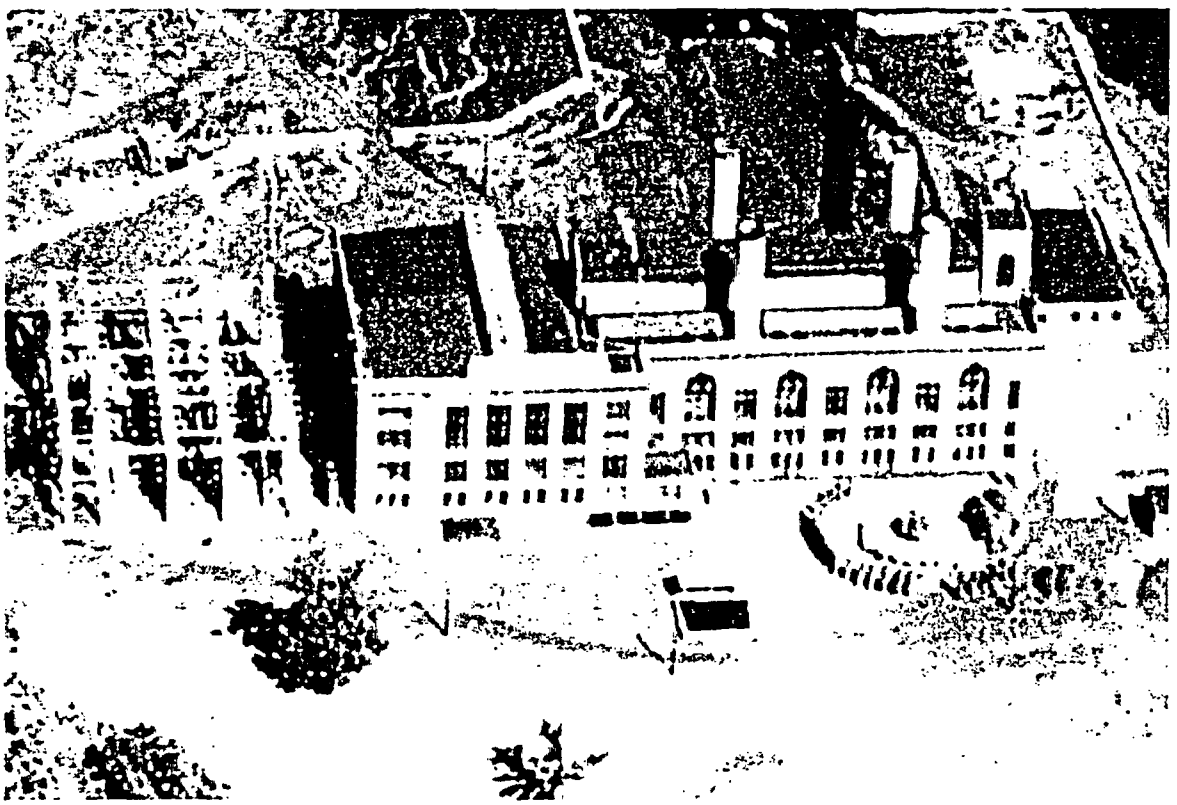
Final Status Survey Report

For

Saxton Nuclear Experimental Corporation
Saxton Steam Generating Station
Structural Surfaces
Discharge Tunnel Transition Area
SS23, SS25



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Executive Summary

This report presents the results and conclusions of the final status survey (FSS) of the Class 1 and 2 structural surfaces and exposed rock/soil of the Saxton Nuclear Experimental Corporation (SNEC) facility designated as SS23-1, SS23-2, SS25-1, and SS25-2. This FSS includes surveys of residual structural surfaces (e.g. concrete) and residual steel in the Discharge Tunnel Transition Area of the Saxton Steam Generating Station of the SNEC site and was conducted in the summer of 2004.

The FSS was performed in accordance with the SNEC License Termination Plan (LTP). The Discharge Tunnel Transition Area survey area was divided into four survey units. Three units consisted of relatively flat residual structural surfaces and the fourth was an open steel grate. 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 Gas Flow Proportional Counter (GFPC) and NaI detector scans of all of four survey units covering about 70 % of the actual surface area.
2) Eighty two fixed point static GFPC measurements.
3) Thirty five fixed point NaI measurements.
4) Three steel scrape samples analyzed by gamma spectroscopy
5) One soil sample analyzed by gamma spectroscopy

The collected FSS survey data demonstrate that the 154 square meters of the SSGS Discharge Tunnel Transition 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 Discharge Tunnel Transition Area (four survey units designated SS23-1, SS23-2, SS25-1, and SS25-2) 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 two Class 1 and two Class 2 survey units of residual structural concrete and steel surfaces and exposed rock/soil in the SSGS Discharge Tunnel Transition Area. 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 Discharge Tunnel Transition Area is Class 1 and 2 impacted structural surface and exposed rock/soil located underground to the west of the SNEC facility. The area is the connection point between the spray pumps and the discharge tunnel. The survey unit encompasses about 154 square meters of concrete and steel. Because the classification varies spatially and because of the different surfaces in the area, the survey area has been divided into four survey units. Layout of the survey area and individual units are shown in Attachment 1 of Appendix A and Attachment 1 of Appendix B. The four survey units are discussed below. The individual survey unit designations are derived from table 5-2 of the SNEC LTP (reference 9.3).

Survey unit SS23-1 is a Class 2 residual concrete surface in the SSGS Discharge tunnel entrance from the spray pumps area. It consists of the concrete surfaces of the walls in the tunnel entrance area. The survey unit is approximately 66 square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit SS23-2 is a Class 2 rock/soil surface in the SSGS Discharge tunnel entrance from the spray pumps area. It consists of the exposed rock and soil of the floor area in the tunnel entrance area. The survey unit is approximately 31 square meters. Appendix A contains drawings showing the layout of the survey unit.

Survey unit SS25-1 is a Class 1 residual concrete surface in the SSGS Discharge tunnel entrance from the spray pumps area. It consists of the concrete surface in the discharge to spray pump transition area in the discharge tunnel.

The survey unit is approximately 41 square meters. Appendix B contains drawings showing the layout of the survey unit.

Survey unit SS25-2 is a Class 1 residual steel surface in the SSGS Discharge tunnel entrance from the spray pumps area. It consists of a steel gate in the discharge to spray pump transition area in the discharge tunnel. A portion of the gate was in its withdrawal well and was not accessible. The survey unit is the accessible portion of the gate and is approximately 16 square meters. Appendix B 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 liquid 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 Discharge Tunnel Transition Area had the potential for contamination as a result of shared water systems which introduced contamination into the SSGS and the discharge tunnel. The area is connected to the discharge tunnel. No remediation was performed, but materials that would interfere with survey were removed.

4.0 Site Release Criteria

The site release criteria applied to the structural surface areas of the SSGS Discharge Tunnel Transition Area 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 and B. Scan measurements were conducted over approximately 100% of the surface of the Class 1 survey units. Scan coverage of the two Class 2 survey units was approximately 30% and 100%. Scans were

conducted 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 5 of appendix A and attachment 6 of appendix B). These points were located on survey maps using the Visual Sample Plan program (reference 9.6, attachment 6 of appendix A and attachment 7 of appendix B). Measurements were collected with the GFPC using a long fixed count at each point.

The survey design uses a surrogate Cs137/gross beta effective DCGL developed from radionuclide mix analyses from samples collected before the Final Status Survey in the vicinity of the survey unit. The mix was based on radionuclide mix data (including the hard-to-detects listed in Table 5-1 of the LTP) from the discharge tunnel (attachment 4 of appendix B).

Cs137, Co60, Am241, Ni63, Pu238, and Pu239 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 design information from the survey design packages.

Table 5.0-1 – DQO/Design

DQO/Design Parameter	SS23-1, SS23-2	SS25-1, SS25-2
SNEC Design Calc. #	E900-04-017	E900-04-015
MARSSIM Classification	2	1
Survey Unit Area (m^2)	66, 31	41, 16
Statistical Test	WRS	WRS
Type 1 decision error (α)	0.05	0.05
Type 2 decision error (β)	0.1	0.1
LBGR (cpm)	500	350
Estimated σ (dpm/100cm^2)	34.5	45.4
Relative Shift (Δ/σ)	2.7	1.6
Number of static points	13, 9	60, 35
DCGLw (Cs137 dpm/100cm^2)	8807	8807
75% Admin Limit (Cs137 dpm/100cm^2)	6605	6605
DCGLw (Cs137 ncpm)	593	424
Action Level (cpm)	500 net GFPC 300 gross NaI	350 net GFPC 200 gross NaI
Scan MDC (dpm/100cm^2)	1817	2644 GFPC 3717 NaI-steel
SNEC Survey Request #	SR165	SR158
Scan Survey Instrument	L2350-1 w/ 43-68B, L2350-1 w/ 44-10	L2350-1 w/ 43-68B, L2350-1 w/ 44-10

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 and 9.10 which are filed in the SNEC history files.

6.1 Survey Unit SS23-1

6.1.1 Scan survey

Scan measurements were made in SS23-1 using a hand-held GFPC detector with an MDCscan of 1817 dpm/100cm^2 (table 3 on page 3 of appendix A). The scan action level was 500 net cpm (table 4 on page 3 of appendix A).The adjusted surrogate Cs137 gross beta DCGLw for this survey unit was 8807 dpm/100cm^2 and the 75% administrative limit was 6605 dpm/100cm^2 (attachment

4-5 of appendix B). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Of the 66 square meters of this survey unit scanning was conducted on 20 square meters of the surface. Therefore 30 percent of the survey unit was scanned which is consistent with coverage requirement for Class 2 survey units. All 43-68 GFPC scans were less than the 500 net cpm action level.

6.1.2 Fixed point measurements

Thirteen 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 2.7 a minimum of 9 fixed points were required.

