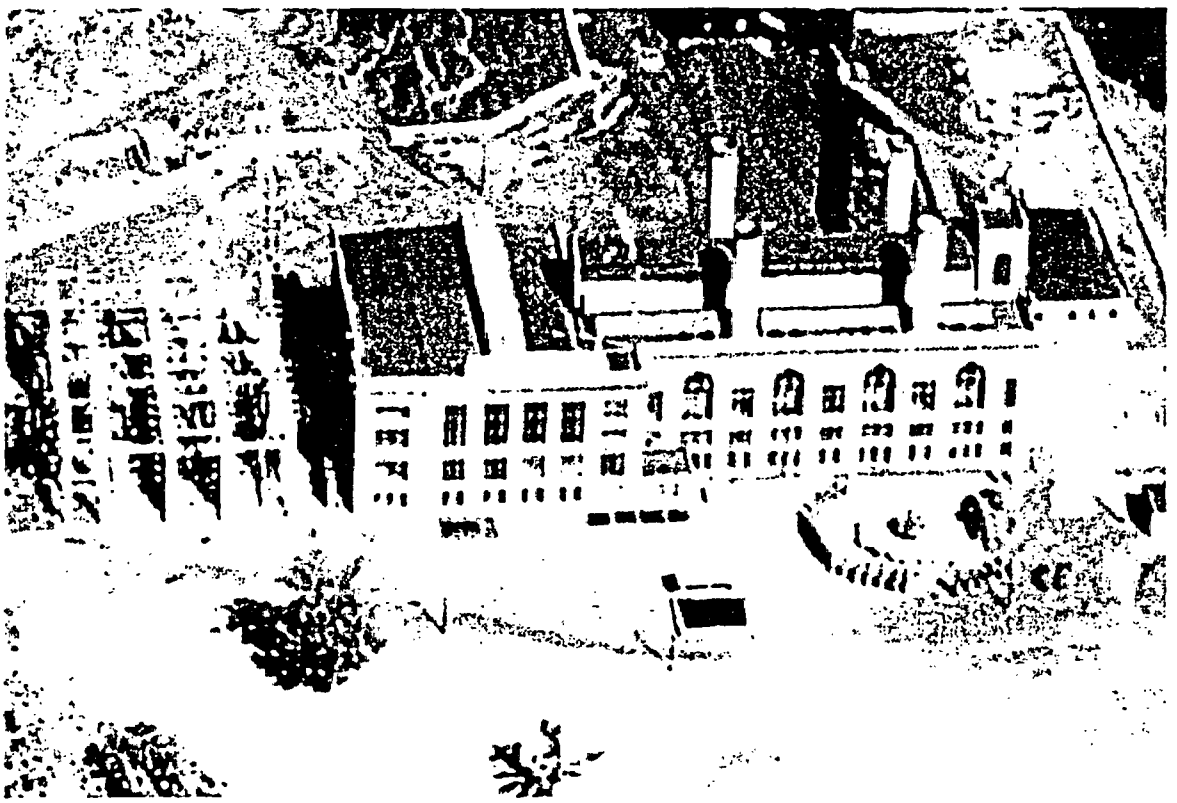
Final Status Survey Report

For

Saxton Nuclear Experimental Corporation
Saxton Steam Generating Station
Structural Surfaces –Basement
SS14, SS15, SS16, SS17



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Executive Summary

This report presents the results and conclusions of the final status survey (FSS) of the Class 1, 2, and 3 structural surfaces of the Saxton Nuclear Experimental Corporation (SNEC) facility designated as SS14-1 through SS14-6, SS15, SS16, and SS17. This FSS includes surveys of residual structural surfaces (e.g. concrete and steel) in the Basement of the Saxton Steam Generating Station of the SNEC site and was conducted in the fall of 2003.

The FSS was performed in accordance with the SNEC License Termination Plan (LTP). The Basement survey area was divided into nine survey units. Each unit consisted of relatively flat residual structural surfaces. 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) Automated position sensitive large area detector surface contamination monitor (SCM) scans of about 46% of the surface area.
2) Direct Gas Flow Proportional Counter (GFPC) and NaI detector scans of portions of six survey units covering about 18% of the actual surface area.
3) One hundred and eighteen fixed point static GFPC measurements.
4) One hundred and eighteen smears samples
5) Sixty six fixed point NaI measurements
6) Seventeen concrete core samples

The SCM surveys were conducted by a contractor utilizing a large area position sensitive gas flow proportional counter. Portions of the survey units could not be surveyed with this equipment because of the large size of this detector and surface irregularity. Subsequent hand-help GFPC and NaI scans were conducted of areas not SCM scanned.

The collected FSS survey data demonstrate that the 1094 square meters of the SSGS Basement 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 residual structural surfaces in the SSGS Basement (nine survey units designated SS14-1, SS14-2, SS14-3, SS14-4, SS14-5, SS14-6, SS15, S16, and SS17) and west 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 nine survey units consisting of seven Class1, one Class 2, and one Class 3 survey units of residual structural surface in the SSGS Basement. This report only addresses the FSS performed on this specific area. The format of this report follows the guidance contained in reference 9.2.

2.0 Survey Area Description

The SSGS Basement is Class 1, 2, or 3 impacted structural surface located underground to the west of the SNEC facility. The survey unit encompasses about 1094 square meters of concrete and steel. Because the area exceeds the size guidance in the SNEC LTP for Class 1 survey units (up to 100 square meters recommended), and the classification varies spatially in the area, the survey area has been divided into nine survey units. Layout of the survey area and individual units are shown in Attachment 1-1 of Appendix A and Attachment 1 of Appendix B. The nine survey units are discussed below. The individual survey unit designations are from table 5-2 of the SNEC LTP (reference 9.3).

