June 8, 2005
E910-05-018

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Gentlemen,

Subject Saxton Nuclear Experimental Corporation (SNEC)
Operating License No., DPR-4
Docket No. 50-146
FSS Report for Open Land Area OL9

The purpose of this letter is to submit for your review the attached FSS Report for Open Land Area OL9. One CD-ROM is included in this submission. The CD-ROM labeled: FSS Report for Open Land Area OL9 – Publicly Available" contains the following 7files:

Document Title	File Name	File Size (Mbytes)
Main Report	001 FSS Report – OL9.pdf	0.27
Appendix A Rev. 0 Cover sheet, Rev.1 (pages 1-9).	002 OL9 – Appendix A Rev. 0 Cover sheet, Rev.1 (1-9).pdf	41.9
Appendix A (attachments 1-1 to 2-6).	003 OL9 – Appendix A (attachments 1-1 to 2-6).pdf	38.1
Appendix A (attachments 2-7 to 2-10	004 OL9 – Appendix A (attachments 2-7 to 2-10).pdf	23.7
Appendix A (attachments 3-1 to 5-2)	005 OL9 – Appendix A (attachments 3-1 to 5-2).pdf	26.9
Appendix A (attachments 6-1 to 6-8)	006 OL9 – Appendix A (attachments 6-1 to 6-8),pdf	17.2
Appendix A (attachments 7-1A to 9-1), Appendix B to D	007 OL9 – Appendix A (attachments 7-1A to 9-1), Appendix B to Appendix D.pdf	42.0

If you have any questions on this information, please contact Mr. Art Paynter at (814) 635-4384.

Sincerely,

G. A. Kuehn
Program Director, SNEC

cc: NRC Project Manager
NRC Project Scientist, Region 1
Mr. Tim Bauer, ORISE Project Leader

A020

Final Status Survey Report

For

Saxton Nuclear Experimental Corporation
Open Land Area OL9

Prepared by GPU Nuclear, Inc.

May 2005

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Executive Summary

This report presents the results and conclusions of the final status survey (FSS) of the Class 2 open land areas around the Saxton Nuclear Experimental Corporation (SNEC) facility designated as OL9. This FSS includes surveys of open land areas to the southwest of the SNEC site and was conducted in April of 2005.

The FSS was performed in accordance with revision 4 of the SNEC License Termination Plan (LTP) (reference 9.3). The survey area (OL9) was divided into two survey units. Each unit consisted of relatively flat open land. Data was collected from each survey unit in accordance with the specific survey design data collection requirements. The following is a summary of the measurements performed:

1) Direct NaI(Tl) scans of all or part of seventy-four 100 square meter grids covering about 50% of the actual land area.

2) Thirty-six soil samples collected and then analyzed by laboratory gamma spectroscopy.

One grid along the border with a Class 1 area was identified to exceed the DCGLw as a result of the survey. This is documented in the corrective action program (reference 9.12).This grid and four adjacent grids were reclassified to Class 1 and included in the adjacent Class 1 area (OL3) for additional surveys.

The collected FSS survey data demonstrate that the 12800 square meters (after reassignment of 500 square meters in the 5 grids as discussed above to the adjacent Class 1 area) of the OL9 survey area meets the radiological release criteria for unrestricted use specified in 10CFR20.1402. Therefore GPU Nuclear, Inc. concludes that the area meets the NRC requirements and may be released for unrestricted use.

1.0 Purpose and Scope

This report presents the results and conclusions of the final status survey of the open land area designated OL9 to the southwest of the SNEC facility. It provides the information required by 10CFR50.82(a)(11) and the SNEC license termination plan (LTP) to demonstrate that this area meets the radiological criteria for unrestricted use specified in 10CFR20.1402.

This report describes the radiological data collected in two (2) Class 2 survey units of open land surface. This report only addresses the FSS performed on this specific land area designated as OL9 on reference 9.1. The format of this report follows the guidance contained in reference 9.2.

2.0 Survey Area Description

Survey Area OL9 is Class 2 impacted open land to the west of the Saxton Steam Generating Station footprint laying generally in a south-west direction to but not including the steam plant spray pond. The survey unit encompasses about 12800 square meters of open land. Because the area exceeds the size guidance in the SNEC LTP for Class 2 survey units (10000 square meters recommended maximum), the survey area has been divided into two survey units. Layout of the survey area and individual units relative to the site layout are shown in Attachment 5-1 of Appendix A. The two survey units are discussed below. They are both Class 2 impacted survey units. The OL9 designation is taken from the drawing, reference 9.1.

Survey unit OL9-1 is an open land area in the south west section of the site. It is generally west of the other OL9 survey unit (OL9-2) and in part surrounds, and is bounded on the west by, the area that used to contain the Saxton Steam Generating Station cooling spray pond. The survey unit is approximately 5800 square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit OL9-2 is an open land area in the south west section of the site. It is generally east of the other OL9 survey unit (OL9-1) and west of the Class 1 survey areas closer to the original SNEC site. The survey unit was initially about 7500 square meters. The final area applicable to this survey report is 7000 square meters. Appendix A contains drawings showing the layout of the survey unit.

