29								October 14, 1999
10	SX11SL99233	111084	Subsurface Sample #2 (0-3') AH-156, SP1			< 0.12	0.33								November 18, 1999
11	SX9SL99208	111068	Subsurface Sample #1 (4-6') AG-156, SP1			< 0.14	0.45								November 18, 1999
12	SX11SL99229	111080	Subsurface Sample #1 (0-3') AG-156, SP1			< 0.12	0.47								November 18, 1999
13	SX11SL990124	110649	Spray Pond - Sample #1, SP1			< 0.02	0.62								October 28, 1999
14	SX11SL990125	110650	Spray Pond - Sample #2, SP1			< 0.05	0.72								October 28, 1999
15	SX11SL990126	110651	Spray Pond - Sample #3, SP1			< 0.06	1.8								October 28, 1999
16	SX11SL990127	110652	Spray Pond - Sample #4, SP1			< 0.05	2.2								October 28, 1999
17	SX11SL990120	110645	Spray Pond - Sample #10, SP1			< 0.019	< 0.02								October 28, 1999
18	SX11SL990119	110644	Spray Pond - Sample #6, SP1			< 0.03	< 0.03								October 28, 1999
19	SX11SL990122	110647	Spray Pond - Sample #9, SP1			< 0.03	< 0.03								October 28, 1999
20	SX11SL990123	110648	Spray Pond - Sample #8, SP1			< 0.03	< 0.03								October 28, 1999
21	SX11SL990121	110646	Spray Pond - Sample #7, SP1			< 0.05	< 0.05								October 28, 1999
22	SX9SL99204	111064	Subsurface Sample #2 (4-6') AH-156, SP1			< 0.17	< 0.06								November 18, 1999
23	SX9SL99205	111065	Subsurface Sample #3 (4-6') AJ-156, SP1			< 0.1	< 0.11								November 18, 1999
24	SX11SL99228	111137	Subsurface Sample #3 (0-3') AJ-156, SP1			< 0.3	< 0.2								November 18, 1999
25	SXSL25262	111151	Composite of Spray Pond Soil 125, 126 & 127, SP1			0.053	1.57	0.0035	< 0.0009	0.0043					October 28, 1999
26	SX11SL990126	Teledyne; L21441-1	Spray Pond - Sample #3, SP1 (Spray01)	< 2.08	< 0.0384	< 0.0111	1.56	< 0.0102	< 0.0402	< 0.00898	< 2.38	0.225	< 1.19	< 0.025	October 28, 1999
27	SX11SL990127	Teledyne; L21441-2	Spray Pond - Sample #4, SP1 (Spray01)	< 2.04	< 0.0338	< 0.019	2.8	< 0.0162	< 0.0225	< 0.0318	< 1.64	0.591	< 1.22	< 0.0387	October 28, 1999

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

ATTACHMENT 2 . 2

TABLE 2 - REDUCED LISTING, LESS THAN VALUES REMOVED

	SHEC Sample No	LAB No.	Location/Description	Cs-137	Am-241	Pu-239	C-14	Analysis Date
1	SX10SD99223	111076	Southwest Garage #4 Floor Drain Rim - OL9	6.4				July 22, 1999
2	SX11SD990135	110660	SW Garage - South of Fence - 12" Line, OL9	0.072				September 2, 1999
3	SX11SL990085	**Teledyne; L20270-2**	Soil, Grid AP-144, SURFA01, OL8	1.3				October 6, 1999
4	SX11SL990128	110653	Spray Pond - Sample #5, SP1	0.29				October 14, 1999
5	SX11SL990124	110649	Spray Pond - Sample #1, SP1	0.62				October 28, 1999
6	SX11SL990125	110650	Spray Pond - Sample #2, SP1	0.72				October 28, 1999
7	SX11SL990126	110651	Spray Pond - Sample #3, SP1	1.8				October 28, 1999
8	SX11SL990127	110652	Spray Pond - Sample #4, SP1	2.2				October 28, 1999
9	SXSL25262	111151	Composite of Spray Pond Soil 125, 126 & 127, SP1	1.57	0.0035	0.0043		October 28, 1999
10	SX11SL990126	**Teledyne; L21441-1**	Spray Pond - Sample #3, SP1 (Spray01)	1.56			0.225	October 28, 1999
11	SX11SL990127	**Teledyne; L21441-2**	Spray Pond - Sample #4, SP1 (Spray01)	2.8			0.591	October 28, 1999
12	SX11SL99230	111082	Subsurface Sample #4 (0-4') AI-153, SP1	0.21				November 18, 1999
13	SX11SL99233	111084	Subsurface Sample #2 (0-3') AH-156, SP1	0.33				November 18, 1999
14	SX9SL99208	111068	Subsurface Sample #1 (4-6') AG-156, SP1	0.45				November 18, 1999
15	SX11SL99229	111080	Subsurface Sample #1 (0-3') AG-156, SP1	0.47				November 18, 1999
16	SXSD3240	**Teledyne; L20648-8**	SSGS Drain Field. OL9	0.4				October 22, 2002
17	SXSD3242	**Teledyne; L20648-9**	SSGS Drain Field, OL9	0.6				October 22, 2002
18	SXSD3243	**Teledyne; L20648-10**	SSGS Drain Field, OL9	0.6				October 22, 2002
19	SXSL5717	**Teledyne, L25070-1-2**	Soil, SR-132, AL-143, OL9	1.04			0.28	June 16, 2004

ATTACHMENT 2.3

TABLE 3 - DECAYED SAMPLE LISTING

	SHEC Sample No	LAB No.	Location/Description	Cs-137	Am-241	Pu-239	C-14	Elapsed (d)	Analysis Date
				T 1/2 (d) 11020	T 1/2 (d) 157861	T 1/2 (d) 8813848	T 1/2 (d) 2092883		Decay Date 3/15/2005
1	SX10SD99223	111076	Southwest Garage #4 Floor Drain Rim - OL9	5.6213				2063	July 22, 1999
2	SX11SD990135	110660	SW Garage - South of Fence - 12" Line, OL9	0.0634				2021	September 2, 1999
3	SX11SL990085	Teledyne; L20270-2	Soil, Grid AP-144, SURFA01, OL8	1.1473				1987	October 6, 1999
4	SX11SL990128	110653	Spray Pond - Sample #5, SP1	0.2561				1979	October 14, 1999
5	SX11SL990124	110649	Spray Pond - Sample #1, SP1	0.5479				1965	October 28, 1999
6	SX11SL990125	110650	Spray Pond - Sample #2, SP1	0.6363				1965	October 28, 1999
7	SX11SL990126	110651	Spray Pond - Sample #3, SP1	1.5908				1965	October 28, 1999
8	SX11SL990127	110652	Spray Pond - Sample #4, SP1	1.9443				1965	October 28, 1999
9	SXSL25262	111151	Composite of Spray Pond Soil 125, 126 & 127, SP1	1.3904	0.0035	0.0043		1965	October 28, 1999
10	SX11SL990126	Teledyne; L21441-1	Spray Pond - Sample #3, SP1 (Spray01)	1.3787			0.2249	1965	October 28, 1999
11	SX11SL990127	Teledyne; L21441-2	Spray Pond - Sample #4, SP1 (Spray01)	2.4745			0.5906	1965	October 28, 1999
12	SX11SL99230	111082	Subsurface Sample #4 (0-4') AI-153, SP1	0.1858				1944	November 18, 1999
13	SX11SL99233	111084	Subsurface Sample #2 (0-3') AH-156, SP1	0.2920				1944	November 18, 1999
14	SX9SL99208	111068	Subsurface Sample #1 (4-6') AG-156, SP1	0.3982				1944	November 18, 1999
15	SX11SL99229	111080	Subsurface Sample #1 (0-3') AG-156, SP1	0.4159				1944	November 18, 1999
16	SXSD3240	Teledyne; L20648-8	SSGS Drain Field, OL9	0.3786				875	October 22, 2002
17	SXSD3242	Teledyne; L20648-9	SSGS Drain Field, OL9	0.5679				875	October 22, 2002
18	SXSD3243	Teledyne; L20648-10	SSGS Drain Field, OL9	0.5679				875	October 22, 2002
19	SXSL5717	Teledyne, L25070-1-2	Soil, SR-132, AL-143, OL9	1.0224			0.2800	272	June 16, 2004