Survey unit SS14-1 is a Class 1 residual concrete surface in the SSGS Basement. It consists of a portion of the floor area in the east end of the basement but does not include trenches and sumps. The survey unit is approximately 65 square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit SS14-2 is a Class 1 residual concrete surface in the SSGS Basement. It consists of a portion of the floor area in the east central part of the basement but does not include trenches and sumps. The survey unit is approximately 58 square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit SS14-3 is a Class 1 residual concrete surface in the SSGS Basement. It consists of a portion of the floor area in the center of the basement but does not include trenches and sumps. The survey unit is approximately 83

square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit SS14-4 is a Class 1 residual concrete surface in the SSGS Basement. It consists of a portion of the floor area in the west central part end of the basement but does not include trenches and sumps. The survey unit is approximately 61 square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit SS14-5 is a Class 1 residual concrete surface in the SSGS Basement. It consists of a portion of the floor area in the west end of the basement but does not include trenches and sumps. The survey unit is approximately 53 square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit SS14-6 is a Class 1 residual concrete surface in the SSGS Basement. It consists of trenches and sumps of the floor area throughout the basement. The survey unit is approximately 84 square meters. Appendix B contains drawings showing the layout of the survey unit.

Survey unit SS15 is a Class 1 residual concrete surface in the SSGS Basement. It consists of the wall in the east end of the basement. The survey unit is approximately 100 square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit SS16 is a Class 2 residual concrete surface in the SSGS Basement. It consists of the walls up to 2 meters from the floor in the basement, except for the east end which is SS15. The survey unit is approximately 240 square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit SS17 is a Class 3 residual concrete surface in the SSGS Basement. It consists of the walls above 2 meters from the floor in the basement, except for the east end which is SS15. The survey unit is approximately 350 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 possess but not 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. Steam from the SNEC reactor was directed to the adjacent Saxton Steam Generating Station (SSGS) to generate electricity. Other shared systems also introduced SNEC activity into the SSGS and the main SNEC discharge entered the SSGS discharge tunnel. After shutdown in 1972, the SNEC facility was placed in a condition equivalent to the current SAFSTOR status. Since then, it has 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. The SSGS was dismantled circa 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, 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

The Basement was contaminated as a result of shared water systems which introduced contamination into the SSGS. Remediation included gross decontamination, removal of piping, and removal of concrete surfaces using various methods including scabbling, torch cutting, grinding, scraping, and water flushing.

4.0 Site Release Criteria

The site release criteria applied to the structural surface areas of the SSGS Basement 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 structural surfaces were derived by analyses using a building re-use 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 surfaces 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 Appendices A, B, C, and D. Scan measurements were conducted over approximately 100% of the surface of each of the seven Class 1 survey units. Scan coverage of the Class 2 survey unit was approximately 56%. Scans of the Class 3 survey unit covered approximately 15% of the survey unit Scans were conducted using an automated position sensitive large area gas flow proportional counter ("Surface Contamination Monitor" - SCM) with follow-up scans in the Class 1 survey units using a hand-held Gas Flow Proportional Counter (GFPC) and / or NaI detector.

The number of fixed measurement points was determined by using the COMPASS computer program (reference 9.5, attachment 4 of appendix A). These points were located on survey maps using the Visual Sample Plan program (reference 9.6, attachment 3 of appendix A). Measurements were collected with the GFPC using a long fixed count at each point.

No fixed point measurements were performed in several of the survey units. Because of the manner in which the SCM measures continuously and collects position information as well, SCM scanning is equivalent to continuous, full coverage static measurements. Section 5.4.3 of the SNEC LTP provides for use of such positionally sensitive scanning in lieu of fixed point measurements when the scanning system has a detection limit a small fraction of the DCGL (e.g. 10%). MARSSIM section 6.7.1 requires that fixed point measurements be capable of detecting the DCGL. In addition, section 6.4.1 of MARSSIM briefly discusses the potential use of modern, positionally referenced survey

instrumentation. The maximum MDC observed for a 100cm^2 area in the SCM scanning was less than 50% of the DCGL. Although the LTP recommends lower detection limits for use of the SCM as fixed point measurements, the use of the SCM results for direct measurements is acceptable because the detection limits meets the MARSSIM requirements. Therefore, no static measurements are required.

The survey design uses surrogate Cs137/gross beta effective DCGLs developed from radionuclide mix analyses from samples collected before the Final Status Survey in the vicinity of the survey unit. The mix for the basement / footprint areas was based on radionuclide mix data (including the hard-to-detects listed in Table 5-1 of the LTP) from the Basement itself (appendix F). Cs137, Co-60, Am241, and Pu239 were positively detected in one or more of these samples and are accounted for in the adjusted surrogate DCGL.

The mix for the trenches and sumps was based on radionuclide mix data (including the hard-to-detects listed in Table 5-1 of the LTP) from sumps and drains (attachment 5 of appendix G). Cs137, Co-60, C-14, Am241, Ni-63, Pu-238, Pu239, and Sr-90 were positively detected in one or more of these samples and are accounted for in the adjusted surrogate DCGL.

The following table (Table 5.0-1) presents the Data Quality Objectives (DQO) and other relevant information from the survey design package.

Table 5.0-1 – DQO/Design

DQO/Design Parameter	SS14-1 through SS14-5 and SS15	SS14-1 through SS14-6 and SS15	SS14-6	SS16	SS17
SNEC Design Calc. #	E900-03-027, E900-03-029	E900-03-019	E900-03-025	E900-03-019	E900-03-019
MARSSIM Classification	1	1	1	2	3
Survey Unit Area (m^2)	65,58,83,61,53,100	65,58,83,61,53,84,100	84	240	350
Statistical Test	WRS	N/A	WRS	N/A	N/A
Type 1 decision error (α)	0.05	N/A	0.05	N/A	N/A
Type 2 decision error (β)	0.1	N/A	0.1	N/A	N/A
LBGR (cpm)	800	N/A	800	N/A	N/A
Estimated σ (dpm/100cm^2)	65.2	N/A	65.2	N/A	N/A
Relative Shift (Δ/σ)	2.8	N/A	2.8	N/A	N/A
Number of static points	66	N/A	52	N/A	N/A
DCGLw* (Cs137 dpm/100cm^2)	13571	13571	5940	13571	13571
75%Admin Limit* (Cs137 dpm/100cm^2)	10178	10178	4455	10178	10178
DCGLw *(Cs137 cpm)	770 net	N/A	335	N/A	N/A
75% Admin Limit* (cpm)	500** net	N/A	200**	N/A	N/A
DCGLw *(Cs137 pCi/g)	6.56	N/A	N/A	N/A	N/A
75% Admin Limit* (pCi/gm)	4.92	N/A	N/A	N/A	N/A
Scan MDC (dpm/100cm^2)	2175 concrete 1671 steel	6547	2175 concrete 1671 steel	6547	6547
SNEC Survey Request #	SR97, SR100, SR102, SR114	SR84	SR95	SR84	SR84
Scan Survey Instrument	L2350-1 w/43-68B or 44-10	SCM***	L2350-1 w/43-68B or 44-10	SCM***	SCM***

* this table presents DCGL and action level values as revised in sources listed in section 5.0
** GFPC action level. The NaI action level is 300 gross cpm
*** because the SCM performs continuous scans with positional information that are equivalent to full coverage fixed point surveys, some MARSSIM design parameters are not applicable (e.g. LBGR, number of static points, etc.). The SCM produces results directly in dpm/100cm^2 so cpm based factors are not used.