3.0 Operating History

3.1 Plant Operation

The Saxton Nuclear Experimental Corporation (SNEC) facility included a pressurized water reactor (PWR), which was licensed to operate at 23.5 megawatts thermal (23.5 MWTh). The reactor, containment vessel and support buildings have all been removed. The facility is owned by the Saxton Nuclear Experimental Corporation and is licensed by GPU Nuclear, Inc. The SNEC facility is maintained under a Title 10 Part 50 license and associated Technical Specifications. In 1972, the license was amended to permit SNEC to possess but not to operate the SNEC reactor.

The facility was built from 1960 to 1962 and operated from 1962 to 1972 primarily as a research and training reactor. After permanent cessation of operation in 1972, the facility was placed in a condition equivalent to the current SAFSTOR status. Since then, it had been maintained in a monitored condition. The fuel was removed in 1972 and shipped to a (now DOE) facility at Savannah River, SC, who is now the owner of the fuel. As a result of this, neither SNEC nor GPU Nuclear, Inc. has any further responsibility for the spent fuel from the SNEC facility. The building and structures that supported reactor operation were partially decontaminated by 1974.

In the late 1980s and through the 1990s, additional decontamination and disassembly of the containment vessel and support buildings and final equipment and large component removal was completed. Final decontamination and dismantlement of the reactor support structures and buildings was completed in 1992. Large component structures, the pressurizer, steam generator, and reactor vessel were removed in late 1998. Containment vessel removal (to below grade) and backfill was completed in late 2003. Currently, decontamination, disassembly and demolition of the SNEC facility buildings and equipment has been completed and the facility is in the process of Final Status Survey for unrestricted release and license termination.

3.2 Survey Area Remediation Status

No remediation occurred in the OL9 area regarding the open land areas.

One grid in OL9-2 was found to have elevated activity during the FSS scan of the grid. Following investigation and additional sampling, as a consequence of this elevated measurement area, five grids were removed from OL9-2 and reassigned to the adjacent Class 1 area (OL3) for Class 1 survey.

4.0 Site Release Criteria

The site release criteria applied to the open land areas of OL9 correspond to the radiological dose criteria for unrestricted use per 10CFR20.1402. The dose criteria is met "if the residual radioactivity that is distinguishable from background

radiation results in a Total Effective Dose Equivalent (TEDE) to an average member of the critical group that does not exceed 25 mrem/yr, including that from groundwater sources of drinking water, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA)".

Levels of residual radioactivity that correspond to the allowable dose to meet the site or survey unit release criteria for open land were derived by analyses using a resident farmer family scenario. The dose modeling for this scenario is explained in the SNEC LTP (reference 9.3). The derived concentration guideline levels (DCGL) shown in Table 5-1 of the SNEC LTP form the basis for satisfying the site release criteria.

Residual radioactivity sample results for the soils were used to calculate a surrogate Cs137 DCGL. The adjusted surrogate DCGL was developed using the methodology described in the SNEC LTP section 5.2.3.2.3 based on nuclide specific DCGLs from Table 5-1 of the LTP.

An adjustment was made to the surrogate Cs137 DCGL to address the de-listed radionuclides as described in the LTP section 6.2.2.3. SNEC has instituted an administrative limit of 75% of the DCGL for all measurement results. The de-listed radionuclides are conservatively accounted for in this 25% reduction since the de-listed radionuclides were only 4.7% of the dose contribution. These adjustment factors are discussed in section 6 of the SNEC LTP.

5.0 Final Status Survey Design and DQO

The SNEC calculation providing the design of the survey for these survey units is provided in Appendix A. Since the survey units were both Class 2, scan measurements were conducted over approximately 50% of the surface of each survey unit. Scans were conducted using a narrow window optimized for Cs137 to reduce background.

The number of sample points was determined by using the COMPASS computer program (reference 9.6 and attachment 6 of appendix A). These points were located on survey maps using the Visual Sample Plan program (reference 9.7 and attachment 7 of appendix A). Samples are collected to a depth of 1 meter to match the site surface dose model used in the SNEC LTP (reference 9.3).

The survey design uses two surrogate Cs137 effective DCGLs developed from radionuclide mix analyses from soil samples collected before the Final Status Survey in the vicinity of the survey unit. For OL9-1 the mix was based on radionuclide mix data (including the hard-to-detects listed in Table 5-1 of the LTP) from the adjacent spray pond area, and for OL9-2 the mix was based on radionuclide mix data (including the hard-to-detects listed in Table 5-1 of the

LTP) from the adjacent original SNEC site area (OL1 and OL2) (see attachment 2 of appendix A).

Cs137, Am241, C14, Pu239, Co60, and Sr90 were positively detected in one or more of these samples and are accounted for in the adjusted surrogate DCGL. The following table (Table 1) presents the Data Quality Objectives (DQO) and other relevant information from the survey design package.