None of the design fixed point measurements in SS23-1 had results in excess of the action level of 593 net cpm for the GFPC measurements. The table below (Table 6.1-1) 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 greater than the variability assumed in the survey design. If the observed variability and an LBGR of 50% of the DCGL are used, then 10 measurements would be the minimum required. Since thirteen measurements were taken, 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 SS23-1

Point Number	Unshielded GFPC cpm
8	813*
9	266
10	271
C	274
D	240
E	338
F	395
G	300
H	271
I	319
J	286
K	312
L	406
Mean	345
Std Dev	149
Min	240
Max	813

* the shielded value at point 1 was 363 cpm, for a net of 450 (less than the action level of 593)

6.2 Survey Unit SS23-2

6.2.1 Scan survey

Scan measurements were made in SS23-2 using a hand-held GFPC detector with an MDCscan of 1817 dpm/100cm^2 (table 3 on page 3 of appendix A). The scan action level was 500 net cpm (table 4 on page 3 of appendix A).The adjusted surrogate Cs137 gross beta DCGLw for this survey unit was 8807 dpm/100cm^2 and the 75% administrative limit was 6605 dpm/100cm^2 (attachment 4-5 of appendix B). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Scan measurements were made in SS23-2 using a hand-held NaI detector with an MDCscan of 2.8 pCi/g (table 5 on page 3 of appendix A). The scan action level was 300 gross cpm (section 2.2.3 on page 3 of appendix A).The adjusted surrogate Cs137 DCGLw for this survey unit was 6.52 pCi/g and the 75% administrative limit was 4.89 pCi/g (table 6 on page 4 of appendix A). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Of the 31 square meters of this survey unit NaI scanning was conducted on all 31 square meters of the surface. Therefore 100 percent of the survey unit was scanned which is consistent with coverage requirement for Class 2 survey units. About 2 square meters were also scanned with the GFPC. All 43-68 GFPC scans were less than the 500 net cpm action level. One area greater than the 300 gross cpm action level was found with the NaI scans. This area was bounded to be about 6 square meters. The rest of the survey unit was less then the 300 gross cpm action level for the NaI scans.

6.2.2 Fixed point measurements

Nine 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 2.7 a minimum of 8 fixed points were required.

None of the design fixed point measurements in SS23-2 had results in excess of the action level of 593 net cpm for the GFPC measurements. The table below (Table 6.2-1) 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. Several points (1 through 4) had gross unshielded readings above the 593 net cpm action level. However, in each case, the net counts per minute was less than the action level.

The standard deviation of the GFPC measurements collected from the survey unit was greater than the variability assumed in the survey design. Other design choices (increased type 2 decision error and/or an LBGR of 50% of the DCGL) are used, then 9 or fewer measurements would be the minimum required. The assessment of variability, relative shift, and number of fixed point measurements required is acceptable 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 SS23-2

Point Number	Unshielded GFPC cpm
1	787
2	667
3	728
4	691
5	588
6	369
7	500
A	333
B	388
Mean	561
Std Dev	170
Min	333
Max	787

6.2.3 Elevated measurement comparison

NaI scanning in SS23-2 identified one location where the scan result exceeded the 300 gross cpm scan action level. Actual scan results were 363 gross cpm with a bounded area of about 6 square meters. In order to assess the alarm point a soil sample was collected at the location of the alarm point. The result is shown in table 6.2-2 below. Since the activity was less than the DCGL, no elevated measurement comparison test is required.

Table 6.2-2 – Alarm point soil sample results for SS23-2

Location	Cs137 pCi/g
SS23-2 AP1	<0.1

6.2.4 Survey assessment

Use of the 43-68 GFPC detector for fixed point measurements was not intended in the initial design concept, and it was expected that soil / rock samples would be collected at the fixed point locations. Despite not having the random fixed point soil samples, there is reasonable assurance that the survey unit meets release criteria for several reasons: 1) the residual material had large rock content that could be appropriately surveyed by a GFPC, 2)The NaI scans show that the area is generally well below the DCGLw, 3) Final pre-FSS soil samples from the area and the FSS alarm point sample are all much less than the DCGLw. Although not a random layout of sample points and thus not fully

conforming to MARSSIM requirements, six FSS quality (QC, chain-of-custody, etc.) soil samples were collected at alarm points during a final pre-FSS survey as part of the survey reported in reference 9.11. In addition, one soil sample was collected as a result of a NaI scan alarm during the FSS survey as discussed above. Table 6.2-3 below shows the results of these soil samples. Although there are not as many samples and they are not randomly placed as expected by MARSSIM, there is strong evidence that the survey unit passes.

Table 6.2-2 – Soil sample results for SS23-2

Location	Cs137 pCi/g
SS23-2 AP1	<0.1
SR155 AP1	<0.1
SR155 AP2	<0.1
SR155 AP3	<0.1
SR155 AP4	<0.13
SR155 AP5	<0.14
SR155 AP6	<0.12

6.3 Survey Unit SS25-1

6.3.1 Scan survey

Scan measurements were made in SS25-1 using a hand-held GFPC detector with an MDCscan of 2644 dpm/100cm^2 (table 3 on page 3 of appendix B). The scan action level was 350 net cpm (section 2.1.5 on page 3 of appendix B).The adjusted surrogate Cs137 gross beta DCGLw for this survey unit was 8807 dpm/100cm^2 and the 75% administrative limit was 6605 dpm/100cm^2 (attachment 4-5 of appendix B). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Scan measurements were made in SS25-1 using a hand-held NaI detector with an MDCscan of 2.7 pCi/g (table 4 on page 3 of appendix B). The scan action level was 200 gross cpm (section 2.2.3 on page 3 of appendix B).The adjusted surrogate Cs137 DCGLw for this survey unit was 6.52 pCi/g and the 75% administrative limit was 4.89 pCi/g (attachment 4-6 of appendix B). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Of the 41 square meters of this survey unit scanning was conducted on all 41 square meters of the surface. All of the surface was scanned with the GFPC and about 40 of the 41 square meters were scanned using the NaI detector. Therefore 100 percent of this Class 1 survey unit was scanned. All 43-68 GFPC

scans were less than the 350 net cpm action level and all NaI scans were less than the 200 gross cpm action level.

6.3.2 Fixed point measurements

Sixty 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 the relative shift of about 1.6 a minimum of 13 fixed points were required. Additional sample points were defined to increase sample density based on engineering judgment.

None of the design fixed point measurements in SS25-1 had results in excess of the action level of 424 net cpm for the GFPC measurements. The table below (Table 6.3-1) shows the gross beta GFPC results for each fixed point measurement, along with the mean, standard deviation and range of the sixty fixed point measurement results combined. Three measurements of the ceiling that were above 424 gross cpm as listed in the table below were each less than the action level in net cpm with the shielded reading at the measurement point subtracted.

The standard deviation of the GFPC measurements collected from the survey unit was higher than the variability assumed in the survey design. If the observed variability is used with a less conservative LBGR (e.g. 50% of the DCGLw) a relative shift higher than that used for the design would result. In addition, the number of sample points collected (60) was larger than the minimum based on the relative shift used in the design (13). 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 SS25-1

Point	Unshielded GFPC cpm	Unshielded GFPC cpm	Unshielded GFPC cpm	Unshielded GFPC cpm
	Floor	Ceiling	North wall	South wall
1	316	286	250	237
2	289	429	193	294
3	281	356	234	226
4	302	477	230	248
5	321	408	203	211
6	317	469	213	238
7	228	346	243	251
8	210	376	236	264
9	214	473	256	244
10	192	382	191	216
11	193	250	261	251
12	208	343	335	211
13	196	371	256	299
14	340	430	342	356
15	308	390	334	325
			Mean (all60)	289
			Std Dev	77.1
			Min	191
			Max	477

6.4 Survey Unit SS25-2

6.4.1 Scan survey

Scan measurements were made in SS25-2 using a hand-held NaI detector with an MDCscan of 3717 dpm/100cm^2 (table 4 on page 3 of appendix B). The scan action level was 200 gross cpm (section 2.2.3 on page 3 of appendix B).The adjusted surrogate Cs137 beta DCGLw for this survey unit was 8807 dpm/100cm^2 and the 75% administrative limit was 6605 dpm/100cm^2 (attachment 4-5 of appendix B). No fixed point number adjustment was needed in this case because the MDCscan was below the 75% administrative limit.

Of the 16 square meters of this survey unit scanning was conducted on all 16 square meters of the surface. Therefore 100 percent of the Class 1 survey unit was scanned. All NaI scans were less than the 200 gross cpm action level.

6.4.2 Fixed point measurements

Thirty five biased fixed point measurement locations were defined for the survey unit which provided static measurements on most of the surface. Because of the high biased coverage fraction, no random points were defined. Each fixed point was measured with the 43-10 NaI detector.

No action level was pre-defined for the design fixed point measurements in SS25-2. The table below (Table 6.4-1) shows the NaI results for each fixed point measurement, along with the mean, standard deviation and range of the fixed point measurement data. Measurement points 9 and 10 were subsequently sampled for investigation. Static measurements were taken after the scrape samples. These were lower than the initial results and are shown as '9 post' and '10 post' in table 6.4-1. These are not included in the statistics in the table.

Table 6.4-1 – Fixed point results for SS25-2

Point Number	NaI cpm
1	84
2	84
3	80
4	84
5	73
6	71
7	71
8	186
9	229
10	208
11	176
12	137
13	168
14	150
15	78
16	75
17	62
18	57
19	75
20	62
21	72
22	61
23	50
24	46
25	47
26	40
27	54
28	57
29	45
30	35
31	38
32	43
33	43
34	48
35	81
Mean	84.9
Std dev	51.7
Min	35
Max	229
9 post	127
10 post	149

Two NaI fixed point measurements exceeded the scan action level. Scrape samples were collected from these two points, along with a sample from a third point for reference. The table below (table 6.4-2 shows the results of the samples.

Table 6.4-1 – Fixed point scrape results for SS25-2

Sample Location	Cs137 pCi/g
SS25-2 9	45.1
SS25-2 10	40.8
SS25-2 26	3.5

6.4.3 Elevated measurement comparison

Because of the limited scrape sample data and the unique nature of the survey unit, a special calculation assessment was performed on the elevated sample results to determine if the survey unit meets release requirements. This assessment is provided as appendix C. This assessment indicates that after removal of the material by sampling, the residual activity meets release requirements with a maximum residual activity at any fixed measurement location of 78% of the release limit (attachment 4-2 of appendix C).

An elevated measurement comparison test can also be performed on the initial static measurement data based on the summary in attachment 4-1 of appendix C. the survey unit average is 1319 dpm /100 cm^2 with a Cs137 75% administrative limit of 6605 dpm/100cm^2. The survey unit average is therefore 0.2 of the 75% administrative limit including the single elevated point at FP9. Since the survey unit is about 16 square meters, each static point represent about 0.5 square meters. Using the minimum area factor for 1 square meter for Cs137 of 11.2 gives a value of 0.01 for the elevated area [(6771-1319)/6605/11.2) for a total emc test value of 0.21 for the survey unit.