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 9.9, 9.10, 9.11, 9.12, 9.13, and 9.15 which are filed in the SNEC history files.

6.1 Survey Unit SS14-1

6.1.1 Scan survey

Scan measurements were made in SS14-1 using a hand-held GFPC detector with an MDCscan of 2175 dpm/100cm^2 (section 4.22 on page 9 of appendix A) The scan action level was 500 net cpm (section 2.1.7 on page 3 of appendix A).The adjusted surrogate Cs137 beta DCGLw for this survey unit was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix F). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Scan measurements were made in SS14-1 using the automated SCM system with a design MDCscan of 6547 dpm/100cm^2 (section 2.1.10 on page 3 of appendix C). The adjusted surrogate Cs137 beta DCGLw for this survey unit for the SCM scans was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix F).

Of the 65 square meters of this survey unit, portions were inaccessible to the SCM scanning for various reasons, particularly uneven surfaces not amenable to large probe automated scanning. Follow-up hand-held scanning was conducted on those portions not SCM scanned using GFPC and NaI detectors. Of the 65 square meters, all were actually scanned, with about 16 square meters scanned using the hand-held detectors. Therefore essentially 100 percent of the survey unit was scanned.

All SCM surveys indicated activity less than the 75% administrative limit for a minimum 1 square meter grid averaging. One square meter averages are applied to the SCM data since this is the minimum size of an area for emc testing per the SNEC LTP. All 43-68 GFPC scans were less than the 500 net cpm action level.

NaI scans were conducted several times. The first two scans identified several alarm locations. In order to provide a single thorough scan survey, the NaI scan was repeated (reference 9.15). This scan showed seven alarm points, two of which were identified in the earlier surveys. These seven areas totaled 2.2 square meters. The remainder of the survey unit was less than the 300 gross cpm action level.

6.1.2 Fixed point measurements

Although a majority of the survey unit was scanned using the automated SCM system and the SNEC LTP indicates that static measurements are not required when using these position sensitive large detectors, 13 random start systematic fixed point measurement locations were defined for the survey unit. Each fixed

point was measured with both the 43-68 GFPC and the 44-10 NaI detectors. Based on a conservative relative shift of about 2.8 a minimum of 8 fixed points were required.

None of the design fixed point measurements in SS14-1 had results in excess of the action level of 500 net cpm for the GFPC measurements. The NaI measurements indicated one location (FP8) that exceeded the scan action level of 300 gross cpm with a result of 356 gross cpm. Interestingly, the elevated NaI result is at the same location as the highest GFPC result. There was no pre-defined count rate action level for the fixed point NaI measurements. The elevated fixed point location corresponds to alarm point 2-5 as discussed below.

The table below (Table 6.1-1) shows the gross beta GFPC results and the gamma NaI results for each fixed point measurement, along with the mean, standard deviation and range of the fixed point measurement data.

Because the survey design did not require concrete samples at all fixed point locations, no statistics or tests can be done on the concrete results. However, an assessment can be done assuming that the fixed point locations that were not sampled are similar to those that were sampled for survey unit average measurements. If it is assumed that these are twelve locations averaging 2.1 pCi/g and combine those with the one AP sample from FP8 of 25.3 pCi/g, this would result in a survey unit average of 3.9 pCi/g, which is less than the DCGLw. The data would result in a S+ of 12 out of 13 samples. The critical value (table I3 reference 9.4) is 9, so the sign test under these assumptions would pass.

The standard deviation of the GFPC measurements 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 fixed point measurements required is consistent between the survey design and the survey results. Based on this, no changes to the survey design or additional measurements are required.

Table 6.1-1 – Fixed point results for SS14-1

Point Number	Unshielded GFPC cpm	Gross NaI cpm
1	345	193
2	417	242
3	426	157
4	410	150
5	232	110
6	388	186
7	378	202
8	514*	356
9	335	109
10	370	183
11	382	126
12	395	152
13	379	157
Mean	382	179
Std Dev	63.1	65.3
Min	232	109
Max	514	356

* background was 282 cpm so net is less than the action level

Smears for loose surface contamination were taken at each fixed point measurement location. All smears were less than the MDC for beta-gamma (<162 dpm/100cm^2) and alpha (<12.2 dpm/100cm^2) activity.

6.1.3 Elevated measurement investigation

NaI scans conducted in the survey unit identified seven areas of approximately 2.2 square meters total that exceeded the action level of 300 gross cpm. The maximum NaI measurement obtained was 606 gross cpm at the area designated AP2-6.

To investigate the alarm areas, concrete samples were collected at the AP points and six other 'unit' locations (FP1, FP2, FP10, FP11, FP12, and FP13) in the survey unit. All of the samples were collected by core boring. Results of the samples for Cs137 (no other licensed isotopes were detected) are listed in table 6.1-2 below for the AP samples and table 6.1-3 for the survey unit general area samples. Sample results are reported as the average of measurements on the front and back of the top 1 inch slice of the core, except for AP2-1 and AP2-5 which are front face only.