Table 1 – DQO/Design

DQO/Design Parameter	OL9-1	OL9-2
SNEC Design Calc. #	E900-05-020	E900-05-020
MARSSIM Classification	2	2
Survey Unit Area (m^2)	~5800	~7000*
Statistical Test	Sign	Sign
Type 1 decision error (α)	0.05	0.05
Type 2 decision error (β)	0.1	0.1
LBGR (pCi/gm)	2.4	3.95
Estimated σ (pCi/gm)	0.29	0.29
Relative Shift (Δ/σ)****	1.4	1.2
Number of static points	18**	21***
DCGLw (Cs137 pCi/gm)	3.76	5.73
75% Action Level(pCi/gm)	2.82	4.3
Scan MDC (pCi/gm)	5.97	5.97
SNEC Survey Request #	SR204	SR205
Scan Survey Instrument	L2350-1 w/ 44-10	L2350-1 w/ 44-10

* - after removal of five grids following investigation of elevated measurement
** - 18 provided by design, 15 required based on relative shift
*** - 21 provided by design, 18 required based on relative shift, 17 actually collected
**** - relative shift is based on the action level

The two survey designs had different DCGLs because of the use of different radionuclide mix data. The mix data used for each survey unit was derived from available data closest to the unit.

6.0 Final Status Survey Results

The following sections provide the survey summary results for each survey unit as required by the respective design. Summary data was taken from references 9.10 and 9.11 which are filed in the SNEC history files.

6.1 Survey Unit OL9-1

6.1.1 OL9-1 Scan survey

Scan measurements were made in 31 grids using a 2 inch by 2 inch NaI detector with an MDCscan of 5.97 pCi/gm (attachment 4 of appendix A). The adjusted surrogate Cs137 Action Level for this survey unit was 2.82 pCi/gm and the DCGLw was 3.76 pCi/gm (table 1 on page 2 of appendix A). Although this is a Class 2 survey unit and the EMC process does not specifically apply, the area factor can be used to compare the MDCscan to the DCGLw. In this case, although the MDCscan is above the DCGLw, the MDCscan was below the DCGL times the effective area factor. Therefore, no sample number adjustment was needed.

Of the 31 grids scanned (33 grids were planned in the design, 2 were deleted because they were actually in the river), portions were inaccessible for various reasons, particularly boggy / wet soil conditions. Of the 31 grids, a total of about 196 square meters was not scanned due to interferences. This results in approximately 2904 square meters actually scanned in the 5800 square meter survey unit, or about 50 percent.

The scans conducted in all 31 grids did not identify any activity in the soils greater than the MDCscan. The action level was >350 cpm (table 2 on page 2 of appendix A). No area greater than 350 cpm was found in OL9-1.

6.1.2 OL9-1 soil samples

Eighteen random start triangular grid systematic soil sample locations were defined for the survey unit, based on a conservative relative shift of about 1.4 and a judgmental increase of 3 samples to allow for potential interferences. Using the typical LBGR of 50% of the DCGL, only 11 samples would have been required, including the 20% adjustment. Given the variability used for the survey design (0.29 pCi/gm) and the Action Level (2.82 pCi/gm) the LBGR used was conservative. No biased samples were required.

One location (sample point 12) had samples collected at two depths due to the presence of building rubble overburden. Each sample consisted of a 0.5 meter layer. The top layer was crushed building debris, with soils in the second 0.5 meter layer. The result from the top layer (building debris) is used in the table below because its MDA value is higher than the positive result for the underlying soil layer sample and results in a conservative assumption for the survey unit mean.

None of the design fixed point soil samples in OL9-1 had results in excess of the action level or the adjusted surrogate DCGLw. The table below (Table 2) shows the Cs137 results (no other licensed isotopes were detected) for each sample, along with the mean, standard deviation and range of the soil sample data. Results that are less than MDA are assumed to be positive at the MDA value for the statistics in the table. This will overestimate the mean.

The standard deviation of the samples collected from the survey unit was less than the variability assumed in the survey design. Therefore, the assessment of variability, relative shift, and number of samples required is consistent between the survey design and the survey results. Based on this, no changes to the survey design or additional samples are required.

Table 2 - Soil sample results for OL9-1

Sample Number	Cs137 pCi/gm
1	0.12
2	0.30
3	0.10
4	<0.19
5	0.31
6	0.13
7	<0.19
8	<0.20
9	0.47
10	<0.07
11	<0.20
12*	<0.15
13	0.28
14	<0.16
15	<0.11
16	<0.18
17	<0.17
18	<0.06
Mean	.19
Std Dev	.10
Min	<0.06
Max	.47

* Point 12 value is the MDA for the top layer of two samples. The bottom layer result was positive at 0.09 pCi/gm

6.2 Survey Unit OL9-2

6.2.1 OL9-2 Scan survey

Scan measurements were made in 39 grids (of the initial OL9-2 area before reassignment of 5 grids) using a 2 inch by 2 inch NaI detector with an MDCscan of 5.97 pCi/gm (attachment 4 of appendix A). The Action Level for this survey unit was 4.3 pCi/gm and the DCGLw was 5.73 pCi/gm (table 1, page 2 of appendix A). Although this is a Class 2 survey unit and the EMC process does not specifically apply, the area factor can be used to compare the MDCscan to the DCGLw. In this case, the MDCscan was below the DCGL times the effective area factor. Therefore, no sample number adjustment was needed.