ATTACHMENT 2 . 4

TABLE 4 - DECAYED VALUES - RATIO TO Cs-137

	SHEC Sample No	LAB No.	Location/Description	Cs-137	Am-241	Pu-239	C-14	Total	Decay Date 3/15/2005 Analysis Date
1	SX10SD99223	111076	Southwest Garage #4 Floor Drain Rim - OL9	1.0				1.000	July 22, 1999
2	SX11SD990135	110660	SW Garage - South of Fence - 12" Line, OL9	1.0				1.000	September 2, 1999
3	SX11SL990085	Teledyne; L20270-2	Soil, Grid AP-144, SURFA01, OL8	1.0				1.000	October 6, 1999
4	SX11SL990128	110653	Spray Pond - Sample #5, SP1	1.0				1.000	October 14, 1999
5	SX11SL990124	110649	Spray Pond - Sample #1, SP1	1.0				1.000	October 28, 1999
6	SX11SL990125	110650	Spray Pond - Sample #2, SP1	1.0				1.000	October 28, 1999
7	SX11SL990126	110651	Spray Pond - Sample #3, SP1	1.0				1.000	October 28, 1999
8	SX11SL990127	110652	Spray Pond - Sample #4, SP1	1.0				1.000	October 28, 1999
9	SXSL25262	111151	Composite of Spray Pond Soil 125, 126 & 127, SP1	1.0	0.0025	0.0031		1.006	October 28, 1999
10	SX11SL990126	Teledyne; L21441-1	Spray Pond - Sample #3, SP1 (Spray01)	1.0			0.1631	1.163	October 28, 1999
11	SX11SL990127	Teledyne; L21441-2	Spray Pond - Sample #4, SP1 (Spray01)	1.0			0.2387	1.239	October 28, 1999
12	SX11SL99230	111082	Subsurface Sample #4 (0-4') AI-153, SP1	1.0				1.000	November 18, 1999
13	SX11SL99233	111084	Subsurface Sample #2 (0-3') AH-156, SP1	1.0				1.000	November 18, 1999
14	SX9SL99208	111068	Subsurface Sample #1 (4-6') AG-156, SP1	1.0				1.000	November 18, 1999
15	SX11SL99229	111080	Subsurface Sample #1 (0-3') AG-156, SP1	1.0				1.000	November 18, 1999
16	SXSD3240	Teledyne; L20648-8	SSGS Drain Field. OL9	1.0				1.000	October 22, 2002
17	SXSD3242	Teledyne; L20648-9	SSGS Drain Field, OL9	1.0				1.000	October 22, 2002
18	SXSD3243	Teledyne; L20648-10	SSGS Drain Field, OL9	1.0				1.000	October 22, 2002
19	SXSL5717	Teledyne, L25070-1-2	Soil, SR-132, AL-143, OL9	1.0			0.2739	1.274	June 16, 2004
			Mean Ratio to Cs-137=>	1.000	0.002	0.003	0.225	1.231	
			Normalized=>	81.25%	0.20%	0.25%	18.30%		
			Sigma=>	0	N/A	N/A	0.057		

ATTACHMENT 2.5

Table 5

Effective DCGL Calculator for Cs-137 (in pCi/g)

SNEC'AL	75%	Total Activity Limit DCGLw		Administrative Limit	
		4.62	pCi/g	3.47	pCi/g

SAMPLE NUMBER(s)⇒ OL9-1 - Open Land Area

Cs-137 Limit		Cs-137 Administrative Limit	
3.76	pCi/g	2.82	pCi/g

26.61%	25.0	mrem/y TEDE Limit
5.32%	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	
1	Am-241	0.002	0.163%	9.9	2.73	0.01	0.04	0.01	0.01	0.00	Am-241
2	C-14	0.23	18.293%	2.0	5.4	0.85	4.23	0.85	2.81	0.17	C-14
3	Co-60		0.000%	3.5	67.0	0.00	0.00	0.00	0.00	0.00	Co-60
4	Cs-137	1.00	81.301%	6.6	397.4	3.76	18.81	3.76	3.79	0.01	Cs-137
5	Eu-152		0.000%	10.1	1440	0.00	0.00	0.00	0.00	0.00	Eu-152
6	H-3		0.000%	132	3111	0.00	0.00	0.00	0.00	0.00	H-3
7	Ni-63		0.000%	747	19000	0.00	0.00	0.00	0.00	0.00	Ni-63
8	Pu-238		0.000%	1.8	0.41	0.00	0.00	0.00	0.00	0.00	Pu-238
9	Pu-239	0.003	0.244%	1.6	0.37	0.01	0.06	0.01	0.05	0.03	Pu-239
10	Pu-241		0.000%	86	419.8	0.00	0.00	0.00	0.00	0.00	Pu-241
11	Sr-90		0.000%	1.2	0.61	0.00	0.00	0.00	0.00	0.00	Sr-90
		1.23E+00	100.000%			4.62	23.14	4.62	6.652	0.213	
						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 2.6

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 $DCGL_w$s 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).

ATTACHMENT 2.7

ATTACHMENT 2 - 8

TABLE 1 - Data Listing (pCi/g)

	SNEC Sample No	Location/Description	H-3	Sr-90	Co-60	Cs-137	Am-241	Pu-238	Pu-239	Pu-241	C-14	Ni-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	SXSL1063	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, 818' 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, 798' 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	8.67E-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 6' 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 6' From CV, 804' El, OL1	1.15E+01	3.00E-02	1.00E-02	4.34E+00	3.10E-02	1.60E-02	7.00E-03	1.91E+00	4.00E+00	7.78E+00	4.00E-02
11	SXSL2649	Anulus Well, A-2, 6 to 18' 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	SXSL2071	CV Area - East Yard Dirt Pile - Middle, 1/2 Way Up, OL1		3.00E-02	7.00E-02	5.60E-01							
14	SXSL2072	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 @ 6" 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	SXSL3146	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	SXSL3149	Soil Pile, CV Yard, Six Feet on East Side, SR-37, OL1		2.97E-02	8.00E-02	3.00E-01							
19	SXSL3163	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	SXSL4149	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				

TABLE 2 - Decayed Listing (pCi/g)