Table 6.1-2 – AP Concrete Sample Results for SS14-1

Location	Cs137 pCi/gm
AP2-1	12.1
AP2-2	23.6
AP2-3	12.4
AP2-4	22.7
AP2-5	25.3
AP2-6	52.9
AP2-7	17.4
Average	23.8

Table 6.1-3 – Unit Concrete Sample Results for SS14-1

Location	Cs137 pCi/gm
FP1	2.5
FP2	4.4
FP10	2.1
FP11	1.0
FP12	1.8
FP13	1.1
Average	2.1

An evaluation of the dose consequences of the residual activity identified in the samples was performed and is included as appendix E. This assessment assumed that the entire survey unit contained activity at the observed average of the concrete samples from the basement survey units, or 13.3 pCi/gm. This is conservative considering the actual affected surface area was much less than the total survey unit, and the average of the sample results from SS14-1 is less than the value used. Section 2.4.3 of Appendix E shows that the dose consequences from direct radiation (4.2 mR/yr) under these assumptions is much less than the unrestricted release limit.

An elevated measurement comparison test consistent with equation 8-2 from reference 9.4 can also be shown. Using the 75% administrative limit from table 7 of appendix F (4.92 pCi/g Cs137) for conservatism, the survey unit average results in a emc fraction of 0.43. Interpolation of table 5-15a from reference 9.3 (SNEC LTP) for 2.2 square meters gives a Cs137 area factor of 8.2. Subtracting the survey unit mean from the AP mean, dividing by the 75% administrative limit and dividing by the area factor gives an emc fraction of 0.54 for the elevated area. Adding the two gives a total elevated measurement comparison test value of 0.97, which is less then the test requirement of <1.0 using the more conservative 75% administrative limit.

Therefore, the elevated measurements meet unrestricted release requirements and elevated measurement criteria.

6.2 Survey Unit SS14-2

6.2.1 Scan survey

Scan measurements were made in SS14-2 using a hand-held GFPC detector with an MDCscan of 2175 dpm/100cm^2 (section 4.22 on page 9 of appendix A) The scan action level was 500 net cpm (section 2.1.7 on page 3 of appendix A).The adjusted surrogate Cs137 beta DCGLw for this survey unit was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix F). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Scan measurements were made in SS14-2 using the automated SCM system with a design MDCscan of 6547 dpm/100cm^2 (section 2.1.10 on page 3 of appendix C). The adjusted surrogate Cs137 beta DCGLw for this survey unit for the SCM scans was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2.(appendix F).

Of the 58 square meters of this survey unit, portions were inaccessible to the SCM scanning for various reasons, particularly uneven surfaces not amenable to large probe automated scanning. Follow-up hand-held scanning was conducted on those portions not SCM scanned using GFPC and NaI detectors. Of the 58 square meters, all were actually scanned, with about 27 square meters scanned using the hand-held detectors. Therefore essentially 100 percent of the survey unit was scanned.

All SCM surveys indicated activity less than the 75% administrative limit for a minimum 1 square meter grid averaging. One square meter averages are applied to the SCM data since this is the minimum size of an area for emc testing per the SNEC LTP. All 43-68 GFPC scans were less than the 500 net cpm action level. All 44-10 NaI scans were less than the 300 cpm action level.

6.2.2 Fixed point measurements

Although a majority of the survey unit was scanned using the automated SCM system and the SNEC LTP indicates that static measurements are not required when using these position sensitive large detectors, 13 random start systematic fixed point measurement locations were defined for the survey unit. Each fixed point was measured with both the 43-68 GFPC and the 44-10 NaI detectors. Based on a conservative relative shift of about 2.8 a minimum of 8 fixed points were required.

None of the design fixed point measurements in SS14-2 had results in excess of the action level of 500 net cpm for the GFPC measurements. None of the NaI measurements exceeded the scan action level of 300 gross cpm. There was no pre-defined count rate action level for the fixed point NaI measurements. The table below (Table 6.2-1) shows the gross beta GFPC results and the gamma NaI results for each fixed point measurement, along with the mean, standard deviation and range of the fixed point measurement data.

The standard deviation of the GFPC measurements collected from the survey unit was slightly above the variability assumed in the survey design. However, since the LBGR used was much higher than the default 50% of the DCGL, the actual observed variability with a slightly lower LBGR would still result in a relative shift of 2.8 or higher. Therefore, the assessment of variability, relative shift , and number of fixed point measurements required is consistent between the survey design and the survey results. Based on this, no changes to the survey design or additional measurements are required.

Table 6.2-1 – Fixed point results for SS14-2

Point Number	Unshielded GFPC cpm	Gross NaI cpm
1	442	179
2	372	143
3	372	144
4	390	169
5	350	134
6	278	92
7	318	116
8	348	117
9	316	121
10	440	132
11	372	94
12	241	65
13	227	93
Mean	344	123
Std Dev	66.7	32.2
Min	227	65
Max	442	179

Smears for loose surface contamination were taken at each fixed point measurement location. All smears were less than the MDC for beta-gamma (<162 dpm/100cm^2) and alpha (<12.2 dpm/100cm^2) activity.

Table 6.2-2 - Concrete Sample Results for SS14-2

Location	Cs137 pCi/gm
FP7	0.94

6.3 Survey Unit SS14-3

6.3.1 Scan survey

Scan measurements were made in SS14-3 using a hand-held GFPC detector with an MDCscan of 2175 dpm/100cm^2 (section 4.22 on page 9 of appendix A) The scan action level was 500 net cpm (section 2.1.7 on page 3 of appendix A).The adjusted surrogate Cs137 beta DCGLw for this survey unit was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix F). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Scan measurements were made in SS14-3 using the automated SCM system with a design MDCscan of 6547 dpm/100cm^2 (section 2.1.10 on page 3 of appendix C). The adjusted surrogate Cs137 beta DCGLw for this survey unit for the SCM scans was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix F).

Of the 83 square meters of this survey unit, portions were inaccessible to the SCM scanning for various reasons, particularly uneven surfaces not amenable to large probe automated scanning. Follow-up hand-held scanning was conducted on those portions not SCM scanned using GFPC and NaI detectors. Of the 83 square meters, all were actually scanned, with about 17 square meters scanned using the hand-held detectors. Therefore essentially 100 percent of the survey unit was scanned.