Based on the special assessment in appendix C and the elevated measurement comparison test above, the survey unit passes the emc test ('equation 8-2' is <1) meets unrestricted release criteria.

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 fixed point measurements in the survey units are less than or equal to the DCGLw.

7.2 Summary of Overall Results

SS23-1 had no alarm points during GFPC scan surveys of approximately 30% of the surface. Scan MDCs were adequate. Thirteen fixed point GFPC measurements were all less than the DCGLw. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements.

SS23-2 had one alarm point during NaI scanning of about 100% of the surface and no alarm points during additional GFPC scan surveys of approximately 6.5% of the surface. A soil sample at the alarm point was less than the DCGL. Scan MDCs were adequate. Nine fixed point GFPC measurements were all less than the DCGLw. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements. Soil samples should have been collected from the survey unit at the fixed point locations but were not. Seven soil samples from the survey unit are available which are all less than detectable concentrations. These soil samples are six in depth samples, which is appropriate for samples collected from well below the surface grade in the entrance pit.

SS25-1 had no alarm points during GFPC scan surveys of 100% of the surface. Additional NaI scan surveys of 98% of the surface also had no alarm points. Scan MDCs were adequate. Sixty fixed point GFPC measurements were all less than the DCGLw. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements.

SS25-2 had no alarm points during NaI scan surveys of approximately 100% of the accessible surface. Scan MDCs were adequate. Thirty five biased fixed point NaI measurements were performed covering nearly 100% of the accessible surface. Two of the static points exceeded the scan action level and were sampled. Measurements after sampling showed the majority of the activity was removed by sampling. Elevated measurement comparison tests show that the initial sample results meet release requirements. Scan fraction and number of fixed point measurements meets LTP and MARSSIM requirements.

7.3 Survey Variations (Design, survey request, LTP)

7.3.1 Approximately 1.2 square meters of SS25-1 was inaccessible to the 44-10 NaI survey.

7.3.2 Soil samples were not collected from the fixed point locations in SS23-2 but GFPC fixed point measurements were collected instead.

7.4 QC comparisons

<u>7.4.1 Scan surveys</u>

Numerous areas were rescanned as QC duplicates with the hand-held detectors. The QC hand-held GFPC and NaI rescans did not identify any activity above alarm points and so are in agreement with the primary scans because the conclusion that the survey area passes is supported by both the initial and QC

results (reference 9.8). GFPC QC scans were conducted on 6.15 m^2 of the survey area, which represents about 9.8 percent of the 63 m^2 originally scanned by GFPC. NaI QC scans were conducted on 6.9 m^2 of the survey area, which represents about 7.9 percent of the 87 m^2 originally scanned by NaI. These each exceed the minimum 5% required.

7.4.2 Fixed Point measurements

Two fixed point measurements from SS23-1 and three from SS25-1 received QC duplicate GFPC measurements. These duplicates had good agreement as shown in the table below (Table 7.4-1) because the conclusion that the survey area passes is supported by both the initial and QC results (reference 9.8). Five QC splits out of 82 measurements represents 6.1 percent of the fixed point measurements. Two fixed point measurements from SS25-2 received QC duplicate NaI measurements. These duplicates had good agreement as shown in the table below (Table 7.4-1) because the conclusion that the survey area passes is supported by both the initial and QC results (reference 9.8). Two QC splits out of 35 measurements represents 5.7 percent of the fixed point measurements. These both exceed the 5% minimum criterion.

Table 7.4-1 Discharge Tunnel Transition Area Fixed Point QC Duplicate comparison

Fixed Point	Result (cpm)	QC Result (cpm)
GFPC SS23-1 C	274	256
GFPC SS23-1 F	395	356
GFPC SS25-1 Ceiling 7	346	242
GFPC SS25-1 N Wall 6	213	161
GFPC SS25-1 S Wall 4	248	157
NaI SS25-2	73	77
NaI SS25-2	62	86

One SS25-2 scrape sample of the fixed point locations received a duplicate. This duplicate had good agreement as shown in the table below (Table 7.4-2) because the conclusion that the survey area passes is supported by both the initial and QC results (reference 9.8). One QC split out of 3 measurements represents 33 percent of the scrape samples. This exceeds the 5% minimum criterion.

Table 7.4-2 Discharge Tunnel Transition Area Scrape QC Duplicate comparison

Fixed Point	Result (pCi/g)	QC Result (pCi/g)
GFPC SS25-2 9	45.1	37.6

7.4.3 Elevated measurements

One alarm point from SS23-2 had a QC duplicate scan measurement and a split QC measurement of the investigative soil sample. These duplicates had good agreement as shown in the tables below (Table 7.4-3 and 7.4-4) because the conclusion that the survey area passes is supported by both the initial and QC results (reference 9.8). One QC split out of 1 measurement of the scan and the soil sample each represents 100 percent of the measurements. This exceeds the 5% minimum criterion.

Table 7.4-3 Discharge Tunnel Transition Area AP Scan QC Duplicate comparison

Point	Result (cpm)	QC Result (cpm)
SS23-2 AP1	363	332

Table 7.4-2 Discharge Tunnel Transition Area AP Soil Sample QC Duplicate comparison

Point	Result (pCi/g)	QC Result (pCi/g)
SS23-2 AP1	<0.1	<0.1

8.0 Final Survey Conclusions

The Structural Surfaces of the SSGS Discharge Tunnel Transition Area survey units SS23-1 SS23-2, SS25-1, and SS25-2 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 three of the survey units and an elevated measurement test of SS25-2 shows that the unit meets the emc test and therefore passes the release criteria.

3) SS23-2 did not have random soil samples or a sufficient number of soil samples collected for a soil survey area to be a full MARSSIM design. The area contained large rock surfaces amenable to the GFPC measurements that were performed and soil samples that are available show that there is reasonable assurance that the survey unit meets the release 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 Discharge Tunnel Transition Area designated SS23-1, SS23-2, SS25-1, and SS25-2 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) # SR158
9.10 SNEC Survey Request (SR) # SR165
9.11 SNEC Survey Request (SR) # SR155

10.0 Appendices

Appendix A - SNEC Calculation E900-04-017 –"Upper Spray Pump Area & DT Entrance - Survey Design" (9 pages plus numerous attachments)

Appendix B - SNEC Calculation E900-04-015 – "Spray Pump Pit – Survey Design" (10 pages plus numerous attachments)

Appendix C – SNEC Calculation E900-04-020 – "Assessment of Survey Results for Transition Area Steel Gate" (6 pages plus numerous attachments)

Appendix A

Spray Pump Pit and Discharge Tunnel Survey Design

FirstEnergy

SNEC CALCULATION COVER SHEET

CALCULATION DESCRIPTION

Calculation Number	Revision Number	Effective Date	Page Number
E900-04-017	0	8/31/04	1 of 9

Subject

Upper Spray Pump Area & DT Entrance - Survey Design

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

Question 2 - Is this calculation defined as a "Design Calculation"? Refer to definitions 3.2 and 3.3. Yes ☒ No ☐

Question 3 - Does the calculation have the potential to affect an SSC as described in the USAR? Yes ☐ No ☒

NOTES: If a "Yes" answer is obtained for Question 1, the calculation must meet the requirements of the SNEC Facility Decommissioning Quality Assurance Plan. If a "Yes" answer is obtained for Question 2, the Calculation Originator's immediate supervisor should not review the calculation as the Technical Reviewer. If a "YES" answer is obtained for Question 3, SNEC Management approval is required to implement the calculation. Calculations that do not have the potential to affect SSC's may be implemented by the TR.

DESCRIPTION OF REVISION

APPROVAL SIGNATURES

Calculation Originator	B. Brosey/ B. Brosey	Date	8/30/04
Technical Reviewer	P. Donnachie/ P. Donnachie	Date	8/31/04
Additional Review	A. Paynter/ [illegible]	Date	31Aug04
Additional Review		Date	
SNEC Management Approval		Date	

1.0 PURPOSE

1.1 The purpose of this calculation is to develop a survey design for the upper Spray Pump building and the Discharge Tunnel entrance area. These survey units are listed in Table 1 and are shown in **Attachments 1-1** to **1-2**.

Table 1, Survey Unit Information

Survey Units	Location	Material Types	Area Classification	Area (m^2)
SS9-2	Spray Pump Bldg. Floor at El. 795'	Concrete	2	30.2
SS11-1	Walls of Spray Pump Bldg. To El. ~802'	Concrete	2	59.7
SS11-2	Walls of Spray Pump Bldg. Above El. ~802'	Concrete	3	58.2
SS23-1	Entrance to Discharge Tunnel	Concrete	2	65.9
SS23-2	Entrance to Discharge Tunnel	Soil/Stone	2	31

2.0 SUMMARY OF RESULTS

The following information should be used to develop a survey request for this survey design:

2.1 GFPC Scanning Criteria

2.1.1 A gas flow proportional counter (GFPC) shall be used in the beta detection mode for the initial scan survey work on all concrete surfaces (Ludlum 2350-1 with a 43-68B probe).

2.1.2 All GFPC instruments used shall demonstrate an efficiency (ε_t) at or above ***23.9%*** (value used for planning). Detector efficiency factors are presented in the following Table.

Table 2, GFPC Detection Efficiency Results Used for Planning

Material Type	ε_i	ε_s	ε_t (as %)*	ECF	% Cs-137	Resulting counts/disintegration
Concrete	0.478	0.5	23.9%	0.31	0.982	0.0728

*Typical SNEC GFPC detector efficiency factors (as of 7/1/04) are provided in **Attachment 2-1**.

NOTE 1: Total efficiency should not be less than ε_t value for any instrument used during this survey effort.
NOTE 2: ECF is efficiency correction factor.

2.1.3 An efficiency correction factor (ECF) is applied to compensate for efficiency loss over rough surface areas based on **Reference 3.1** criteria and **Attachment 3-1**. An applicable ECF has been determined for both survey areas listed in Table 2. This value corrects detection efficiency based on the average depth of the worst rough surface area in either location. Use of this factor for all concrete surfaces will underestimate the detection efficiency for the majority of surfaces in these two areas.