			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	
			4485.27	10446.15	1925.23275	11019.5925	157861.05	32050.6875	8813847.75	5259.6	2092882.5	36561.525	4967.4	January 16, 2004	
	SNEC Sample No	Location/Description	H-3	Sr-90	Co-60	Cs-137	Am 241	Pu-238	Pu-239	Pu-241	C-14	Ni 63	Eu-152	Analysis Date	ET (d)
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	SXSL1063	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, 818' 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, 798' 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 6' From CV, 800' El., OL1	9.84E+00	1.68E-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 28, 2001	903
10	SXSL1281	AX-128, 3-1, Soil, CV Tunnel East 6' From CV, 804' 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 28, 2001	903
11	SXSL2649	Anulus Well, A-2, 6 to 18' 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	SXSL2071	CV Area - East Yard Dirt Pile - Middle, 1/2 Way Up, OL1		2.87E-02	5.48E-02	5.37E-01								March 8, 2002	680
14	SXSL2072	CV Area - East Yard Dirt Pile - Bottom (also top center), OL1		2.87E-02	4.70E-02	9.58E-02								March 8, 2002	680
15	SXSL3140	East CV Yard, Soil Pile @ 6" 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	SXSL3146	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	SXSL3149	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	SXSL3163	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	SXSL4149	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

ATTACHMENT 2-9

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	CV Tunnel Sediment Composite, OL1		9.01E+00	8.59E-01	1.17E+03	1178.89
2	SX9SL99219	Subsurface Sample #29 (0-5'), AY-128, OL1				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, 6 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	CV Tunnel Sediment Composite, OL1		7.71E-03	7.35E-04	1.00E+00	1.01
2	SX9SL99219	Subsurface Sample #29 (0-5'), AY-128, OL1				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 AX-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, 6 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)

SPECIAL	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	
5.73	pCi/g	4.30	pCi/g

17.45%	25.0 mrem/y TEDE Limit
7.79%	[illegible] mrem/y Drinking Water (DW) Limit

☑ 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	[illegible]	0.00	[illegible]	0.00	0.00	[illegible]	Am-241
2	C-14		0.000%	2.0	[illegible]	0.00	[illegible]	0.00	0.00	[illegible]	C-14
3	Co-60	0.0064	0.216%	3.5	[illegible]	0.04	[illegible]	0.04	0.05	[illegible]	Co-60
4	Cs-137	1.0000	33.738%	6.6	[illegible]	5.73	[illegible]	5.73	3.79	[illegible]	Cs-137
5	Eu-152		0.000%	10.1	[illegible]	0.00	[illegible]	0.00	0.00	[illegible]	Eu-152
6	H-3	1.9499	65.786%	132	[illegible]	11.17	[illegible]	11.17	0.37	[illegible]	H-3
7	Ni-63		0.000%	747	[illegible]	0.00	[illegible]	0.00	0.00	[illegible]	Ni-63
8	Pu-238		0.000%	1.8	[illegible]	0.00	[illegible]	0.00	0.00	[illegible]	Pu-238
9	Pu-239		0.000%	1.6	[illegible]	0.00	[illegible]	0.00	0.00	[illegible]	Pu-239
10	Pu-241		0.000%	86	[illegible]	0.00	[illegible]	0.00	0.00	[illegible]	Pu-241
11	Sr-90	0.0077	0.260%	1.2	[illegible]	0.04	[illegible]	0.04	0.16	[illegible]	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 *not % of Total.*		

ATTACHMENT 2 : 10

2350 INSTRUMENT AND PROBE EFFICIENCY CHART
02/22/05 Added 2350-1 #126218 with 43-68 #095080 and 2350-1 #126188 with 43-68 #099186. Returned from DURATEK following calibration. ***Typical - 2" by 2" NaI (w) Inst. Response***

Inst.#	Cal Due	AP #		Probe #	Cal Due	*cpm/mR/h*
95361	6/25/05	P & W		25686 Pk	6/28/05	211,799
98620	12/01/05	G&W		196022 Pk	12/01/05	204,609
98642	9/28/05	B&W		185844 Pk	9/28/05	209,771
98647	11/02/05	G &Y		211667 Pk	11/02/05	213,180
117566	01/05/06	ROR		402PK	01/13/06	205411
117573	5/18/05	O &Y		211674 Pk	5/18/05	212,173
129407	12/17/05	White		206280	12/17/05	222,724
129423	5/18/05	P &Y		211687 Pk	5/18/05	213,539
129440	**11/01/05**	**O&W**		**210938 Pk**	**11/01/05**	**196,636**
126198	11/22/05	R&W		196021	11/22/05	210398

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

ATTACHMENT 3 . 1

NaI Scan MDC Calculation

$b := 200$ $p := .5$ $HS_d := 56.42$ $SR := 25$ $d := 1.38$

$Conv := 206$ $MS_{output} := 1.157 \cdot 10^{-4}$

$\frac{HS_d}{SR} = 2.257$ *Observation Interval (seconds)*

$O_i := \frac{HS_d}{SR}$ *Observation Interval (seconds)*

$b_i := \frac{(b \cdot O_i)}{60}$

$MDCR_i := \left(d \cdot \sqrt{b_i}\right) \cdot \frac{60}{O_i}$

$MDCR_i = 100.629$ *net counts per minute*

$MDCR_{surveyor} := \frac{MDCR_i}{\sqrt{p}}$

$MDCR_{surveyor} = 142.311$ *net counts per minute*

$MDER := \frac{MDCR_{surveyor}}{Conv}$

$MDER = 0.691$ μR/h

$MDC_{scan} := \frac{MDER}{MS_{output} \cdot 1 \cdot 10^3}$

$MDC_{scan} = 5.971$ pCi/g

where:

b = background in counts per minute

b_i = background counts in observation interval

Conv = NaI manufacturers reported response to energy of contaminant (cpm/uR/h)

d = index of sensitivity (Table 6.5 MARSSIM), 1.38 = 95% of correct detection's, 60% false positives

HS_d = hot spot diameter (in centimeters)

MDC_{scan} = Minimum Detectable Concentration for scanning (pCi/g)

$MDCR_i$ = Minimum Detectable Count Rate (ncpm)

$MDCR_{surveyor}$ = $MDCR_i$ corrected by human performance factor (ncpm)

MDER = Minimum Detectable Exposure Rate (uR/h)

MS_{output} = MicroShield output exposure rate for 1 pCi/g of contaminant (mR/h)

O_i = obervation Interval (seconds)

p = human performance factor

SR = scan rate in centimeters per second

NOTE

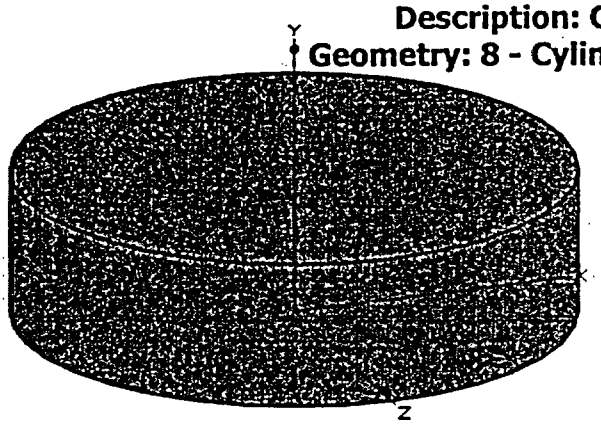
This is an example of an MDCscan calculation that is valid for a specific set of site conditions, and assumptions. These variables include the computer model used, soil density, soil moisture content, surveyor efficiency, ground cover, soil background radionuclide content and other variables that influence calculated results. However, this scan MDC has been deemed appropriate for initial survey planning purposes at this site location.