Of the 39 grids scanned, portions were inaccessible for various reasons, particularly because of the presence of a large pile of previously surveyed soil / building debris. Of the 39 grids, a total of about 400 square meters was not scanned due to interferences (primarily from piles of previously surveyed soil and building debris). This results in approximately 3500 square meters actually scanned in the 7500 square meter survey unit, or about 47 percent.

The scans conducted in all 39 grids EXCEPT FOR GRID AT138 did not identify any activity in the soils greater than the MDCscan. The action level was >350 cpm (table 2, page 2 of appendix A). In grid AT138, two alarm points (APs) about 2 feet apart were found using the scanning process. Subsequently, this area was delineated to an area of about 12 square meters, with the majority of the elevated measurement activity in two much smaller spots. One AP (AP-1) was 497 cpm and the other (AP-2) was 844 cpm. Investigation sampling was conducted on this elevated area. The sample collected at AP-1 was 4.7 pCi/gm Cs137, and the AP-2 sample was 14.3 pCi/gm Cs137, both of which exceed the Cs137 Action Level of 4.3 pCi/gm and the AP-2 sample exceeds the DCGLw for that survey unit.

Because areas greater than the DCGLw are not expected in Class 2 areas, grid AT138, along with four other grids (two east and two west of AT138) along the same Class 1 (OL3) border were removed from OL9-2 and reassigned to the Class 1 survey area OL3. This removes the AP from OL9-2, leaving no remaining elevated areas or APs in the Class 2 survey unit. This also retains a Class 2 border in OL9-2 between the Class 1 OL3 area and the Class 3 OL8 area. No area greater than the 350 cpm action level was found in any of the other grids in OL9-2.

Because of the reassignment of the five grids to OL3, four additional grids were scanned adjacent to the five reassigned grids as part of the investigation. The reassigned grids and additional scan grids are shown on the map in appendix D and can be compared to the original layout shown on attachments 5-1 and 7-2 in appendix A.

While identifying elevated activity in the Class 2 area was unexpected and required reclassification of a portion of OL9-2 to Class 1, the detection of the two alarm points is a positive indication of the effectiveness of the scanning process.

Because 5 scanned grids were reassigned to OL3, and 4 additional grids were scanned after the area changes to OL9-2, this resulted in 38 grids scanned in the final OL9-2 configuration. Of these, 400 square meters were not scanned due to interferences as noted above. This results in approximately 3400 square meters actually scanned in the 7000 square meter survey unit, or about 49 percent.

6.2.2 OL9-2 soil samples

Twenty-one random start triangular grid systematic soil sample locations were defined for the survey unit, based on a conservative relative shift of about 1.2 and a judgmental increase of 3 samples to allow for potential interferences. Using the typical LBGR of 50% of the DCGL, only 11 samples would have been required, including the 20% adjustment. Given the variability used for the survey design (0.29 pCi/gm) and the Action Level (4.3 pCi/gm) the LBGR used was conservative. No biased samples were required.

Sample point 11 was relocated 3.5 meters west to avoid interference with a concrete pad. This was approved by the survey design engineer.

Soil samples from 2 locations (points 8 and 20) were not collected due to interference from piles of previously surveyed dirt and building debris. Two additional sample points (17 and 18) were in the grids subsequently reassigned to OL3 due to the elevated measurement found in grid AT138. This leaves a total of 17 samples actually collected in the currently defined OL9-2. Sample points 17 and 18 and their location within the reassigned grids can be seen on the map in appendix D.

None of the design fixed point soil samples assigned to OL9-2 had results in excess of the Action Level or the adjusted surrogate DCGLw. The table below (Table 3) shows the Cs137 results (no other licensed isotopes were detected) for each sample, along with the mean, standard deviation and range of the soil sample data. Results that are less than MDA are assumed to be positive at the MDA value for the statistics in the table. This will overestimate the mean.

The standard deviation of the samples collected from the survey unit was less than the variability assumed in the survey design. Therefore, the assessment of variability, relative shift , and number of samples required is consistent between the survey design and the survey results. Based on this, no changes to the survey design or additional samples are required.