2.1.4 The amount of detectable beta emitter is dependant on the amount of Cs-137 present in the radionuclide mix. From **Reference 3.2** the mix is determined to be 98.2% Cs-137. No other radionuclides are credited with providing any additional (detectable) beta emissions.

Table 3, Summary Of GFPC Scanning Parameters

Area or Structure	Material Type	Scan Speed	Surface to Detector Face	Minimum Coverage*	MDCscan
SS9-2, SS11-1, SS23-1	Concrete	0.9" per sec (2.2 cm/sec)	Contact	25%	1,817 dpm/100 cm^2
SS11-2	Concrete	0.9" per sec (2.2 cm/sec)	Contact	10%	1,817 dpm/100 cm^2

Table 4, Summary Of GFPC Action Levels

Area or Structure	First Phase (gcpm)	DCGLw (ncpm)
All Concrete	500	593

2.1.5 The action levels during first phase scanning is provided above. If this level is reached, the surveyor should stop and perform a count of at least 1/2 minute duration to identify the actual second phase count rate from the elevated area. If the second phase count rate is equal to or greater than the DCGLw cpm, the area must be identified, bounded and documented to include an area estimate.

2.2 *NaI Scanning Criteria*

2.2.1 A 2" by 2" diameter NaI detector with a Cs-137 window setting shall be used for gamma scanning these survey units IAW Table 5 parameters.

2.2.2 The conversion factor for NaI survey instruments used shall not be less than ***208,302 cpm/mR/h*** (see **Attachment 2-1** for current NaI instrument conversion factors as of 7-1-04).

Table 5, Summary Of Scanning Parameters

Instrument Type Used	Area or Structure	Material Type	Scan Speed	Surface to Detector Face	Coverage	MDCscan*
NaI (2" by 2" Cs-137 Window)	SS23-2	Soil/Stone	10" per sec (25 cm/sec)	4" (5.08 cm)	100% of accessible surfaces	2 – 2.84 pCi/g

*See Attachment 4-1 to 4-4 for calculation results using an assumed 100–200 cpm background values and MicroShield output for modeled survey areas. The soil model assumes a 6" thick source term and is ~56.4 cm in diameter with a density of loose lime stone (~2/3 of 3 g/cc = 2 g/cc).

2.2.3 The action level during first phase scanning using a NaI instrument is ***300 gross cpm***. If this level is reached, the surveyor should stop and perform a count of at least 15 seconds duration to identify the actual count rate of the elevated area.

2.2.4 Based on NaI scanning work, sample areas IAW the following criteria:

2.2.4.1 When an area is confirmed to be above the action level sited in Section 2.2.3, the location should be marked for sampling (see Section 2.5) These areas shall be bounded and documented.

2.3 *DCGLw Values*

The following Table shows the DCGLw values that were used to plan surveys in these areas. Soil volumetric DCGLw values are used as a planning tool.

Areas above the action level should be sampled to determine the actual concentration and fraction of Table 6 values.

Table 6, Summary Of DCGLw Values

Surface DCGLw (dpm/100 cm^2)	Volumetric DCGLw (pCi/g)
GA = 8,968 (6,726 A.L.)	6.52 (4.89 A.L.) for Cs-137

DCGLw values from Reference 3.2.
A.L. = the administrative limit.

2.4 *Fixed Point GFPC Static Measurements*

2.4.1 The minimum required number of static survey points for each area is provided in Table 7 (see **Attachment 5-1** to **5-10** for the calculations yielding the minimum No. of random start systematic grid survey points – Compass output, **Reference 3.3**).

Table 7, Minimum No. Random Start Systematic Grid Survey Points (GFPC)

Survey Units	Location	Static Points
SS9-2	Spray Pump Bldg. Floor at El. 795'	9
SS11-1	Walls of Spray Pump Bldg. to El. ~802'	9
SS11-2	Walls of Spray Pump Bldg. Above El. ~802'	9
SS23-1	Entrance to Discharge Tunnel - Concrete	9
SS23-2	Entrance to Discharge Tunnel – Stone/Soil	8

See Attachment 6-1 to 6-2 for locations of fixed point measurements.

2.4.2 VSP (**Reference 3.4**) is used to plot all measurement points on **Attachment 6-1** and **6-2**. The actual number of random start systematically spaced measurement points may be greater than that required by the Compass computer code because of any of the following:

- placement of the initial random starting point (edge effects),
- odd shaped diagrams, and/or
- coverage concerns

2.5 *Sampling of Soil/Loose Stone*

2.6.1 Obtain a sample volume IAW **Reference 3.5**.

3.0 REFERENCES

3.1 SNEC Calculation No. 6900-02-028, GFPC Instrument Efficiency Loss Study.

3.2 SNEC Calculation No. E900-04-015, Spray Pump Pit – Survey Design

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

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

3.5 SNEC Procedure E900-IMP-4520.04, "Survey Methodology to Support SNEC License Termination".

3.6 ISO 7503-1, Evaluation of Surface Contamination, Part 1: Beta-emitters (maximum beta energy greater than 0.15 MeV) and alpha-emitters, 1988.

3.7 Plan SNEC Facility License Termination Plan.

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

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

3.10 MicroShield, Computer Radiation Shielding Code, Version 5.05-00121, Grove Engineering.

3.11 NUREG-1507, "Minimum Detectable Concentrations With Typical Radiation Survey Instruments for Various Contaminants and Field Conditions," June 1998.

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

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

4.0 ASSUMPTIONS AND BASIC DATA

4.1 Remediation History

Since the Spray Pump moved water from the Discharge Tunnel, the same radionuclide mix is assumed for this area as was used inside the Discharge Tunnel. The Discharge Tunnel access area has been used during remediation efforts in the Discharge Tunnel. No remediation was necessary in either of these areas, but materials that could hinder survey work were removed prior to performing these surveys. Some potential safety issues with regard to collapsing loose stone side walls exist in the Discharge Tunnel access area and thus only the accessible exposed stone wall surfaces will be surveyed.

4.2 Cs-137's detection efficiency has been checked by SNEC personnel using ISO standard 7503-1 methodology (**Reference 3.6**). The SNEC facility uses a conservatively low GFPC efficiency as input to the survey design process.

4.3 Survey unit variability (GFPC only) used to plan the number of fixed point measurement locations is shown on **Attachment 7-1** and **7-2**. **Attachment 8-1** is the Williamsburg concrete background results. From the SNEC LTP (**Reference 3.7**), the off-site background soil samples yielded a mean concentration for Cs-137 of 0.28 ± 0.39 pCi/g. This background values variability was used as input to the Compass computer program.

4.4 A GFPC detector stand-off distance of ~2.1" is assumed for all survey areas. This value is used to compensate for rough surfaces in each survey unit. These survey units were inspected IAW **Reference 3.8**. A copy of portions of the SNEC facility post-remediation inspection reports are included (see **Attachment 9-1** to **9-8**). Surface defects (gouges, cracks, etc.), are present within these survey units, yielding a efficiency correction factor (ECF). Thus the average concentration of the source term will be overestimated for all surfaces (GFPC only).

4.5 The detectors physical probe area is 126 cm^2, and the instrument is calibrated to the same source area for Cs-137. The gross activity DCGLw is taken to be 6,726 dpm/100 cm^2 x (126

cm^2 physical probe area/100 cm^2) = 8,475 x (0.982 disintegration of Cs-137/ disintegration in mix) x ε_i (0.478) x ε_s (0.5) x 0.31 (distance factor) which yields ~617 net cpm above background (Compass calculates 593 ncpm as the gross beta DCGLw). The 0.0728 count per disintegration counting efficiency considers only the Cs-137 contaminant present in the sample material matrix, and is calculated by: ε_i (0.478) x ε_s (0.5) x 0.982 disintegration of Cs-137/disintegration in mix x 0.31 (efficiency correction factor due to distance from surface) = ***0.0728 cts/disintegration***.

4.6 A MicroShield soil slab model was used to develop NaI scan MDC value for the soil/stone in the Discharge Tunnel access area (see **Attachment 4-1**). The model is a 6" thick slab of soil/stone 56.4 cm in diameter with a density of 2 g/cc model assumes that the majority of the activity resides in no more than the first 6 inches of exposed materials. The modeled concentration used was 1 pCi/g Cs-137. Then the concentration of Cs-137 in the model is 2.0 g/cc x 1 pCi/g = 2.0E-06 uCi/cc of Cs-137. The calculated MDCscan is shown in Table 5.

4.7 The results of the MicroShield modeling indicate that an exposure rate of approximately 2.41E-04 mR/h is obtained at a distance of 5" (4" inches from the face of the detector). Exposure rate is measured to the center of the detector and therefore the air gap is taken to be 4".

4.8 The majority of the structural surface area is concrete. GFPC measurements of structural concrete are compared to concrete background values (see Williamsburg concrete background values – **Attachment 8-1**).

4.9 The scan MDC calculation is determined based on a 1.38 index of sensitivity at a 95% correct detection probability and 60% false positive rate. In all cases, the scan MDC is less than the gross and volumetric activity DCGLw values for these survey units. A surveyor efficiency factor of 0.5 is assumed.

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

4.11 No special measurements are included for this survey design.

4.12 The applicable SNEC site radionuclides and their associated DCGLw values are listed on Exhibit 1 of this calculation.

4.13 The survey design checklist is listed in Exhibit 2.

4.14 Area factors are not applicable for Class 2 and 3 areas.

4.15 The decision errors and other Data Quality Objectives for this survey design are listed within **Attachment 5-1** through **5-10**, and are justified IAW **Reference 3.9** criteria.

4.16 Analysis results (MDA requirements, etc.) will be IAW **Reference 3.5** criteria.

5.0 CALCULATIONS

5.1 All complex calculations are performed internal to applicable computer codes or within an Excel spreadsheet previously identified.

6.0 APPENDICES

6.1 **Attachment 1-1** to **1-2**, diagrams of Spray Pump and Discharge Tunnel areas.

6.2 **Attachment 2-1**, is typical calibration information for NaI and GFPC detection systems used at the SNEC facility as of 7-1-04.

6.3 **Attachment 3-1**, is a calculation result for determining efficiency loss for a GFPC detector as a function of distance from a calibration source.

6.4 **Attachment 4-1** to **4-4**, is the MicroShield output and MDCscan calculation results for a NaI detector.

6.4.1 **Attachment 4-5** and **4-6**, are the GFPC MDCscan results.