MicroShield v5.05 (5.05-00121)
GPU Nuclear

Page : 1
DOS File : SOIL.MS5
Run Date: March 19, 2005
Run Time: 8:45:26 PM
Duration : 00:00:07

File Ref: _____
Date: _____
By: _____
Checked: _____

Case Title: Soil
Description: Cylinder Slab Source
Geometry: 8 - Cylinder Volume - End Shields



Source Dimensions

Height	15.24 cm	6.0 in
Radius	28.2 cm	11.1 in

Dose Points

	X	Y	Z
# 1	0 cm	27.94 cm	0 cm
	0.0 in	11.0 in	0.0 in

Shields

Shield Name	Dimension	Material	Density
Source	3.81e+04 cm³	Concrete	1.45
Air Gap		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	µCi/cm³	Bq/cm³
Ba-137m	5.2227e-008	1.9324e+003	1.3717e-006	5.0753e-002
Cs-137	5.5208e-008	2.0427e+003	1.4500e-006	5.3650e-002

Buildup
The material reference is : Source

Integration Parameters

Radial	60
Circumferential	60
Y Direction (axial)	60

Results

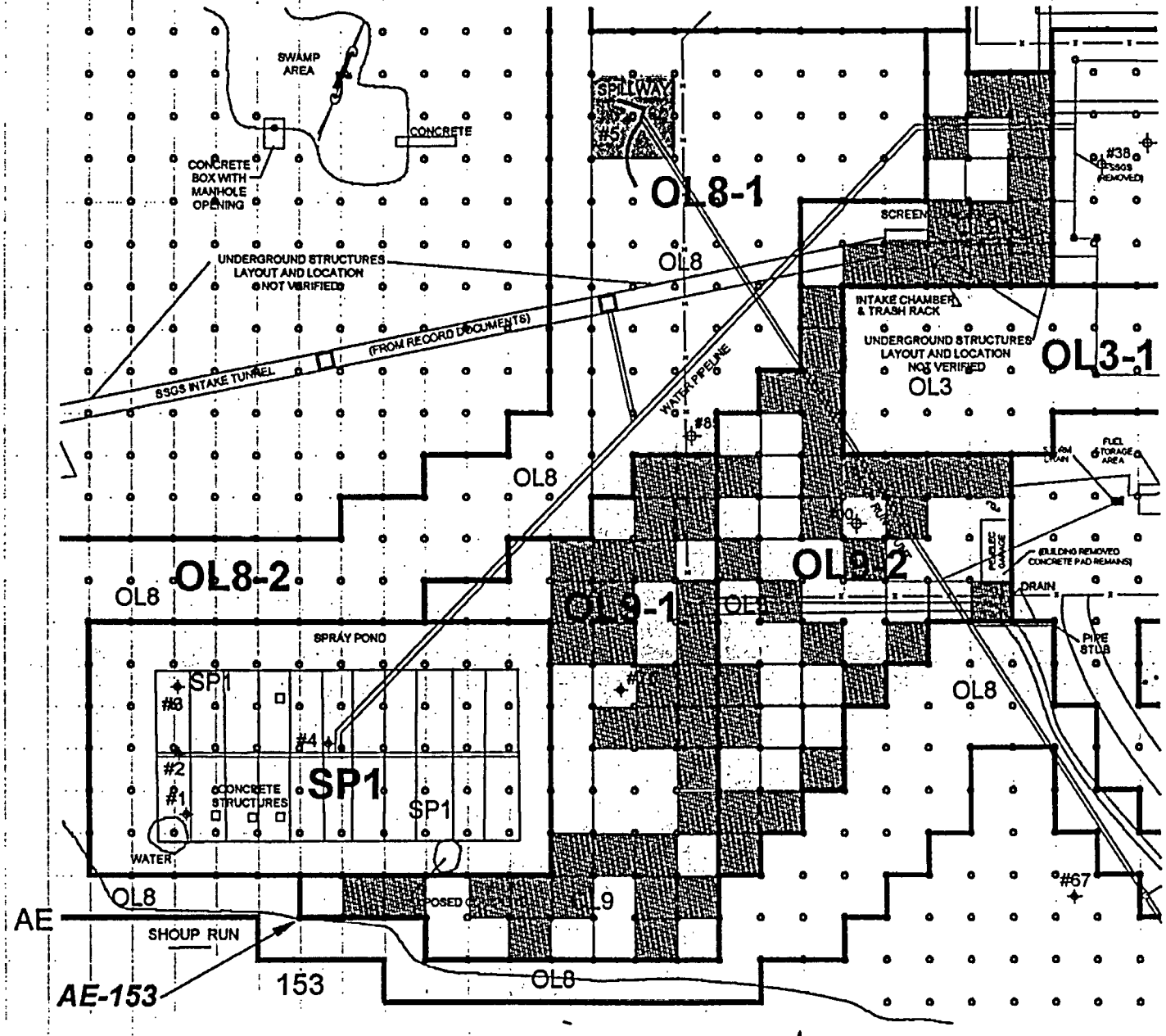
Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	4.001e+01	6.784e-06	8.209e-06	5.650e-08	6.838e-08
0.0322	7.381e+01	1.304e-05	1.588e-05	1.050e-07	1.278e-07

ATTACHMENT 4.3

DOS File : SOIL.MS5
Run Date: March 19, 2005
Run Time: 8:45:26 PM
Duration : 00:00:07

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
0.0364	2.686e+01	7.221e-06	9.426e-06	4.102e-08	5.355e-08
0.6616	1.739e+03	5.967e-02	1.023e-01	1.157e-04	1.983e-04
TOTALS:	1.879e+03	5.969e-02	1.023e-01	1.159e-04	1.985e-04

SNEC Site open Land Area - South West Quadrant



Attachment 5 - 1 A

	SCAN AREAS IN OL9			
	Grid	Survey Unit OL9-1	Grid	Survey Unit OL9-2
1	AE-152	X	AF-143	X
2	AE-151	X	AG-143	X
3	AE-149	X	AG-142	X
4	AE-148	X	AH-141	X
5	AE-147	X	AI-143	X
6	AE-145	X	AJ-143	X
7	AE-144	X	AJ-140	X
8	AD-148	X	AK-141	X
9	AD-145	X	AK-139	X
10	AF-147	X	AL-142	X
11	AF-146	X	AL-137	X
12	AF-145	X	AM-143	X
13	AG-144	X	AM-140	X
14	AH-144	X	AN-141	X
15	AI-146	X	AN-139	X
16	AI-145	X	AO-143	X
17	AI-144	X	AO-141	X
18	AJ-145	X	AO-140	X
19	AJ-144	X	AO-139	X
20	AK-147	X	AO-138	X
21	AK-146	X	AO-137	X
22	AK-144	X	AP-141	X
23	AL-147	X	AQ-142	X
24	AL-146	X	AQ-141	X
25	AL-144	X	AR-141	X
26	AM-147	X	AS-141	X
27	AM-146	X	AT-140	X
28	AM-145	X	AT-139	X
29	AN-145	X	AT-138	X
30	AN-144	X	AT-137	X
31	AO-145	X	AT-136	X
32	AO-144	X	AU-138	X
33			AU-137	X
34			AU-136	X
35			AV-136	X
36			AW-138	X
37			AW-136	X
38			AX-137	X
39			AX-136	X