Table 3 - Soil sample results for OL9-2*

Sample Number	Cs137 pCi/gm
1	<0.20
2	0.20
3	<0.17
4	0.17
5	<0.15
6	<0.17
7	<0.12
9	0.20
10	0.16
11	0.51
12	<0.09
13	0.21
14	<0.09
15	0.20
16	0.11
19	<0.15
21	<0.14
Mean	0.18
Std Dev	0.09
Min	<0.09
Max	0.51

* sample results from grids reassigned to OL3 or not collected due to interferences are not included

6.2.3 OL9-2 Elevated measurement investigation

During scan measurements in OL9-2 grid AT138, two alarm points (in excess of the action level of 350 cpm) were identified. These two points were about 2 feet apart and were 497 cpm and 844 cpm. An area of about 12 square meters was defined around the two alarm points to the edge where the count rate was back down to normal background. This 12 square meters, therefore is not all at the elevated activity of the alarm points (APs) but represents the area and distance needed for the count rate to be unaffected by the elevated spots.

In order to assess the residual radioactivity in the elevated measurement areas, a sample was collected exactly at each AP location. In addition, in order to demonstrate that the elevated area was adequately bounded by the 12 square

meter area, three samples were collected at the edge of the area boundary. The table below (Table 4) shows the Cs137 results (no other licensed isotopes were detected) of these samples.

Table 4 - OL9-2 elevated area investigation sampling

Sample location	Activity (pCi/gm)
AP1	4.7
AP2	14.3
Edge 1	0.10
Edge 2	0.17
Edge 3	0.18

The edge samples show that the elevated area is delineated by the defined boundary. The edge sample results are also consistent with the survey unit mean. Both of the samples from the APs exceed the Action Level of 4.3 pCi/gm and the AP-2 sample exceeds the surrogate adjusted Cs137 DCGLw of 5.73 pCi/gm. Since the SNEC LTP (reference 9.3) and MARSSIM (reference 9.4) do not allow activity in excess of the DCGL in a Class 2 area, this grid is reassigned to the adjacent OL3 Class 1 area. In order to be conservative and assure that the elevated area is bounded and transferred completely to the class 1 unit, four additional grids along the same Class 1 boundary were also reassigned to the Class 1 OL3 survey area. Since these five grids were selected to be scanned in the initial OL9-2 survey design in order to have 100% scanning along the Class 1 boundary, four additional grids adjacent to the reassigned grids were also scanned as part of the Class 2 OL9-2. These follow-up scans in the additional grids showed no elevated areas. The reassigned grids and additional scan grids are shown on the map in Appendix D and can be compared to the original layout shown on attachments 5-1 and 7-2 in appendix A.

Scans and samples collected for investigation of the alarm points in grid AT138 are not included in the discussion of survey unit results. Since no elevated areas were identified in the four additional grids scanned following the reassignment of the five boundary grids to OL3, the additional scan grids do not affect the design or survey unit conclusion. Samples collected from the elevated area would be included in an Elevated Measurements Comparison Test in a Class 1 area. However, since OL9-2 is Class 2 and this grid is removed from OL9-2 and reassigned to an adjacent Class 1 area, no discussion of EMC tests is needed for this survey unit in its final configuration. The results from grid AT138 will be addressed when that portion of OL3 is reported.

Since the reassigned grids contained two of the design sample points for OL9-2, these samples (numbers 17 and 18) are not used in the assessment of OL9-2,

since the points are no longer in OL9-2. For information, however, sample points 17 and 18 were well below the DCGLw (0.10 and <0.16 pCi/gm Cs137 respectively) and consistent with the remainder of the survey unit.

7.0 Data Assessment

7.1 Assessment Criteria

The final status survey data has been reviewed to verify authenticity, appropriate documentation, quality, and technical acceptability. The review criteria for data acceptability are:

1) The instruments used to collect the data were capable of detecting the radiation of the radionuclide of interest at or below the investigation levels.

2) The calibration of the instruments used to collect the data was current and radioactive sources used for calibration were traceable to recognized standards or calibration organizations.

3) Instrument response was checked before and, when required, after instrument use each day data was collected.

4) Survey team personnel were properly trained in the applicable survey techniques and training was documented.

5) The MDCs and the assumptions used to develop them were appropriate for the instruments and the survey methods used to collect the data.

6) The survey methods used to collect the data were appropriate for the media and types of radiation being measured.

7) Special instrument methods used to collect data were applied as warranted by survey conditions, and were documented in accordance with an approved site Survey Request procedure.

8) The custody of samples that were sent for off-site analysis were tracked from the point of collection until final results were provided.

9) The final status survey data consists of qualified measurement results representative of current facility status and were collected in accordance with the applicable survey design package.

If a discrepancy existed where one or more criteria were not met, the discrepancy was reviewed and corrective action taken (as appropriate) in accordance with site procedures.

The statistical test does not need to be performed for this final status survey since the data clearly show that the survey unit meets the release criteria because all measurements in the survey units are less than or equal to the DCGLw.

7.2 Summary of Overall Results

OL9-1 had no alarm points during scan surveys of 50% of the surface. Scan MDCs were adequate. Eighteen soil samples were all less than the DCGLw. Scan fraction, scan MDC, and number of soil samples meets LTP and MARSSIM requirements.

