

Final Status Survey Report

For

Saxton Nuclear Experimental Corporation
Structural Surfaces – Small Penelec Garage
GA1-1

Prepared by GPU Nuclear, Inc.

July 2005

Table Of Contents

Executive Summary

- 1.0 Purpose and Scope**
- 2.0 Survey Area Description**
- 3.0 Operating History**
 - 3.1 Plant Operations**
 - 3.2 Survey Area Remediation Status**
- 4.0 Site Release Criteria**
- 5.0 Final Status Survey Design / DQO Process**
- 6.0 Final Status Survey Results GA1-1**
- 7.0 Data Assessment**
 - 7.1 Assessment Criteria**
 - 7.2 Summary of Overall Results**
 - 7.3 Survey Variations**
 - 7.4 Quality Control Measurements**
- 8.0 Final Survey Conclusions**
- 9.0 References**
- 10.0 Appendices**

Executive Summary

This report presents the results and conclusions of the final status survey (FSS) of the Class 2 structural surfaces of the Saxton Nuclear Experimental Corporation (SNEC) facility designated as GA1-1. This FSS includes surveys of residual structural surfaces (e.g. concrete) of the floor pad of the small southwest Penelec garage of the SNEC site and was conducted in the summer of 2003.

The FSS was performed in accordance with the SNEC License Termination Plan (LTP). The small garage pad survey area was one survey unit, which consisted of relatively flat residual structural surfaces. Data was collected from the 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 85% of the surface area.

The SCM surveys were conducted by a contractor utilizing a large area position sensitive gas flow proportional counter. Portions of the survey unit were not surveyed with this equipment but coverage percentages were adequate.

The collected FSS survey data demonstrate that the 109 square meters of the small Penelec garage pad 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 of the small Penelec garage pad consisting of one survey unit designated GA1-1 south 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 one survey unit consisting of a Class 2 survey unit of residual structural surface of the small Penelec garage pad / slab. 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 small Penelec garage GA1-1 is Class 2 impacted residual structural surface located southwest of the SNEC facility. The survey area encompasses about 109 square meters of concrete and consists of the remaining floor slab of the garage. The remainder of the garage was demolished and removed prior to this survey. Because the area was clearly delineated as a single floor slab, the survey area was a single survey unit. The survey unit designation is derived from table 5-2 of the SNEC LTP (reference 9.3).

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

No known remediation occurred in the garage slab. Removal of debris and sediment to facilitate survey was performed in the slab sumps. Results of the slab sump surveys will be reported with the embedded / buried pipe in a separate report.

4.0 Site Release Criteria

The site release criteria applied to the structural surface areas of the small Penelec garage slab 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 Appendix A. Scans of the Class 2 survey unit covered 85% of GA1-1. Scans were conducted using an automated position sensitive large area gas flow proportional counter ("Surface Contamination Monitor" - SCM).

No fixed point measurements were performed. 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 100cm² area in the SCM scanning was less than 25% 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 Cs137 for the effective DCGL because only Cs137 was observed in samples from the garage area (section 4.3 of appendix A). 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	GA1-1
SNEC Design Calc. #	E900-03-014
MARSSIM Classification	2
Survey Unit Area (m ²)	109
Statistical Test	N/A*
Type 1 decision error (α)	N/A
Type 2 decision error (β)	N/A
LBGR (cpm)	N/A
Estimated σ (dpm/100cm ²)	N/A
Relative Shift (Δ/σ)	N/A
Number of static points	N/A
DCGLw (Cs137 dpm/100cm ²)	28000
75%Admin Limit (Cs137 dpm/100cm ²)	21000
Scan MDC (dpm/100cm ²)	10500**
SNEC Survey Request #	SR80
Scan Survey Instrument	SCM

*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/100cm² so cpm based factors are not used.

** Design Scan MDC shown – actual MDC was 5958 dpm/100cm²

6.0 Final Status Survey Results

The following sections provide the survey summary results for the survey unit as required by the respective design. Summary data was taken from reference 9.7 and 9.8 which are filed in the SNEC history files.

6.1 Scan survey

Scan measurements were made in GA1-1 using the automated SCM system with a design MDCscan of 10500 dpm/100cm² (section 4.4 on page 3 of appendix A). Actual scan MDC was 5958 dpm/100cm² (reference 9.8). The surrogate Cs137 beta DCGLw for this survey unit for the SCM scans was 28000 dpm/100cm² and the 75% administrative limit was 21000 dpm/100cm² (section 4.3 on page 3 of appendix A).

Of the 109 square meters of this survey unit, portions were not scanned by the SCM. Since this is a Class 2 area, scanning was not attempted on all of the

surface. Of the 109 square meters, 92.8 square meters were actually scanned. Therefore about 85 percent of the survey unit was scanned which is consistent with coverage requirements for Class 2 survey units.

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. No follow-up 43-68 scans were required.

6.2 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

GA1-1 had no alarm points during scan surveys of approximately 85% of the surface. Scan MDCs were adequate. Fixed point measurements were not required consistent with the SNEC LTP and MARSSIM for automated position sensitive survey equipment. Scan fraction and elimination of fixed point measurements meets LTP and MARSSIM requirements.

7.3 Survey Variations (Design, survey request, LTP)

Portions of the survey units were not scanned using the SCM automated detector system. However, this was considered in the design that expected scanning of less than 100% of the surface.

7.4 QC comparisons

7.4.1 Scan surveys

Areas were rescanned as QC duplicates. The QC rescans did not identify any activity above alarm points and so are in agreement with the primary scans and support the same conclusion that the survey unit passes. QC scans were conducted on 23.9 m² of the survey area, which represents about 26 percent of the 92.8 square meters originally scanned. This exceeds the minimum 5% required.

7.4.2 Fixed Point measurements

Since no fixed point measurements were required due to the unique nature of SCM scanning, no specific fixed point QC measurements were made.

8.0 Final Survey Conclusions

The Structural Surfaces of the pad / slab of the small Penelec garage survey unit GA1-1 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 unit GA1-1.

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 small Penelec garage slab 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 SNEC procedure E900-IMP-4500.59, "Final Site Survey Planning and DQA"
- 9.6 SNEC procedure E900-IMP-4520.04, "Survey Methodology to Support SNEC License Termination"
- 9.7 SNEC Survey Request (SR) # SR080
- 9.8 Shonka Research Associates, Inc. "Final Report for SCM Survey of Saxton Nuclear Experimental Corporation", March 3, 2005

10.0 Appendices

Appendix A - SNEC Calculation E900-03-014 – "Shonka Line Shack & Warehouse/Garage Pads FSS Survey Design" (5 pages plus numerous attachments)