All SCM surveys indicated activity less than the 75% administrative limit for a minimum 1 square meter grid averaging. One square meter averages are applied to the SCM data since this is the minimum size of an area for emc testing per the SNEC LTP. All 43-68 GFPC scans were less than the 500 net cpm action level. All 44-10 NaI scans were less than the 300 cpm action level.

6.3.2 Fixed point measurements

Although a majority of the survey unit was scanned using the automated SCM system and the SNEC LTP indicates that static measurements are not required when using these position sensitive large detectors, 12 random start systematic fixed point measurement locations were defined for the survey unit. Each fixed

point was measured with both the 43-68 GFPC and the 44-10 NaI detectors. Based on a conservative relative shift of about 2.8 a minimum of 8 fixed points were required.

None of the design fixed point measurements in SS14-3 had results in excess of the action level of 500 net cpm for the GFPC measurements. None of the NaI measurements exceeded the scan action level of 300 gross cpm. There was no pre-defined count rate action level for the fixed point NaI measurements. The table below (Table 6.3-1) shows the gross beta GFPC results and the gamma NaI results for each fixed point measurement, along with the mean, standard deviation and range of the fixed point measurement data.

The standard deviation of the GFPC measurements 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 fixed point measurements required is consistent between the survey design and the survey results. Based on this, no changes to the survey design or additional measurements are required.

Table 6.3-1 – Fixed point results for SS14-3

Point Number	Unshielded GFPC cpm	Gross NaI cpm
1	343	114
2	353	119
3	303	112
4	315	111
5	295	126
6	295	133
7	286	113
8	272	113
9	247	141
10	274	146
11	275	133
12	256	127
Mean	293	124
Std Dev	32.1	12.2
Min	247	111
Max	353	146

Smears for loose surface contamination were taken at each fixed point measurement location. All smears were less than the MDC for beta-gamma (<162 dpm/100cm^2) and alpha (<11.6 dpm/100cm^2) activity.

Table 6.3-2 - Concrete Sample Results for SS14-3

Location	Cs137 pCi/gm
FP5	0.6

6.4 Survey Unit SS14-4

6.4.1 Scan survey

Scan measurements were made in SS14-4 using a hand-held GFPC detector with an MDCscan of 2175 dpm/100cm^2 (section 4.22 on page 9 of appendix A) The scan action level was 500 net cpm (section 2.1.7 on page 3 of appendix A).The adjusted surrogate Cs137 beta DCGLw for this survey unit was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix F). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Scan measurements were made in SS14-4 using the automated SCM system with a design MDCscan of 6547 dpm/100cm^2 (section 2.1.10 on page 3 of appendix C). The adjusted surrogate Cs137 beta DCGLw for this survey unit for the SCM scans was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix F).

Of the 61 square meters of this survey unit, portions were inaccessible to the SCM scanning for various reasons, particularly uneven surfaces not amenable to large probe automated scanning. Follow-up hand-held scanning was conducted on those portions not SCM scanned using GFPC and NaI detectors. Of the 61 square meters, all were actually scanned, with about 21 square meters scanned using the hand-held detectors. Therefore essentially 100 percent of the survey unit was scanned.

All SCM surveys indicated activity less than the 75% administrative limit for a minimum 1 square meter grid averaging. One square meter averages are applied to the SCM data since this is the minimum size of an area for emc testing per the SNEC LTP. All 43-68 GFPC scans were less than the 500 net cpm action level. All 44-10 NaI scans were less than the 300 cpm action level.

6.4.2 Fixed point measurements

Although a majority of the survey unit was scanned using the automated SCM system and the SNEC LTP indicates that static measurements are not required when using these position sensitive large detectors, 14 random start systematic fixed point measurement locations were defined for the survey unit. Each fixed

point was measured with both the 43-68 GFPC and the 44-10 NaI detectors. Based on a conservative relative shift of about 2.8 a minimum of 8 fixed points were required.

None of the design fixed point measurements in SS14-4 had results in excess of the action level of 500 net cpm for the GFPC measurements. None of the NaI measurements exceeded the scan action level of 300 gross cpm. There was no pre-defined count rate action level for the fixed point NaI measurements. The table below (Table 6.4-1) shows the gross beta GFPC results and the gamma NaI results for each fixed point measurement, along with the mean, standard deviation and range of the fixed point measurement data.

The standard deviation of the GFPC measurements 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 fixed point measurements required is consistent between the survey design and the survey results. Based on this, no changes to the survey design or additional measurements are required.

Table 6.4-1 – Fixed point results for SS14-4

Point Number	Unshielded GFPC cpm	Gross NaI cpm
1	196	95
2	327	120
3	213	109
4	299	124
5	274	107
6	304	109
7	303	123
8	316	100
9	288	97
10	264	102
11	297	118
12	290	118
13	338	127
14	278	124
Mean	285	112
Std Dev	39.5	11.0
Min	196	95
Max	338	127

Smears for loose surface contamination were taken at each fixed point measurement location. All smears were less than the MDC for beta-gamma (<162 dpm/100cm^2) and alpha (<11.6 dpm/100cm^2) activity.

Table 6.4-2 - Concrete Sample Results for SS14-4

Location	Cs137 pCi/gm
FP7	0.2

6.5 Survey Unit SS14-5

6.5.1 Scan survey

Scan measurements were made in SS14-5 using a hand-held GFPC detector with an MDCscan of 2175 dpm/100cm^2 (section 4.22 on page 9 of appendix A) The scan action level was 500 net cpm (section 2.1.7 on page 3 of appendix A).The adjusted surrogate Cs137 beta DCGLw for this survey unit was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix F). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Scan measurements were made in SS14-5 using the automated SCM system with a design MDCscan of 6547 dpm/100cm^2 (section 2.1.10 on page 3 of appendix C). The adjusted surrogate Cs137 beta DCGLw for this survey unit for the SCM scans was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix F).

Of the 53 square meters of this survey unit, portions were inaccessible to the SCM scanning for various reasons, particularly uneven surfaces not amenable to large probe automated scanning. Follow-up hand-held scanning was conducted on those portions not SCM scanned using GFPC and NaI detectors. Of the 53 square meters, all were actually scanned, with about 8 square meters scanned using the hand-held detectors. Therefore essentially 100 percent of the survey unit was scanned.