6.5 **Attachment 5-1** to **5-10**, are Compass output results for all areas.

6.6 **Attachment 6-1** to **6-2**, are the random start, systematic grid diagrams for GFPC fixed point survey locations.

6.7 **Attachment 7-1** and **7-2**, are the GFPC variability measurements from these survey units.

6.8 **Attachment 8-1**, is the Williamsburg background measurements of concrete using a GFPC instrument (an non-impacted area).

6.9 **Attachment 9-1** to **9-8**, are sections of survey unit inspection reports for the Spray Pump and Discharge Tunnel areas.

Exhibit 1

SNEC Facility Individual DCGL Values [a]

Radionuclide	25 mrem/y Limit Surface Area ($dpm/100cm^2$)	25 mrem/y Limit (All Pathways) Open Land Areas (Surface & Subsurface) (pCi/g)	4 mrem/y Goal (Drinking Water) Open Land Areas [b] (Surface & Subsurface) (pCi/g)
Am-241	2.7E+01	9.9	2.3
C-14	3.7E+06	2	5.4
Co-60	7.1E+03	3.5	67
Cs-137	2.8E+04	6.6	397
Eu-152	1.3E+04	10.1	1440
H-3	1.2E+08	132	31.1
Ni-63	1.8E+06	747	1.9E+04
Pu-238	3.0E+01	1.8	0.41
Pu-239	2.8E+01	1.6	0.37
Pu-241	8.8E+02	86	19.8
Sr-90	8.7E+03	1.2	0.61

NOTES:

(a) While drinking water DCGLs will be used by SNEC to meet the drinking water 4 mrem/y goal, only the DCGL values that constitute the 25 mrem/y regulatory limit will be controlled under this LTP and the NRC's approving license amendment.

(b) Listed values are from the subsurface model. These values are the most conservative values between the two models (i.e., surface & subsurface).

Exhibit 2

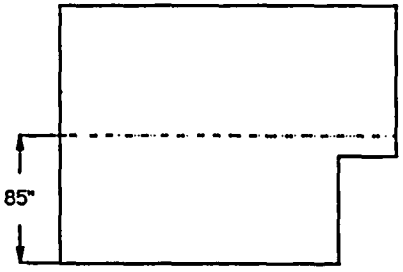
Survey Design Checklist (From Reference 3.7)

Calculation No. E900-04-017	SS9-1 & SS11-1, SS11-2, SS23-1 & SS23-2		
ITEM	REVIEW FOCUS	Status (Circle One)	Reviewer Initials & Date
1	Has a survey design calculation number been assigned and is a survey design summary description provided?	Yes, N/A	8/31/04
2	Are drawings/diagrams adequate for the subject area (drawings should have compass headings)?	Yes, N/A	8/31/04
3	Are boundaries properly identified and is the survey area classification clearly indicated?	Yes, N/A	8/31/04
4	Has the survey area(s) been properly divided into survey units IAW EXHIBIT 10	Yes, N/A	8/31/04
5	Are physical characteristics of the area/location or system documented?	Yes, N/A	8/31/04
6	Is a remediation effectiveness discussion included?	Yes, N/A	8/31/04
7	Have characterization survey and/or sampling results been converted to units that are comparable to applicable DCGL values?	Yes, N/A	8/31/04
8	Is survey and/or sampling data that was used for determining survey unit variance included?	Yes, N/A	8/31/04
9	Is a description of the background reference areas (or materials) and their survey and/or sampling results included along with a justification for their selection?	Yes, N/A	8/31/04
10	Are applicable survey and/or sampling data that was used to determine variability included?	Yes, N/A	8/31/04
11	Will the condition of the survey area have an impact on the survey design, and has the probable impact been considered in the design?	Yes, N/A	8/31/04
12	Has any special area characteristic including any additional residual radioactivity (not previously noted during characterization) been identified along with its impact on survey design?	Yes, N/A	8/31/04
13	Are all necessary supporting calculations and/or site procedures referenced or included?	Yes, N/A	8/31/04
14	Has an effective DCGLw been identified for the survey unit(s)?	Yes, N/A	8/31/04
15	Was the appropriate $DCGL_{EMC}$ included in the survey design calculation?	Yes, N/A	8/31/04
16	Has the statistical tests that will be used to evaluate the data been identified?	Yes, N/A	8/31/04
17	Has an elevated measurement comparison been perfomed (Class 1 Area)?	Yes, N/A	8/31/04
18	Has the decision error levels been identified and are the necessary justifications provided?	Yes, N/A	8/31/04
19	Has scan instrumentation been identified along with the assigned scanning methodology?	Yes, N/A	8/31/04
20	Has the scan rate been identified, and is the MDCscan adequate for the survey design?	Yes, N/A	8/31/04
21	Are special measurements e.g., in-situ gamma-ray spectroscopy required under this design, and is the survey methodology, and evaluation methods described?	Yes, N/A	8/31/04
22	Is survey instrumentation calibration data included and are detection sensitivities adequate?	Yes, N/A	8/31/04
23	Have the assigned sample and/or measurement locations been clearly identified on a diagram or CAD drawing of the survey area(s) along with their coordinates?	Yes, N/A	8/31/04
24	Are investigation levels and administrative limits adequate, and are any associated actions clearly indicated?	Yes, N/A	8/31/04
25	For sample analysis, have the required MDA values been determined.?	Yes, N/A	8/31/04
26	Has any special sampling methodology been identified other than provided in Reference 6.3?	Yes, N/A	8/31/04

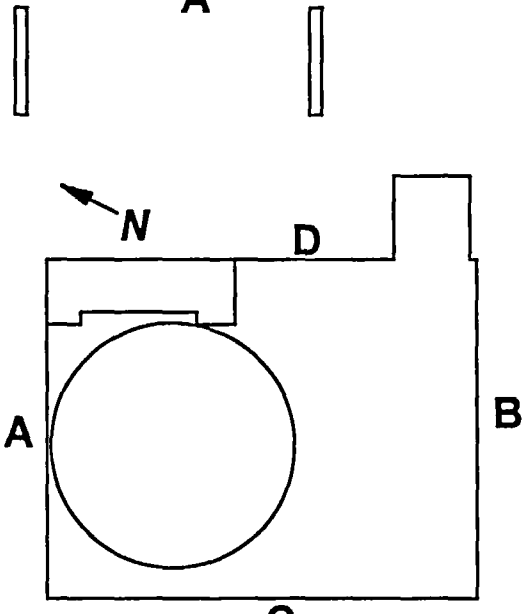
NOTE: a copy of this completed form or equivalent, shall be included within the survey design calculation.

SPRAY PUMP ROOM, 795' El & ABOVE

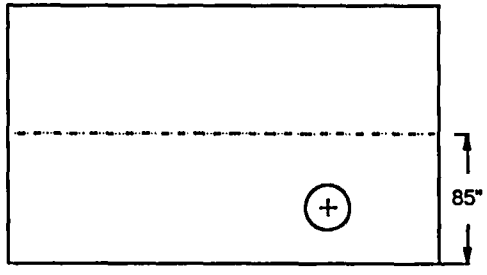
SS9-2, SS11-1 & SS11-2



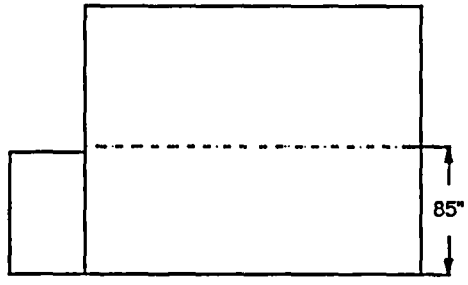
North Wall
A



C
795' El Floor



C
West Wall



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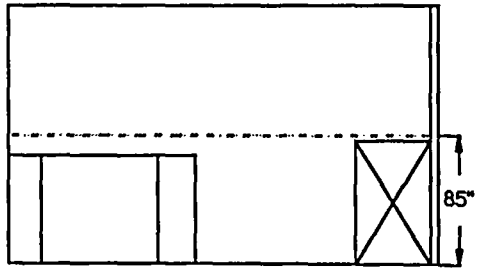
South Wall