OL9-2 had two alarm points close together in one grid. This grid was removed from OL9-2 and is now not a part of the land area released by the OL9-2 survey.

The revised OL9-2 survey unit area had no alarm points during scan surveys of 49% of the surface. Scan MDCs were adequate. Seventeen soil samples were all less than the DCGLw. Scan fraction, scan MDC, and number of soil samples meets LTP and MARSSIM requirements.

Although SNEC does not account for (subtract) background Cs137 in soils for final status reporting and assessment purposes, the actual mean residual activity in the survey area, based on the sample results shown in Tables 2 and 3, is less than the mean of the background Cs137 in soils from section 2 of the SNEC LTP.

7.3 Survey Variations (design, Survey Request, LTP)

7.3.1 Approximately 196 square meters total of the grids scanned for OL9-1 were inaccessible. The remaining scanned portion constituted 50 percent of the survey unit area, well within coverage requirements for Class 2 survey units.

7.3.2 Approximately 400 square meters total of the grids scanned for OL9-2 were inaccessible. The remaining scanned portion constituted 49 percent of the survey unit area, well within coverage requirements for Class 2 survey units.

7.3.3 Sample point 11 of OL9-2 was relocated 3.5 meters west to avoid interference with a concrete pad. This was approved by the survey design engineer.

7.3.4 An elevated measurement area was found by scanning in grid AT138 in OL9-2. Subsequent investigation showed the area to contain activity in excess of the DCGLw. This grid and 4 adjacent grids were reassigned to the adjacent OL3 area for future Class 1 survey.

7.3.5 Soil samples from 2 locations (8 and 20) of OL9-2 were not collected due to interference from piles of previously surveyed dirt and building debris.

7.3.6 Two sample points (17 and 18) in OL9-2 were in the grids subsequently reassigned to OL3 due to the elevated measurement found in grid AT138. These points were sampled and results were well below the DCGLw. However, because the grids containing these two units are reassigned to the Class 1 unit OL3, these sample points are not in the remaining OL9-2 area. This leaves a total of 17 samples actually collected in the currently defined OL9-2.

7.4 QC comparisons

7.4.1 Scan surveys

Numerous grids were partially rescanned as QC duplicates. The QC rescans did not identify any activity above alarm points and so are in agreement with the primary scans. QC scan coverage area of 90 m^2 in OL9-1 and 110 m^2 in OL9-2 exceeds the 5% minimum requirement.

7.4.2 Soil Samples

Two samples from OL9-1 and one samples from OL9-2 received QC split gamma spectroscopy analyses on the soil samples. These duplicates had good agreement as shown in the table below (Table 5). Three QC splits out of 36 samples (not including samples from the five reassigned grids but including the double sample at point 12 in OL9-1) far exceeds the 5% minimum criterion.

Table 5 - OL9 QC Split comparison

Sample Point	Sample Result (pCi/gm)	QC Result (pCi/gm)
OL9-1 03	0.10	0.07
OL9-1 13	0.28	0.50
OL9-2 04	0.17	0.17

8.0 Final Survey Conclusions

The Open Land Areas OL9-1 and OL9-2 final status survey was performed in accordance with the SNEC LTP (reference 9.3), site procedures, design calculations, and Survey Request requirements. FSS data was collected to meet and/or exceed the quantity specified or required for each survey unit design. The survey data for each survey unit meets the following conditions:

1) The average residual radioactivity in the soils is less than the derived surrogate DCGLw in both survey units as modified per item 3 below.

2) All measurements were less than the DCGLw in both of the survey units as modified per item 3 below.

3) The grid associated with the elevated measurement in OL9-2 was reassigned to a adjacent Class 1 area for further survey and assessment. Because of this, there were no APs in the presently defined OL9-2 survey unit. Therefore, no assessment of the AP for OL9-2 is needed.

These conditions satisfy the release criteria established in the SNEC LTP and the radiological criteria for unrestricted use given in 10CFR20.1402. Therefore it is concluded that the SNEC Open Land Area designated OL9 is suitable for unrestricted release.

9.0 References

9.1 SNEC Facility Site area grid map Drawing number SNECRM-020
9.2 SNEC procedure E900-ADM-4500.60 "Final Status Survey Report"
9.3 SNEC License Termination Plan, Revision 4
9.4 NUREG 1575 "Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM), revision 1 August 2000
9.5 SNEC Calculation E900-05-020 "OL9 Open Land Area – Survey Design"
9.6 COMPASS computer program, Version 1.0.0, Oak Ridge Institute for Science and Education
9.7 VISUAL SAMPLE PLAN computer program, Version 3.0, Battelle Memorial Institute
9.8 SNEC procedure E900-IMP-4500.59, "Final Site Survey Planning and DQA"
9.9 SNEC procedure E900-IMP-4520.04, "Survey Methodology to Support SNEC License Termination"
9.10 SNEC Survey Request (SR) # SR204 for FSS of OL9-1
9.11 SNEC Survey Request (SR) # SR205 for FSS of OL9-2
9.12 SNEC Corrective Action Program CAP 2005-008 "Portion of OL9-2 Misclassified"