All SCM surveys indicated activity less than the 75% administrative limit for a minimum 1 square meter grid averaging. One square meter averages are applied to the SCM data since this is the minimum size of an area for emc testing per the SNEC LTP. All 43-68 GFPC scans were less than the 500 net cpm action level. All 44-10 NaI scans were less than the 300 cpm action level.

6.5.2 Fixed point measurements

Although a majority of the survey unit was scanned using the automated SCM system and the SNEC LTP indicates that static measurements are not required when using these position sensitive large detectors, 14 random start systematic fixed point measurement locations were defined for the survey unit. Each fixed point was measured with both the 43-68 GFPC and the 44-10 NaI detectors. Based on a conservative relative shift of about 2.8 a minimum of 8 fixed points were required.

None of the design fixed point measurements in SS14-5 had results in excess of the action level of 500 net cpm for the GFPC measurements. None of the NaI measurements exceeded the scan action level of 300 gross cpm. There was no pre-defined count rate action level for the fixed point NaI measurements. The table below (Table 6.5-1) shows the gross beta GFPC results and the gamma NaI results for each fixed point measurement, along with the mean, standard deviation and range of the fixed point measurement data.

The standard deviation of the GFPC measurements 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 fixed point measurements required is consistent between the survey design and the survey results. Based on this, no changes to the survey design or additional measurements are required.

Table 6.5-1 – Fixed point results for SS14-5

Point Number	Unshielded GFPC cpm	Gross NaI cpm
1	263	129
2	239	133
3	248	131
4	282	140
5	273	127
6	289	128
7	277	129
8	267	128
9	283	119
10	327	111
11	293	127
12	291	116
13	298	122
14	227	122
Mean	276	126
Std Dev	25.8	7.4
Min	227	111
Max	327	140

Smears for loose surface contamination were taken at each fixed point measurement location. All smears were less than the MDC for beta-gamma (<162 dpm/100cm^2) and alpha (<11.6 dpm/100cm^2) activity.

Table 6.5-2 - Concrete Sample Results for SS14-5

Location	Cs137 pCi/gm
FP3	<0.2

6.6 Survey Unit SS14-6

6.6.1 Scan survey

Scan measurements were made in SS14-6 using a hand-held GFPC detector with an MDCscan of 2175 dpm/100cm^2 (section 4.22 on page 9 of appendix A) The scan action level was 200 net cpm (section 2.5.8 on page 4 of appendix G).The adjusted surrogate Cs137 beta DCGLw for this survey unit was 5940 dpm/100cm^2 and the 75% administrative limit was 4455 dpm/100cm^2 (table 5 of attachment 5 of appendix G). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Scan measurements were made in SS14-6 using the automated SCM system with a design MDCscan of 6547 dpm/100cm^2 (section 2.1.10 on page 3 of appendix C). Actual scan MDCs achieved with the SCM were <1894 dpm/100cm^2. The adjusted surrogate Cs137 beta DCGLw for this survey unit for the SCM scans was 5940 dpm/100cm^2 and the 75% administrative limit was 4455 dpm/100cm^2 (table 5 of attachment 5 of appendix G).

Of the 84 square meters of this survey unit, portions were inaccessible to the SCM scanning for various reasons, particularly uneven surfaces not amenable to large probe automated scanning. Follow-up hand-held scanning was conducted on those portions not SCM scanned using GFPC and NaI detectors. Of the 84 square meters, all were actually scanned. Due to the condition of the surface, only 11 square meters was scanned using the SCM. All 84 square meters was scanned using the hand-held detectors. Therefore essentially 100 percent of the survey unit was scanned.

All SCM surveys indicated activity less than the 75% administrative limit for a minimum 1 square meter grid averaging. One square meter averages are applied to the SCM data since this is the minimum size of an area for emc testing per the SNEC LTP. All 43-68 GFPC scans were less than the 200 net cpm action level. All 44-10 NaI scans were less than the 300 cpm action level.

6.6.2 Fixed point measurements

Fifty-two random start systematic fixed point measurement locations were defined for the survey unit. Each fixed point was measured with the 43-68 GFPC detector. Based on a conservative relative shift of about 2.8 a minimum of 8 fixed points were required.

None of the design fixed point measurements in SS14-6 had results in excess of the action level of 200 net cpm for the GFPC measurements. The table below (Table 6.6-1) shows the gross beta GFPC results for each fixed point measurement, along with the mean, standard deviation and range of the fixed point measurement data.

The standard deviation of the GFPC measurements 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 fixed point measurements required is consistent between the survey design and the survey results. Based on this, no changes to the survey design or additional measurements are required.

Table 6.6-1 – Fixed point results for SS14-6

Point Number	Unshielded GFPC cpm*
1	267
2	239
3	238
4	254
5	242
6	231
7	280
8	268
9	264
10	266
11	200
12	221
13	316
14	228
15	251
16	264
17	229
18	338
19	272
20	276
21	262
22	317
23	294
24	273
25	304
26	274
27	279
28	285
29	269
30	299
31	306
32	321
33	277
34	264
35	301
36	234
37	221
38	262
39	242
40	222

Table 6.6-1 continued – Fixed point results for SS14-6

41	243
42	217
43	261
44	202
45	261
46	253
47	166
48	195
49	247
50	271
51	273
52	291
Mean	260
Std Dev	34.5
Min	166
Max	338

* The highest net difference was 122 net cpm

Smears for loose surface contamination were taken at each fixed point measurement location. All smears were less than the MDC for beta-gamma (<166 dpm/100cm^2) and alpha (<11.6 dpm/100cm^2) activity.

6.7 Survey Unit SS15

6.7.1 Scan survey

Scan measurements were made in SS15 using a hand-held GFPC detector with an MDCscan of 2175 dpm/100cm^2 (section 4.22 on page 9 of appendix A) The scan action level was 500 net cpm (section 2.1.7 on page 3 of appendix A).The adjusted surrogate gross beta DCGLw for this survey unit was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix G). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Scan measurements were made in SS15 using the automated SCM system with a design MDCscan of 6547 dpm/100cm^2 (section 2.1.10 on page 3 of appendix C). The adjusted surrogate gross beta DCGLw for this survey unit for the SCM scans was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix G).