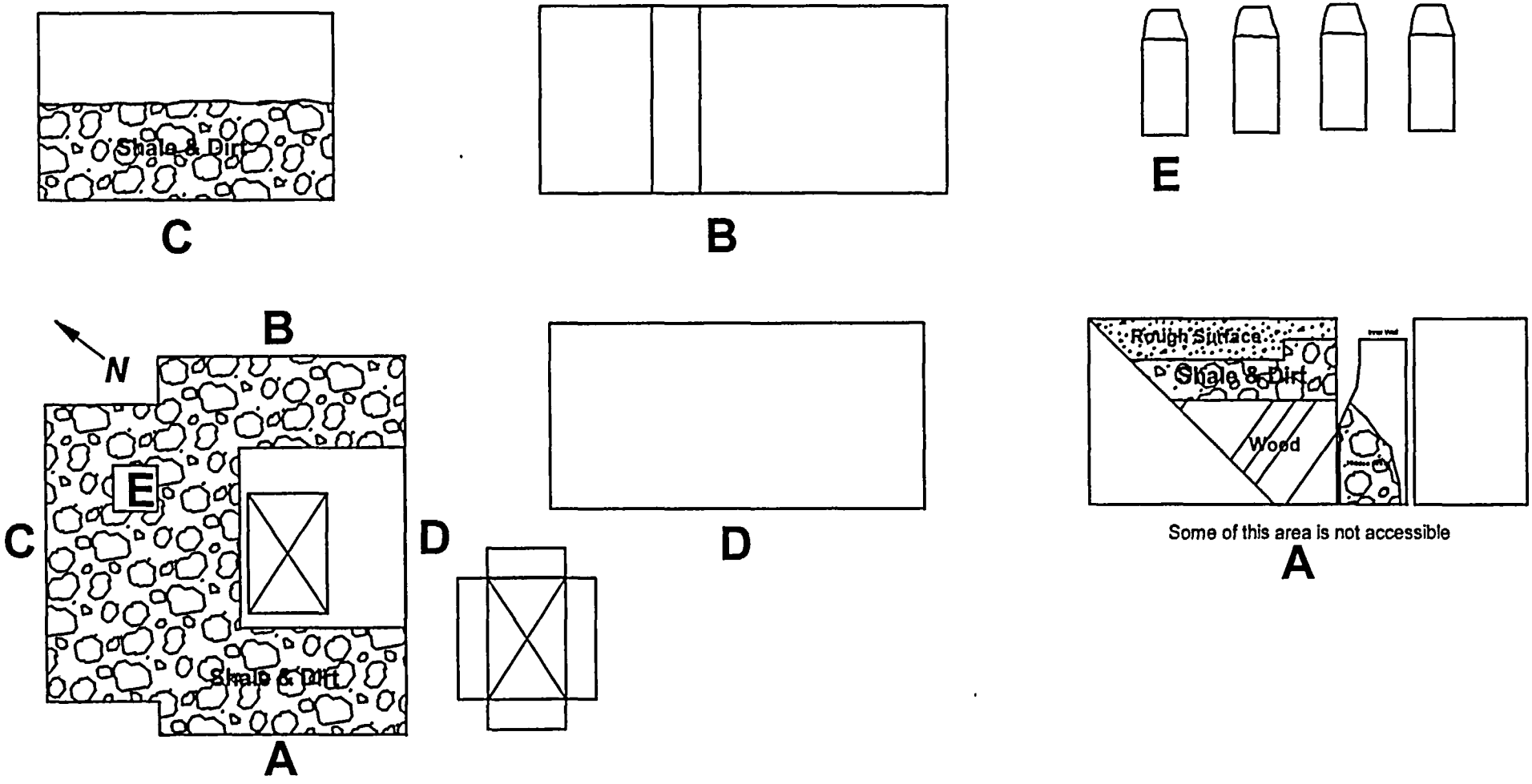


D
East Wall

ATTACHMENT 1 . 1

ENTRANCE TO DISCHARGE TUNNEL

SS23-1 & SS23-2



ATTACHMENT 1 . 2

2350 INSTRUMENT AND PROBE EFFICIENCY CHART

7/01/04 (Typical 2" by 2" NaI (Cs-137 W) Conversion Factors)

Inst.#	Cal Due	AP #		Probe #	Cal Due	cpm/mR/h
98625	5/18/05	R & Y		211680 Pk	5/18/05	214.882
98647	5/18/05	G &Y		211667 Pk	5/18/05	218.807
129423	5/18/05	P &Y		211687 Pk	5/18/05	213.539
117573	5/18/05	O &Y		211674 Pk	5/18/05	212.173
117566	4/9/05	G&R		185852 Pk	4/13/05	209.862
126183	11/19/04	B&R		206280 Pk	12/12/04	190,907
129429	11/3/04	Y&W		206283 Pk	10/31/04	177185
126198	11/03/04	R&W		196021Pk	5/25/05	209.194
126172	6/07/05	G&W		196022	6/07/05	208.302
129440	4/09/05	O&W		210938 Pk	4/14/05	205.603
120588	6/08/05	B&W		185844 Pk	6/09/05	216.654
95361	6/25/05	P&W		025686	6/28/05	211.799

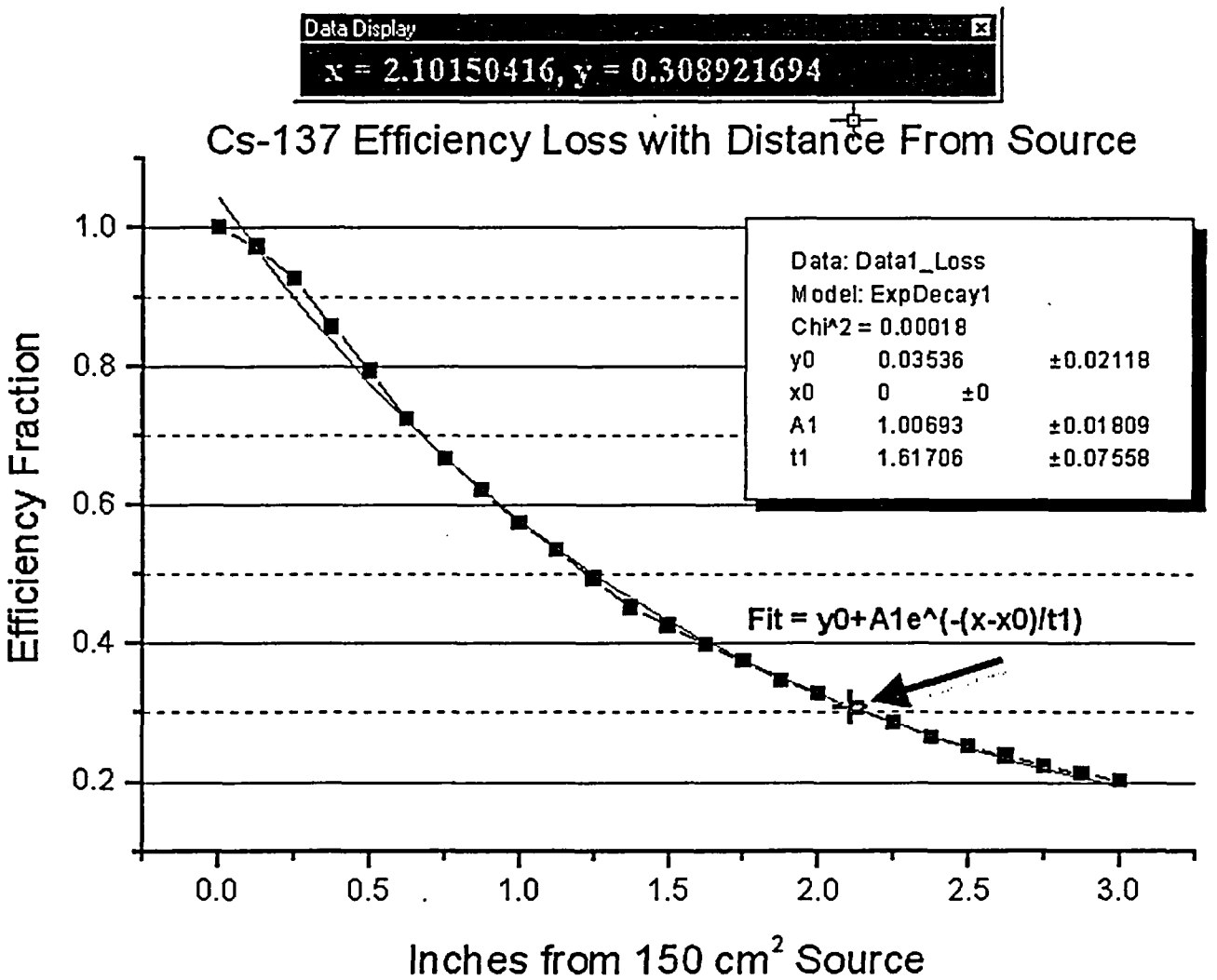
ATTACHMENT 2.1

2350 INSTRUMENT AND PROBE EFFICIENCY CHART

7/01/04 (Typical 43-68 Beta Efficiency Factors)

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

INST #	INST C/D	43-68 PROBE #	PROBE C/D	44-10 PROBE #	PROBE C/D	BETA EFF	ALPHA EFF
79037	04/05/05	122014	04/23/05			25.2%	N/A
126188	1/27/05	099186	1/27/05			28.2%	N/A
126218	01/08/05	095080	01/09/05			27.9%	N/A



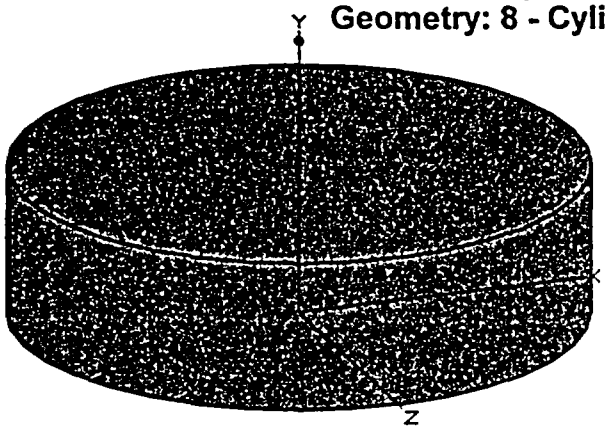
ATTACHMENT 3 . 1

MicroShield v5.05 (5.05-00121)
GPU Nuclear

Page : 1
DOS File : DTEA.MS5
Run Date: August 30, 2004
Run Time: 10:21:06 AM
Duration : 00:00:01

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

Case Title: Stone/Soil
Description: Density 2 g/cc, 6" Cylinder @ 5" from Surface
Geometry: 8 - Cylinder Volume - End Shields



Source Dimensions

Height	15.24 cm	6.0 in
Radius	28.21 cm	11.1 in

Dose Points

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

Shields

Shield Name	Dimension	Material	Density
Source	2325.091 in³	Concrete	2
Air Gap		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	µCi/cm³	Bq/cm³
Ba-137m	7.2088e-008	2.6673e+003	1.8920e-006	7.0004e-002
Cs-137	7.6203e-008	2.8195e+003	2.0000e-006	7.4000e-002

Buildup
The material reference is : Source

Integration Parameters

Radial	40
Circumferential	40
Y Direction (axial)	40

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	5.522e+01	6.811e-06	8.245e-06	5.673e-08	6.868e-08
0.0322	1.019e+02	1.310e-05	1.595e-05	1.054e-07	1.284e-07
0.0364	3.707e+01	7.262e-06	9.488e-06	4.126e-08	5.391e-08
0.6616	2.400e+03	6.601e-02	1.243e-01	1.280e-04	2.410e-04
TOTALS:	2.594e+03	6.604e-02	1.244e-01	1.282e-04	2.413e-04

ATTACHMENT 4 . 1

NaI Scan MDC Calculation

$b := 100$ $p := 0.5$ $HS_d := 56.4$ $SR := 25$ $d := 1.38$

$Conv := 208.302$ $MS_{output} := 2.41 \cdot 10^{-4}$ $O_i := \frac{HS_d}{SR}$

$O_i = 2.256$ *Observation Interval (seconds)*

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

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

$MDCR_i = 71.168$ *net counts per minute*

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

$MDCR_{surveyor} = 100.647$ *net counts per minute*

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

$MDER = 0.483$ µR/h

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

$MDC_{scan} = 2.005$ pCi/g C_s-137

BHB 8/30/04

NaI Scan MDC Calculation

$b := 200$ $p := 0.5$ $HS_d := 56.4$ $SR := 25$ $d := 1.38$

$Conv := 208.302$ $MS_{output} := 2.41 \cdot 10^{-4}$ $O_i := \frac{HS_d}{SR}$

$O_i = 2.256$ *Observation Interval (seconds)*

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

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

$MDCR_i = 100.647$ *net counts per minute*

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

$MDCR_{surveyor} = 142.336$ *net counts per minute*

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

$MDER = 0.683$ μR/h

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

$MDC_{scan} = 2.835$ pCi/g Cs-137

RHB 8/29/04

where:

b = background in counts per minute

b_i = background counts in observation interval

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

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

HS_d = hot spot diameter (in centimeters)