ATTACHMENT 5.2

Site Report

Site Summary

Site Name: OL9-1 SURVEY UNIT

Planner(s): BHB

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	2.82	No	1	28.7
				25	4.7
				100	3.6
				400	3
				2,500	2.3
				10,000	1

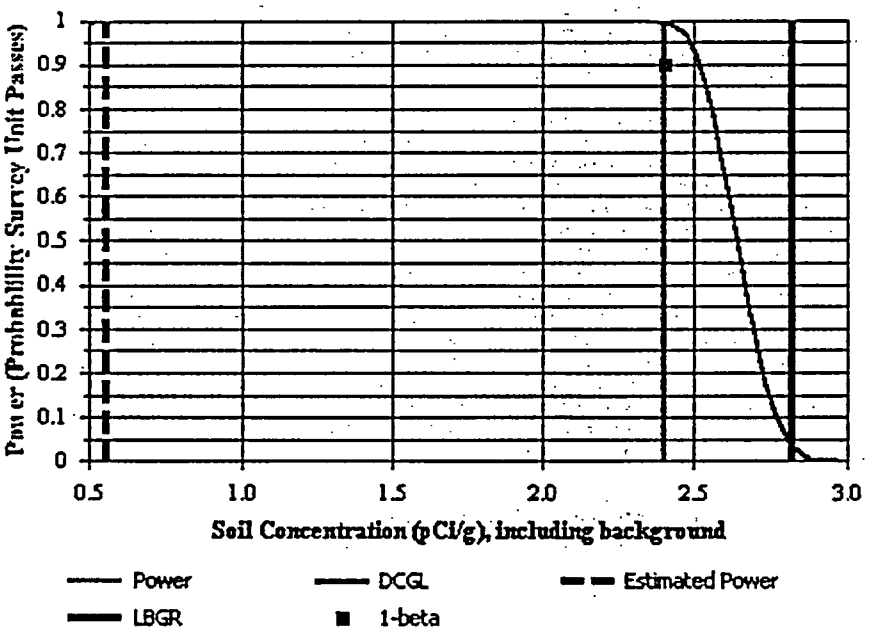
ATTACHMENT 6.1

Surface Soil Survey Plan

Survey Plan Summary

Site:	OL9-1 SURVEY UNIT		
Planner(s):	BHB		
Survey Unit Name:	OL9-1 Survey Unit - SW Quandant		
Comments:	Class 2 Area Entered as Class 1		
Area (m²):	5,800	Classification:	1
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.29
DCGL (pCi/g):	2.82	Sample Size (N):	15
LBGR (pCi/g):	2.4	Estimated Conc. (pCi/g):	0.6
Alpha:	0.050	Estimated Power:	1
Beta:	0.100	EMC Sample Size (N):	15
Scanning Instrumentation:	2" by 2" NaI Detector (w)		

Prospective Power Curve



ATTACHMENT 6.2

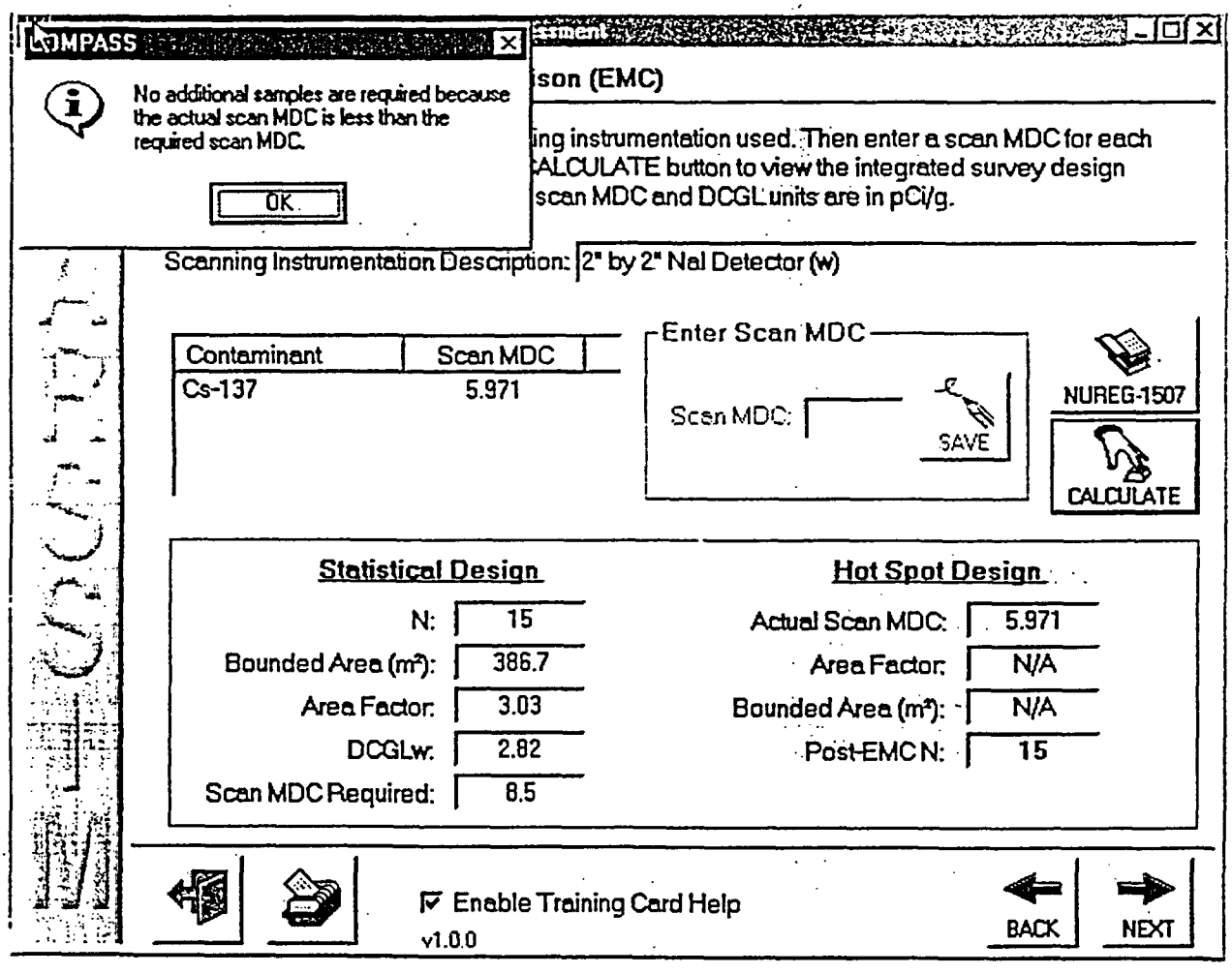
Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	2.82	N/A	N/A	N/A	5.971