Of the 100 square meters of this survey unit, portions were inaccessible to the SCM scanning for various reasons, particularly uneven surfaces not amenable to large probe automated scanning. Follow-up hand-held scanning was conducted

on those portions not SCM scanned using GFPC and NaI detectors. Of the 100 square meters, all were actually scanned, with about 23 square meters scanned using the hand-held detectors. Therefore essentially 100 percent of the survey unit was scanned.

All SCM surveys indicated activity less than the 75% administrative limit for a minimum 1 square meter grid averaging. One square meter averages are applied to the SCM data since this is the minimum size of an area for emc testing per the SNEC LTP. All 43-68 GFPC scans were less than the 500 net cpm action level. All 44-10 NaI scans were less than the 300 cpm action level.

6.7.2 Fixed point measurements

This survey unit was scanned using an automated position sensitive proportional counter. This survey unit did not receive fixed point direct static measurements. As discussed in Section 5.0, the SCM is equivalent to continuous static measurements of the entire surface scanned.

6.8 Survey Unit SS16

6.8.1 Scan survey

Scan measurements were made in SS16 using the automated SCM system with a design MDCscan of 6547 dpm/100cm^2 (section 2.1.10 on page 3 of appendix C). The adjusted surrogate gross beta DCGLw for this survey unit for the SCM scans was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix G). Because the SCM survey achieved adequate coverage for a Class 2 survey, no follow-up GFPC scans were required.

Of the 240 square meters of this survey unit, portions were inaccessible to the SCM scanning for various reasons, particularly due to uneven surfaces not amenable to large probe automated scanning and because SS16 is a Class 2 unit and full scan coverage was not required. Of the 240 square meters, about 135 square meters were actually scanned using the SCM. Therefore about 56 percent of the survey unit was scanned.

All SCM surveys indicated activity less than the 75% administrative limit for a minimum 1 square meter grid averaging. One square meter averages are applied to the SCM data since this is the minimum size of an area for emc testing per the SNEC LTP.

6.8.2 Fixed point measurements

This survey unit was scanned using an automated position sensitive proportional counter. This survey unit did not receive fixed point direct static measurements.

As discussed in Section 5.0, the SCM is equivalent to continuous static measurements of the entire surface scanned.

6.9 Survey Unit SS17

6.9.1 Scan survey

Scan measurements were made in SS17 using the automated SCM system with a design MDCscan of 6547 dpm/100cm^2 (section 2.1.10 on page 3 of appendix C). The adjusted surrogate gross beta DCGLw for this survey unit for the SCM scans was 13571 dpm/100cm^2 and the 75% administrative limit was 10178 dpm/100cm^2 (appendix G). Because the SCM survey achieved adequate coverage for a Class 2 survey, no follow-up GFPC scans were required.

Of the 350 square meters of this survey unit, portions were not scanned for various reasons, particularly uneven surfaces not amenable to large probe automated scanning and because SS17 is a Class 3 unit and full scan coverage was not required. Of the 350 square meters, about 54 square meters were actually scanned using the SCM. Therefore about 15 percent of the survey unit was scanned.

All SCM surveys indicated activity less than the 75% administrative limit for a minimum 1 square meter grid averaging. One square meter averages are applied to the SCM data since this is the minimum size of an area for emc testing per the SNEC LTP.

6.9.2 Fixed point measurements

This survey unit was scanned using an automated position sensitive proportional counter. This survey unit did not receive fixed point direct static measurements. As discussed in Section 5.0, the SCM is equivalent to continuous static measurements of the entire surface scanned.

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

SS14-1 had seven NaI alarm points during scan surveys of approximately 100% of the surface. Scan MDCs were adequate. Thirteen fixed point GFPC measurements were all less than the DCGLw so no statistical tests are required. One NaI fixed point measurement was elevated and corresponded to one of the scan alarm points. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements. Dose assessment performed (appendix E) for elevated measurement evaluation of the elevated scan points and a MARSSIM elevated measurement comparison test show that the survey unit meets elevated

measurement test criteria. An assessment of the concrete sample data based on the assumption that the unsampled fixed points are similar to those sampled for reference (table 6.1-3) shows that the survey unit mean and sign test could be expected to pass.

SS14-2 had no alarm points during scan surveys of approximately 100% of the surface. Scan MDCs were adequate. Thirteen fixed point GFPC and NaI measurements were all less than the DCGLw. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements.

SS14-3 had no alarm points during scan surveys of approximately 100% of the surface. Scan MDCs were adequate. Twelve fixed point GFPC and NaI measurements were all less than the DCGLw. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements.

SS14-4 had no alarm points during scan surveys of approximately 100% of the surface. Scan MDCs were adequate. Fourteen fixed point GFPC and NaI measurements were all less than the DCGLw. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements.

SS14-5 had no alarm points during scan surveys of approximately 100% of the surface. Scan MDCs were adequate. Fourteen fixed point GFPC and NaI measurements were all less than the DCGLw. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements.

SS14-6 had no alarm points during scan surveys of approximately 100% of the surface. Scan MDCs were adequate. Fifty-two fixed point GFPC measurements were all less than the DCGLw. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements.

SS15 had no alarm points during scan surveys of approximately 100% of the surface. Scan MDCs were adequate. No fixed point measurements were collected because of the use of the automated position sensitive detector. Scan fraction and use of the SCM measurements for fixed points meets LTP and MARSSIM requirements.

SS16 had no alarm points during scan surveys of approximately 56% of the surface. Scan MDCs were adequate. No fixed point measurements were collected because of the use of the automated position sensitive detector. Scan fraction and use of the SCM measurements for fixed points meets LTP and MARSSIM requirements.

SS17 had no alarm points during scan surveys of approximately 15% of the surface. Scan MDCs were adequate. No fixed point measurements were collected because of the use of the automated position sensitive detector. Scan

fraction and use of the SCM measurements for fixed points meets LTP and MARSSIM requirements.

7.3 Survey Variations (Design, survey request, LTP)

7.3.1 Portions of the seven Class 1 survey units could not be scanned using the SCM automated detector system. These areas were follow-up scanned using 43-68 GFPC and/or 44-10 NaI detectors.