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

$MDCR_i$ = Minimum Detectable Count Rate (ncpm)

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

MDER = Minimum Detectable Exposure Rate (uR/h)

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

O_i = obervation Interval (seconds)

p = human performance factor

SR = scan rate in centimeters per second

Beta Scan Measurement MDC Calculation

Concrete Surface in Upper SPR & DTEA

$\varepsilon_i := .478$ $\varepsilon_s := .5 \cdot .31 \cdot .982$ $b := 306$ $p := 0.5$ $W_d := 8.8$ $S_r := 2.2$ $d := 1.38$ $A := 100$

$\frac{W_d}{S_r} = 4$ *Observation Interval (seconds)*

$O_i := \frac{W_d}{S_r}$ *Observation Interval (seconds)*

$\varepsilon_t := \varepsilon_i \cdot \varepsilon_s$

$\varepsilon_t = 0.0728$

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

$b_i = 20.4$ *Counts in observation Interval*

$$C := \frac{1}{\left(\varepsilon_i \cdot \varepsilon_s \cdot \frac{A}{100}\right) \cdot \sqrt{p}}$$

$C = 19.438$

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

$MDCR_i = 93.5$ *net counts per minute*

$MDCR_i + b = 399.494$ *gross counts per minute*

$\frac{MDCR_i}{O_i} = 23.4$ *net counts per minute in observation interval*

$MDC_{scan} := C \cdot MDCR_i$

$MDC_{scan} = 1.817 \cdot 10^3$ *dpm per 100 cm^2*

where:

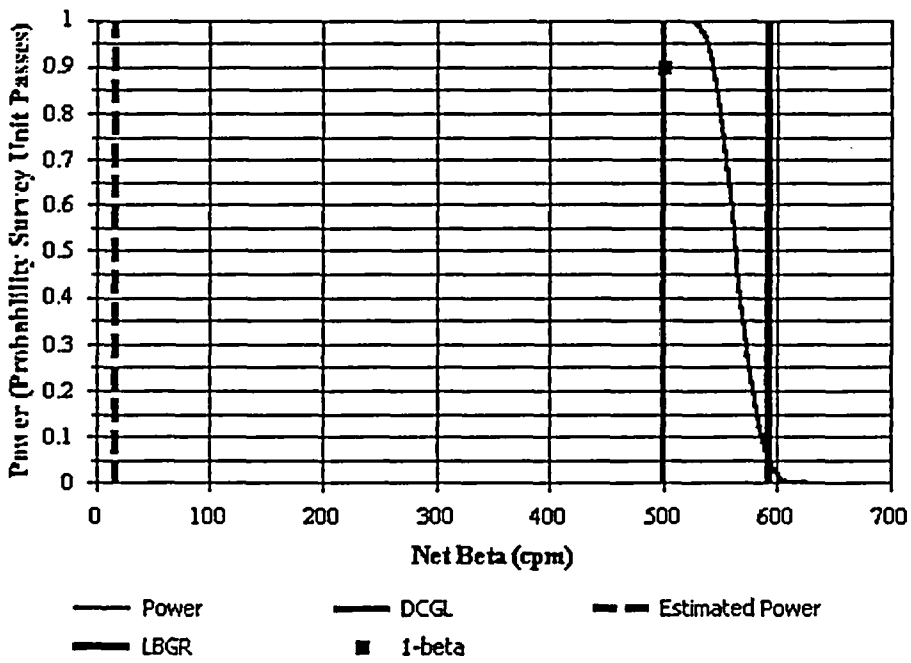
b = background counts per minute
b_i = background counts in observation interval
p = human performance factor
W_d = detector width in centimeters
S_r = scan rate in centimeters per second
d = index of sensitivity (Table 6.5 MARSSIM), 1.38 = 95% of correct detection's, 60% false positives
MDC_{scan} = Minimum Detectable Concentration for scanning (dpm/100 square centimeters)
C = constant used to convert MDCR to MDC
ε_i = instrument efficiency (counts/emission)
ε_s = source efficiency (emissions/disintegration)
A = instrument physical probe area (in square centimeters)

Building Surface Survey Plan

Survey Plan Summary

Site:	Upper Spray Pump Bldg.		
Planner(s):	BHB		
Survey Unit Name:	Spray Pump Bldg. Floor @ El. 785' SS9-2 BHB 9/26/04		
Comments:			
Area (m²):	30	Classification:	2
Selected Test:	WRS	Estimated Sigma (cpm):	34.5
DCGL (cpm):	593	Sample Size (N/2):	9
LBGR (cpm):	500	Estimated Conc. (cpm):	17
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100		

Prospective Power Curve



ATTACHMENT 5.1

Building Surface Survey Plan

Contaminant Summary

S59-2 BWB 8/26/04

Contaminant	DCGLw (dpm/100 cm²)
Gross Activity	6,726

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 6,726
Total Efficiency: 0.07
Gross Beta DCGLw (cpm): 593

ID	Type	Mode	Area (cm²)
26	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Gross Activity	187.87	1.0000	0.48	0.15	0.0728

[1] Average beta energy (keV) [N/A indicates alpha emission]
[2] Activity fraction

Gross Survey Unit Mean (cpm): 323 ± 34 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Concrete	31	306	34.5	956

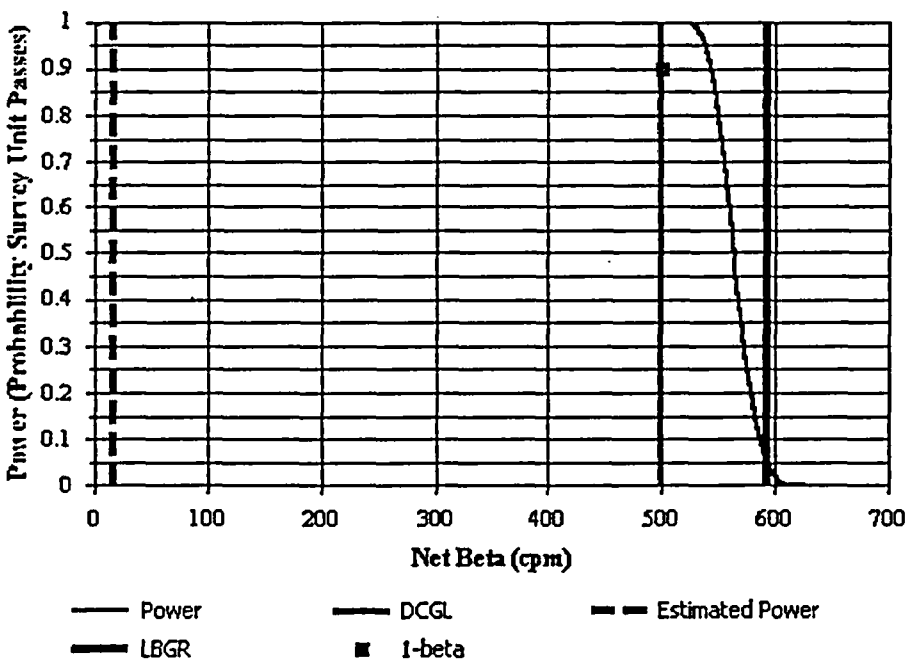
ATTACHMENT 5 . 2

Building Surface Survey Plan

Survey Plan Summary

Site:	Upper Spray Pump Bldg.		
Planner(s):	BHB		
Survey Unit Name:	Walls of Spray Pump Bldg. to El. ~802'		
Comments:	SS11-1		
Area (m²):	60	Classification:	2
Selected Test:	WRS	Estimated Sigma (cpm):	34.5
DCGL (cpm):	593	Sample Size (N/2):	9
LBGR (cpm):	500	Estimated Conc. (cpm):	17
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100		

Prospective Power Curve



ATTACHMENT 5 . 3

Building Surface Survey Plan

Contaminant Summary

5511-1 BHB 8/26/04

Contaminant	DCGLw (dpm/100 cm²)
Gross Activity	6,726

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 6,726
Total Efficiency: 0.07
Gross Beta DCGLw (cpm): 593

ID	Type	Mode	Area (cm²)
26	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Gross Activity	187.87	1.0000	0.48	0.15	0.0728

[1] Average beta energy (keV) [N/A indicates alpha emission]
[2] Activity fraction

Gross Survey Unit Mean (cpm): 323 ± 34 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Concrete	31	306	34.5	956

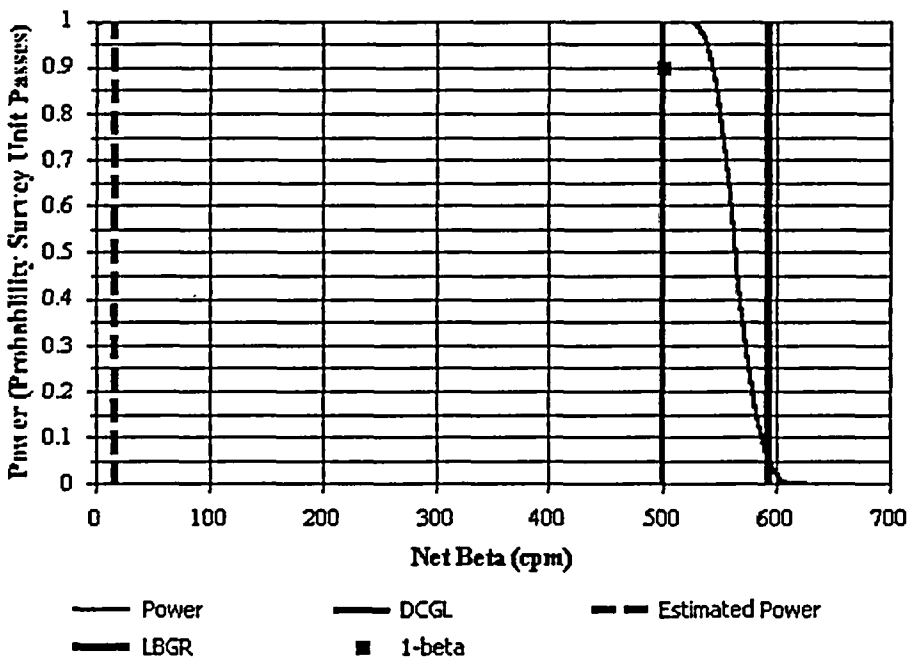
ATTACHMENT 5-4

Building Surface Survey Plan

Survey Plan Summary

Site:	Upper Spray Pump Bldg.		
Planner(s):	BHB		
Survey Unit Name:	Walls of Spray Pump Bldg. Above El. ~802'		
Comments:	SS11-2		
Area (m²):	58	Classification:	3
Selected Test:	WRS	Estimated Sigma (cpm):	34.5
DCGL (cpm):	593	Sample Size (N/2):	9
LBGR (cpm):	500	Estimated Conc. (cpm):	17
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100		