Contaminant	Survey Unit Estimate (Mean ± 1-Sigma) (pCi/g)	Reference Area Estimate (Mean ± 1-Sigma) (pCi/g)
Cs-137	0.56 ± 0.29	0.28 ± 0.39

ATTACHMENT 6.3



ATTACHMENT 6.4

Site Report

Site Summary

Site Name: OL9-2 SURVEY UNIT

Planner(s): BHB

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	4.30	No	1	28.7
				25	4.7
				100	3.6
				400	3
				2,500	2.3
				10,000	1

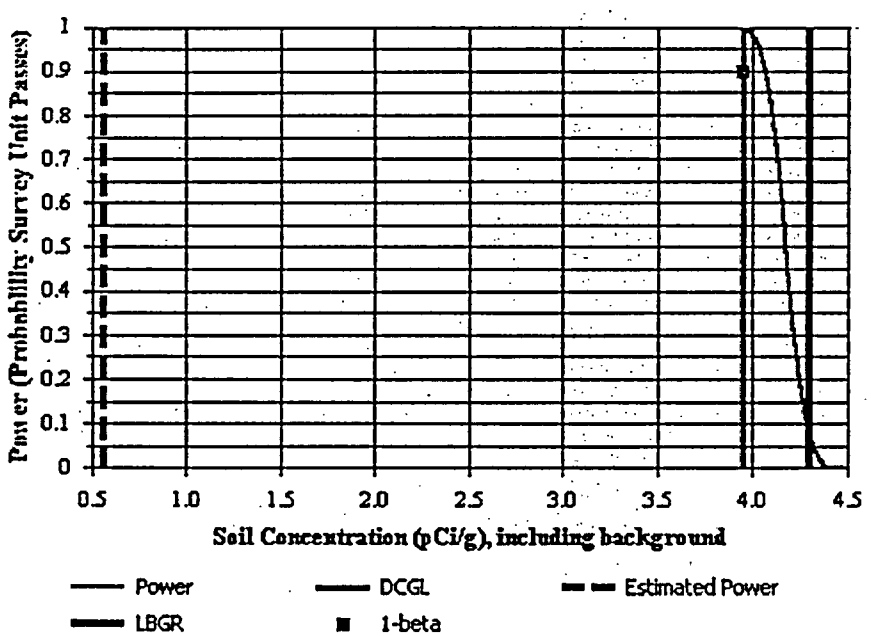
ATTACHMENT 6.5

Surface Soil Survey Plan

Survey Plan Summary

Site:	OL9-2 SURVEY UNIT		
Planner(s):	BHB		
Survey Unit Name:	OL9-2, SW Quadrant		
Comments:	Class 2 Area Entered as Class 1		
Area (m²):	7,500	Classification:	1
Selected Test:	Sign	Estimated Sigma (pCi/g):	0.29
DCGL (pCi/g):	4.30	Sample Size (N):	18
LBGR (pCi/g):	3.95	Estimated Conc. (pCi/g):	0.6
Alpha:	0.050	Estimated Power:	1
Beta:	0.100	EMC Sample Size (N):	18
Scanning Instrumentation:	2" by 2" NaI Detector (w)		