7.3.2 Static points SS14-2 #11 and #13, SS14-3 #6 and #8, SS14-4 #3, #6, #8, and #10, SS14-5 #4 and #14, and SS14-6 static points 38 and 45 were relocated due to obstructions or excessive surface irregularity.

7.4 QC comparisons

7.4.1 Scan surveys

Numerous areas were rescanned as QC duplicates with the hand-held detectors. The QC hand-held rescans did not identify any activity above alarm points and so are in agreement with the primary scans, that the survey area passes. NaI QC scans were conducted on 26.4 m^2 of the survey area, which represents about 15 percent of the approximately 173 m2 originally scanned by hand. This exceeds the minimum 5% required.

GFPC QC scans were conducted on 13.8m^2 of the survey area, which represents about 8.0 percent of the approximately 173 m2 originally scanned by hand. This exceeds the minimum 5% required.

Numerous areas were rescanned as QC duplicates with the SCM. The QC SCM rescans did not identify any activity above alarm points and so are in agreement with the primary scans that the survey area passes. QC SCM scans were conducted on 36.9 m^2 of the survey area, which represents about 7.3 percent of the 508 m2 originally scanned by SCM. This exceeds the minimum 5% required.

Table 7.4-1 Basement Concrete QC Duplicate comparison

Scan Point	Result (cpm)	QC Result (cpm)
SS14-1 AP2-6	574	520

7.4.2 Fixed Point measurements

GFPC fixed point QC measurements were performed in 4 survey units, two from SS14-1, two from SS14-2, three from SS14-3, and three from SS14-4. These duplicates had good agreement as shown in the table below (Table 7.4-2)

because the conclusion that the survey unit passes is supported by both the initial and QC results (reference 9.8). Ten QC splits out of 118 measurements exceeds the 5% minimum criterion.

NaI fixed point QC measurements were performed on five points in one survey unit. These duplicates had good agreement as shown in the table below (Table 7.4-3) because the conclusion that the survey unit passes is supported by both the initial and QC results (reference 9.8). Five QC splits out of 66 measurements exceeds the 5% minimum criterion.

Table 7.4-2 Basement GFPC QC Duplicate comparison

Fixed Point	Unshielded Result (cpm)	QC Result (cpm)
SS14-1 3	426	388
SS14-1 11	382	435
SS14-2 8	348	370
SS14-2 10	440	694
SS14-3 1	343	438
SS14-3 4	315	461
SS14-3 12	256	281
SS14-4 2	327	329
SS14-4 5	274	351
SS14-4 7	303	335

Table 7.4-3 Basement NaI QC Duplicate comparison

Fixed Point	Unshielded Result (cpm)	QC Result (cpm)
SS14-1 1	193	200
SS14-1 3	157	173
SS14-1 5	110	125
SS14-1 7	202	195
SS14-1 9	109	114

Smear QC samples were collected at seven locations. All smear QC results were less than the detection limits of the counting system. These duplicates had good agreement because the conclusion that the survey unit passes is supported by both the initial and QC results (reference 9.8).

One concrete sample QC measurement was made in SS14-1. The agreement between the initial and QC sample was poor as shown in table 7.4-4 below. Because the initial and QC core were discrete samples and could not be homogenized, the small alarm point could not be duplicated in the QC sample.

Table 7.4-3 Basement Concrete QC Duplicate comparison

Fixed Point	Result (pCi/g)	QC Result (pCi/g)
SS14-1 AP2-6	52.9	3.1

8.0 Final Survey Conclusions

The Structural Surfaces of the SSGS Basement survey units SS14-1 through SS14-6, SS15, SS16, and SS17 final status survey was performed in accordance with the SNEC LTP, 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 on the surfaces is less than the derived surrogate DCGLw in all of the survey units.

2) All measurements were less than the DCGLw in units SS14-2, SS14-3, SS14-4, SS14-5, SS14-6, SS15, SS16, and SS17. Unit SS14-1 was shown by calculation to meet the elevated measurement criteria.

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 Structural Surface Areas of the SSGS Basement designated SS14-1, SS14-2, SS14-3, SS14-4, SS14-5, SS14-6, SS15, SS16 and SS17 are 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
9.4 NUREG 1575 "Multi-Agency Radiation Survey and Site Investigation Manual" (MARSSIM), revision 1 August 2000
9.5 COMPASS computer program, Version 1.0.0, Oak Ridge Institute for Science and Education
9.6 VISUAL SAMPLE PLAN computer program, Version 3.0, Battelle Memorial Institute
9.7 SNEC procedure E900-IMP-4500.59, "Final Site Survey Planning and DQA"
9.8 SNEC procedure E900-IMP-4520.04, "Survey Methodology to Support SNEC License Termination"
9.9 SNEC Survey Request (SR) # SR084
9.10 SNEC Survey Request (SR) # SR095
9.11 SNEC Survey Request (SR) # SR097
9.12 SNEC Survey Request (SR) # SR100
9.13 SNEC Survey Request (SR) # SR114
9.14 Shonka Research Associates, Inc. "Final Report for SCM Survey of Saxton Nuclear Experimental Corporation", March 3, 2005
9.15 SNEC Survey Request (SR) # SR102

10.0 Appendices

Appendix A - SNEC Calculation E900-03-027 – "Balance of SSGS Footprint – Survey Plan" (12 pages plus numerous attachments)
Appendix B - SNEC Calculation E900-03-025 – "SSGS Area Trench & Sump Survey Design" (76 pages plus numerous attachments)
Appendix C - SNEC Calculation E900-03-019 –"Shonka SSGS Footprint & CV Steam Pipe Tunnel (SSGS Side) FSS Survey Design" Revision 1 (14 pages)
Appendix D – SNEC Calculation E900-03-029 – "Balance of SSGS Footprint 2 – Survey Plan" (35 pages)
Appendix E – SNEC Calculation E900-05-008 – "Assessment of Survey Results from SSGS Footprint – SS14-1 and SS14-2" (9 pages plus numerous attachments)
Appendix F – DCGL Calculation Logic – SSGS Footprint
Appendix G – SNEC Calculation E900-04-003 – "Assessment of E900-03-025, Rev 0 – SSGS Trench & Sump Area"