10.0 Appendices

Appendix A - SNEC Calculation E900-05-020 "OL9 Open Land Area – Survey Design" Revision 1 (9 pages plus numerous attachments)
Appendix B - COMPASS DQA report for OL9-1 (2 pages)
Appendix C - COMPASS DQA report for OL9-2 (2 pages)
Appendix D – Map of OL9-2 reassigned and additional scan grids

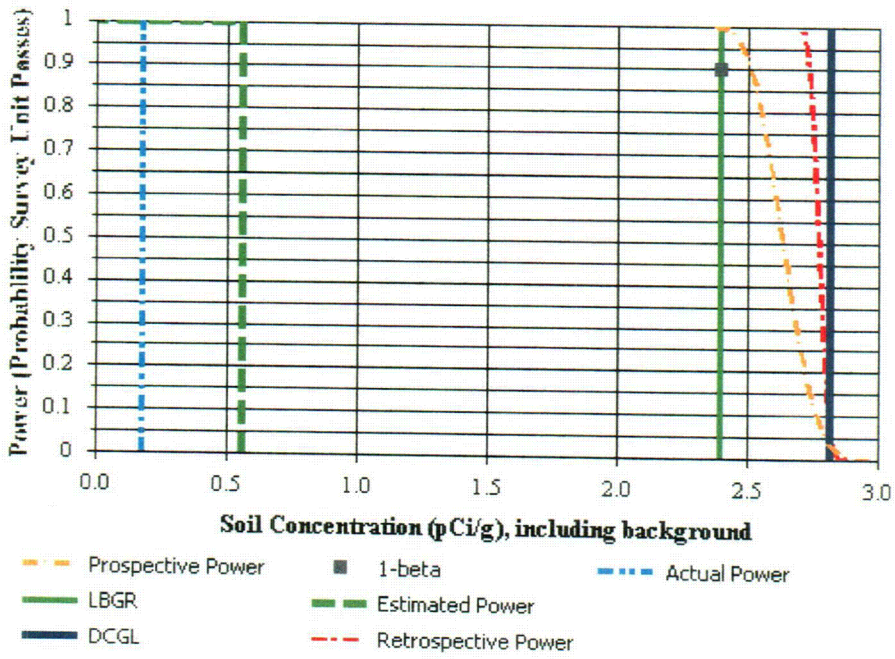
Appendix B, C, D

DQA Surface Soil Report

Assessment Summary

Site:	OL9-1		
Planner(s):	W J Cooper		
Survey Unit Name:	OL9-1 SW quadrant		
Report Number:	2		
Survey Unit Samples:	18		
Reference Area Samples:	0		
Test Performed:	Sign	Test Result:	Not Performed
Judgmental Samples:	0	EMC Result:	Not Performed
Assessment Conclusion:	***Reject Null Hypothesis (Survey Unit PASSES)***		

Retrospective Power Curve



Appendix B – OL9

c01

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)
1	S	0.12
2	S	0.3
3	S	0.1
4	S	0.19
5	S	0.31
6	S	0.13
7	S	0.19
8	S	0.2
9	S	0.47
10	S	0.07
11	S	0.2
12	S	0.15
13	S	0.28
14	S	0.16
15	S	0.11
16	S	0.18
17	S	0.17
18	S	0.06

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	18	N/A	N=15
Mean (pCi/g)	0.19	N/A	0.56
Median (pCi/g)	0.18	N/A	N/A
Std Dev (pCi/g)	0.10	N/A	0.29
High Value (pCi/g)	0.47	N/A	N/A
Low Value (pCi/g)	0.06	N/A	N/A