Prospective Power Curve



ATTACHMENT 6.6

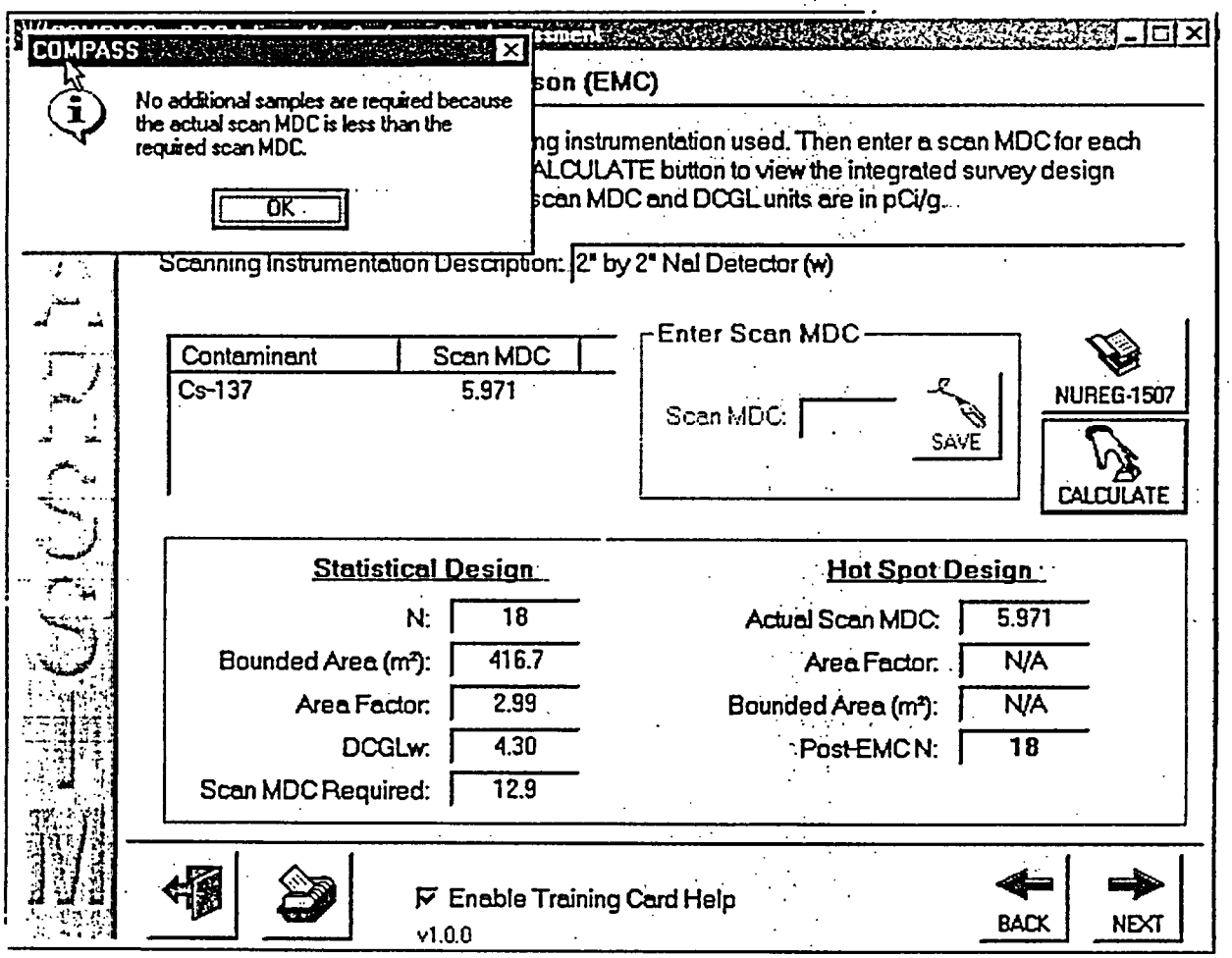
Surface Soil Survey Plan

Contaminant Summary

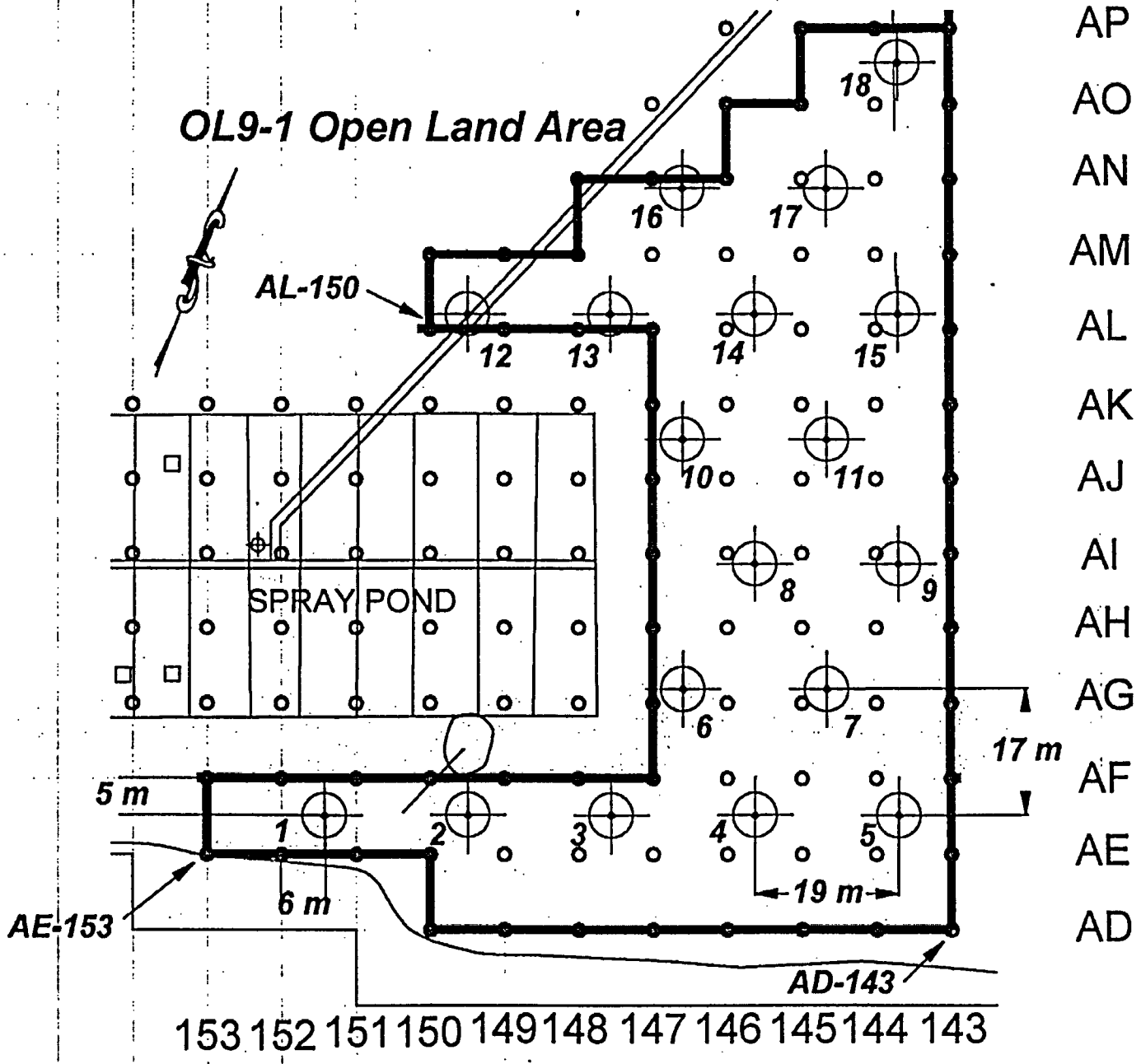
Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.30	N/A	N/A	N/A	5.971

Contaminant	Survey Unit Estimate (Mean ± 1-Sigma) (pCi/g)	Reference Area Estimate (Mean ± 1-Sigma) (pCi/g)
Cs-137	0.56 ± 0.29	0.28 ± 0.39