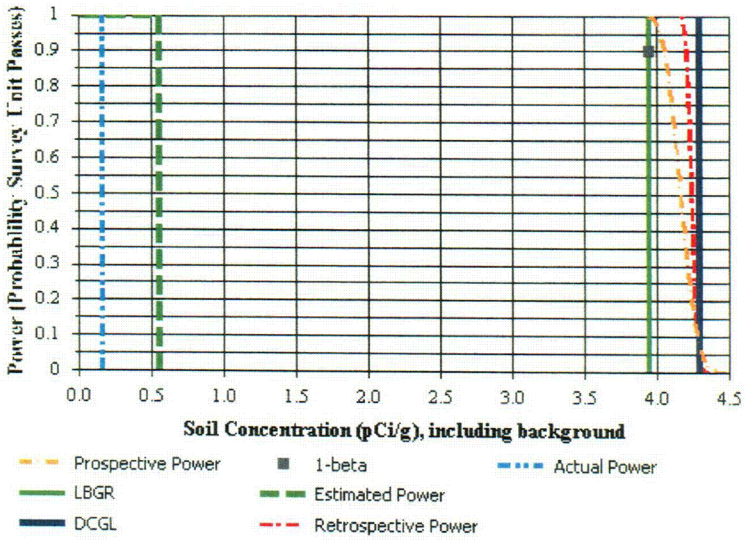
Appendix B – OL9

DQA Surface Soil Report

Assessment Summary

Site:	OL9-2		
Planner(s):	W J Cooper		
Survey Unit Name:	OL9-2		
Report Number:	2		
Survey Unit Samples:	17		
Reference Area Samples:	0		
Test Performed:	Sign	Test Result:	Not Performed
Judgmental Samples:	0	EMC Result:	Not Performed
Assessment Conclusion:	***Reject Null Hypothesis (Survey Unit PASSES)***		

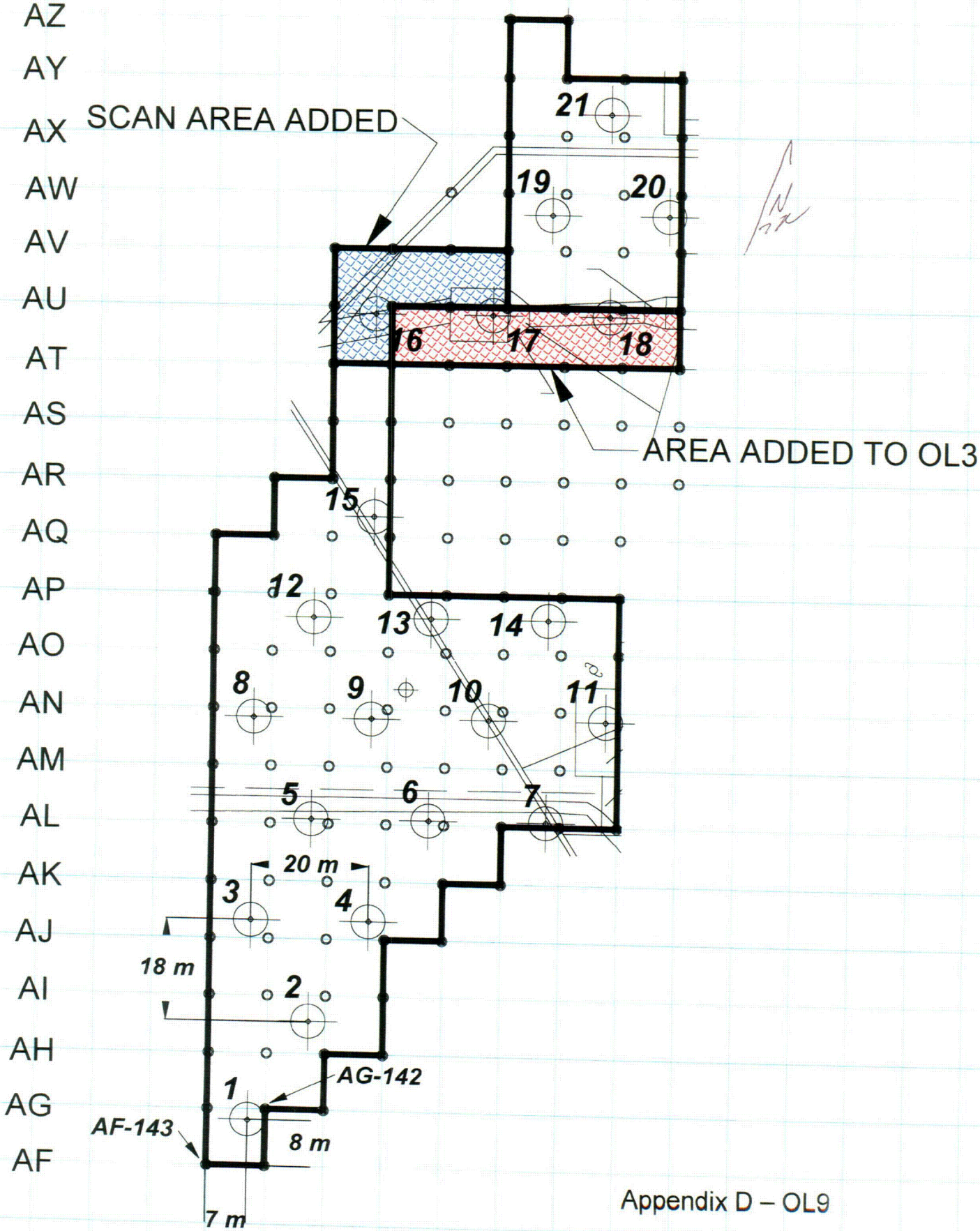
Retrospective Power Curve



Appendix C – OL9

Std Dev (pCi/g)	0.09	N/A	0.29
High Value (pCi/g)	0.51	N/A	N/A
Low Value (pCi/g)	0.09	N/A	N/A

OL9-2 Open Land Area



Appendix D – OL9