ATTACHMENT 6.7

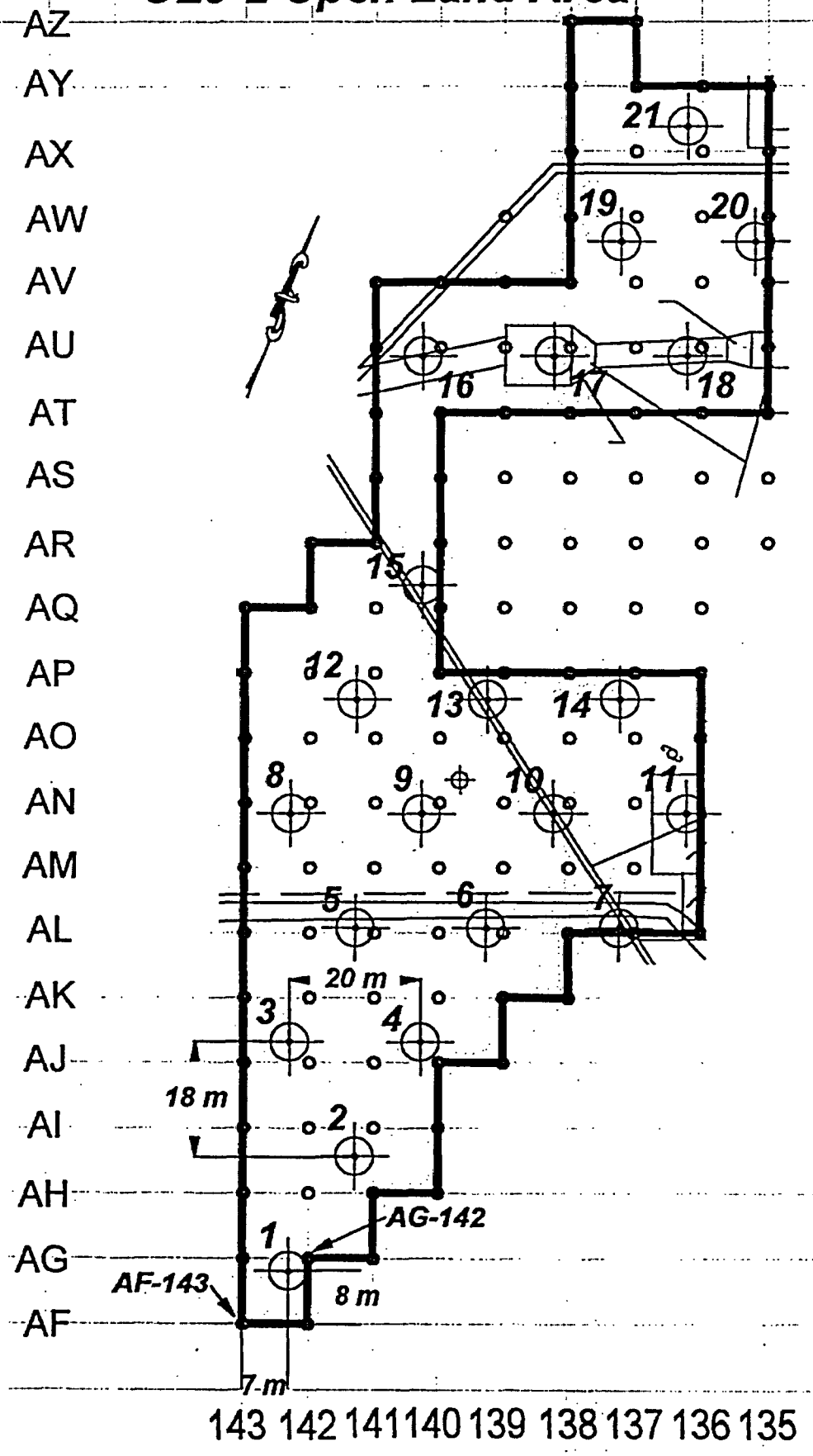


ATTACHMENT 6.8



Attachment 7 - 1 A

OL9-2 Open Land Area



Attachment 7 - 2 A

SR-132 Cs-137 Values		
Grid No.	pCi/g	SPx
AM-148	0.9	SP2
	0.35	SP1
AM-147	0.4	SP1
	0.8	SP2
AM-146	0.07	SP1
	< 0.13	SP2
AM-145	0.7	SP1
	0.4	SP2
AL-148	0.6	SP1
	0.5	SP2
AL-147	0.6	SP1
	0.8	SP2
	0.5	SP3
	0.6	SP4
	0.2	SP5
AL-143	1.1	SP1
	0.7	SP2
AI-146	< 0.14	SP1
	0.19	SP2
	0.4	SP3
	0.4	SP4
	1.1	SP5
AH-146	0.8	SP1
	0.9	SP2
	0.5	SP3
	0.3	SP4
	0.12	SP5
Mean=>	***0.56***	
Sigma=>	***0.29***	

ATTACHMENT 8 . 1

SR – 132 Sample Results

OL8	SP1 = 0.35 pCi/g SP2 = 0.90 pCi/g SP2QC = 0.80	SP1 = 0.40 pCi/g SP2 = 0.80 pCi/g SP1QC = 0.26	SP1 = 0.07 pCi/g SP2 = <0.13 pCi/g SP2QC = <0.10	SP1 = 0.70 pCi/g SP2 = 0.40 pCi/g		OL9			
AM-149	AM-148	AM-147	AM-146	AM-145	AM-144	AM-143	AM-142	AM-141	AM-140
	SP1 = 0.60 pCi/g SP2 = 0.60 pCi/g	SP1 = 0.60 pCi/g SP2 = 0.80 pCi/g SP3 = 0.60 pCi/g SP4 = 0.60 pCi/g SP5 = 0.20 pCi/g	SP1 = 0.60 pCi/g SP2 = 0.20 pCi/g	SP1 = 0.14 pCi/g SP2 = 0.80 pCi/g	SP1 = 0.23 pCi/g SP2 = 0.10 pCi/g	SP1 = 1.1 pCi/g SP2 = 0.70 pCi/g	SP1 = 0.52 pCi/g SP2 = 0.60 pCi/g		
AL-149	AL-148	AL-147	AL-146	AL-145	AL-144	AL-143	AL-142	AL-141	AL-140
SP1	SP1 = 0.55 pCi/g SP2 = 0.60 pCi/g	SP1 = 0.80 pCi/g SP2 = 0.60 pCi/g SP3 = 0.60 pCi/g SP4 = 0.20 pCi/g SP5 = 0.30 pCi/g	SP1 = 0.80 pCi/g SP2 = 0.26 pCi/g SP3 = 0.30 pCi/g SP4 = 0.60 pCi/g SP5 = 1.0 pCi/g	SP1 = 0.20 pCi/g SP2 = 0.30 pCi/g	SP1 = 0.30 pCi/g SP2 = 0.30 pCi/g	SP1 = <0.10 pCi/g SP2 = 0.10 pCi/g	SP1 = 0.30 pCi/g SP2 = 0.20 pCi/g		
AK-149	AK-148	AK-147	AK-146	AK-145	AK-144	AK-143	AK-142	AK-141	AK-140
	SP1 = 0.25 pCi/g SP2 = 0.38 pCi/g	SP1 = 0.33 pCi/g SP2 = 0.90 pCi/g SP3 = 0.32 pCi/g SP4 = 0.29 pCi/g SP5 = 0.34 pCi/g	SP1 = 0.90 pCi/g SP2 = 0.40 pCi/g SP3 = 0.45 pCi/g SP4 = 0.63 pCi/g SP5 = 1.0 pCi/g	SP1 = 0.63 pCi/g SP2 = 0.19 pCi/g					
AJ-149	AJ-148	AJ-147	AJ-146	AJ-145	AJ-144	AJ-143	AJ-142	AJ-141	AJ-140
	SP1 = 0.14 pCi/g SP2 = 0.40 pCi/g	SP1 = 0.30 pCi/g SP2 = 0.75 pCi/g	SP1 = <0.14 pCi/g SP2 = 0.19 pCi/g SP3 = 0.40 pCi/g SP4 = 0.40 pCi/g SP5 = 1.1 pCi/g	SP1 = 0.66 pCi/g SP2 = 0.41 pCi/g					OL8
AI-149	AI-148	AI-147	AI-146	AI-145	AI-144	AI-143	AI-142	AI-141	AI-140
	SP1 = 0.16 pCi/g SP2 = 0.17 pCi/g	SP1 = 0.20 pCi/g SP2 = 0.60 pCi/g SP1QC = 0.20	SP1 = 0.80 pCi/g SP2 = 0.90 pCi/g SP3 = 0.60 pCi/g SP4 = 0.30 pCi/g SP5 = 0.12 pCi/g	SP1 = 0.31 pCi/g SP2 = 0.25 pCi/g				SR-130	SR-130
AH-149	AH-148	AH-147	AH-146	AH-145	AH-144	AH-143	AH-142	AH-141	AH-140
	SP1 = 0.15 pCi/g SP2 = <0.10 pCi/g SP2QC = 0.20	SP1 = 0.40 pCi/g SP2 = <0.10 pCi/g	SP1 = <0.14 pCi/g SP2 = <0.05 pCi/g	SP1 = <0.10 pCi/g SP2 = <0.10 pCi/g				SR-130	SR-130
AG-149	AG-148	AG-147	AG-146	AG-145	AG-144	AG-143	AG-142	AG-141	AG-140

ATTACHMENT 8 - 2

ORIGINAL

Exhibit 1
Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	OL9			Survey Unit Location	First Energy/Penelec Property – Southwest Quadrant
Date	3/21/05	Time	0800	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: A rad material storage area is currently within the bounds of the survey unit. Notified acting RSO.

Response to Question 4: Numerous piles of building materials, wood, scaffold, fence poles are present in the survey unit. Notified L. Shamenek.

Response to Question 8/9: Two concrete pad areas are within the survey unit. (see enclosed photos). These surfaces are designated as survey units SS24 and GA1 and GA2. Notified the survey designer.

Response to Question 12: Slip/fall hazards are present in the survey unit. Personnel entering the area / performing the FSS will be briefed on the hazards present in the area. Notified L. Shamenek.

Survey Unit Inspector (print/sign)	D. Sarge / [signature]	Date	3/22/05
Survey Designer (print/sign)	B. Brosey / B. BROSEY	Date	3/22/05

ATTACHMENT 9.1