Prospective Power Curve



ATTACHMENT 5.5

Building Surface Survey Plan

Contaminant Summary

SS11-2 BHB 8/26/04

Contaminant	DCGLw (dpm/100 cm²)
Gross Activity	6,726

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 6,726
Total Efficiency: 0.07
Gross Beta DCGLw (cpm): 593

ID	Type	Mode	Area (cm²)
26	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Gross Activity	187.87	1.0000	0.48	0.15	0.0728

[1] Average beta energy (keV) [N/A indicates alpha emission]
[2] Activity fraction

Gross Survey Unit Mean (cpm): 323 ± 34 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Concrete	31	306	34.5	956

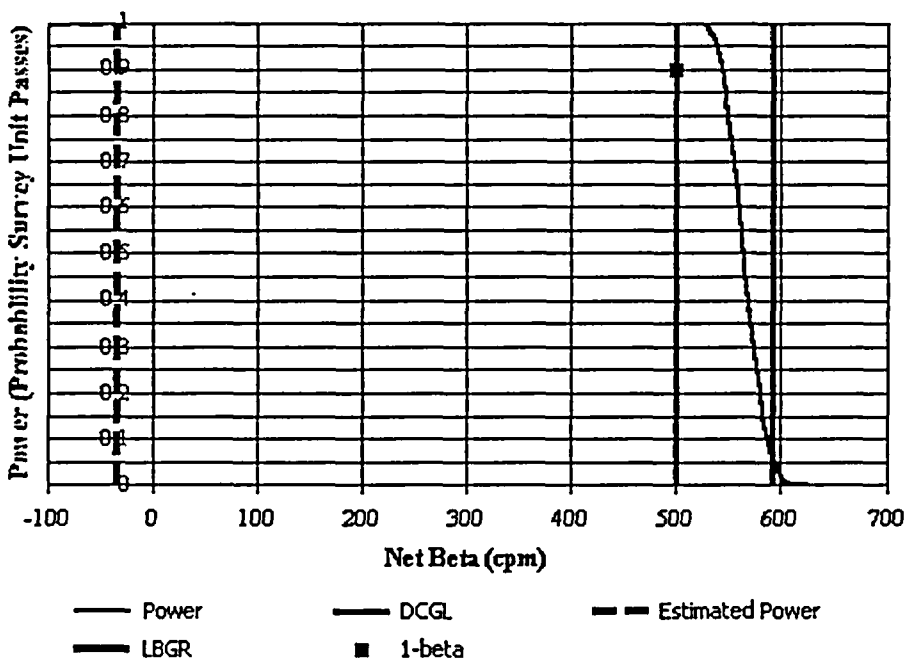
ATTACHMENT 5.6

Building Surface Survey Plan

Survey Plan Summary

Site:	DT Entrance		
Planner(s):	BHB		
Survey Unit Name:	Entrance to Discharge Tunnel - Concrete		
Comments:	SS23-1		
Area (m²):	66	Classification:	2
Selected Test:	WRS	Estimated Sigma (cpm):	34.5
DCGL (cpm):	593	Sample Size (N/2):	9
LBGR (cpm):	500	Estimated Conc. (cpm):	-35
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100		

Prospective Power Curve



ATTACHMENT 5 . 7

Building Surface Survey Plan

Contaminant Summary

5523-1 BNB
8/26/04

Contaminant	DCGLw (dpm/100 cm²)
Gross Activity	6,726

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 6,726
Total Efficiency: 0.07
Gross Beta DCGLw (cpm): 593

ID	Type	Mode	Area (cm²)
27	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Gross Activity	187.87	1.0000	0.48	0.15	0.0728

[1] Average beta energy (keV) [N/A indicates alpha emission]
[2] Activity fraction

Gross Survey Unit Mean (cpm): 271 ± 29 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Concrete	31	306	34.5	956

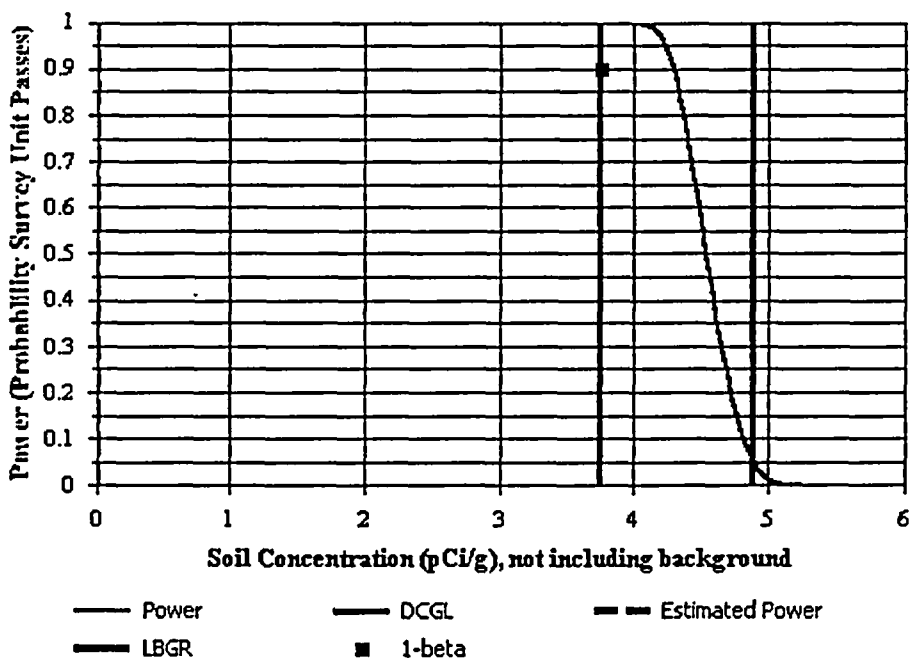
ATTACHMENT 5 - 8

Surface Soil Survey Plan

Survey Plan Summary

Site:	Entrance to Discharge Tunnel - Stone/Soil		
Planner(s):	BHB		
Survey Unit Name:	Entrance to Discharge Tunnel - Stone/Soil		
Comments:	SS23-2		
Area (m^2):	31	Classification:	2
Selected Test:	WRS	Estimated Sigma (pCi/g):	0.39
DCGL (pCi/g):	4.89	Sample Size (N/2):	8
LBGR (pCi/g):	3.75	Estimated Conc. (pCi/g):	0
Alpha:	0.050	Estimated Power:	1
Beta:	0.100		

Prospective Power Curve



ATTACHMENT 5.9

Surface Soil Survey Plan

Contaminant Summary

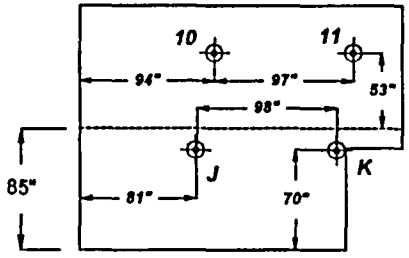
Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Cs-137	4.89	N/A	N/A	N/A	N/A

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

ATTACHMENT 5 . 10

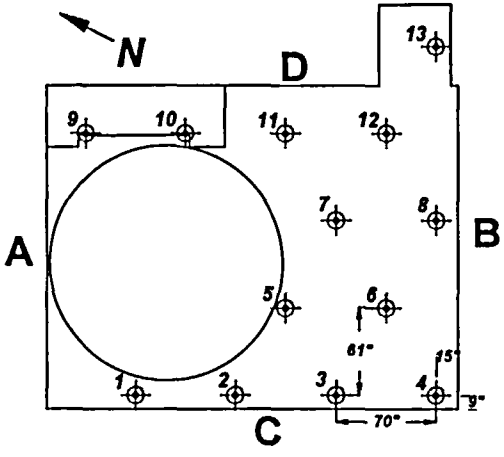
SPRAY PUMP ROOM, 795' El & ABOVE

SS9-2, SS11-1 & SS11-2



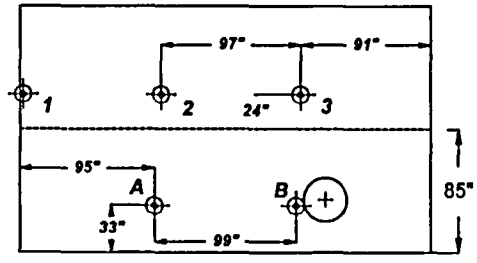
North Wall

A



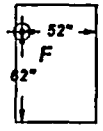
C

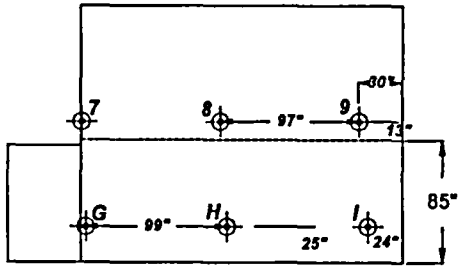
795' El Floor



C

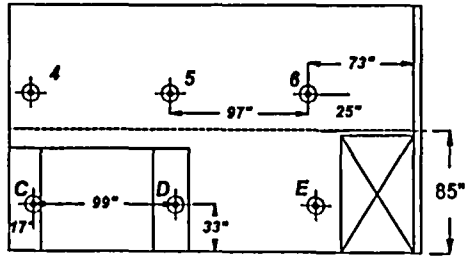
West Wall





B

South Wall



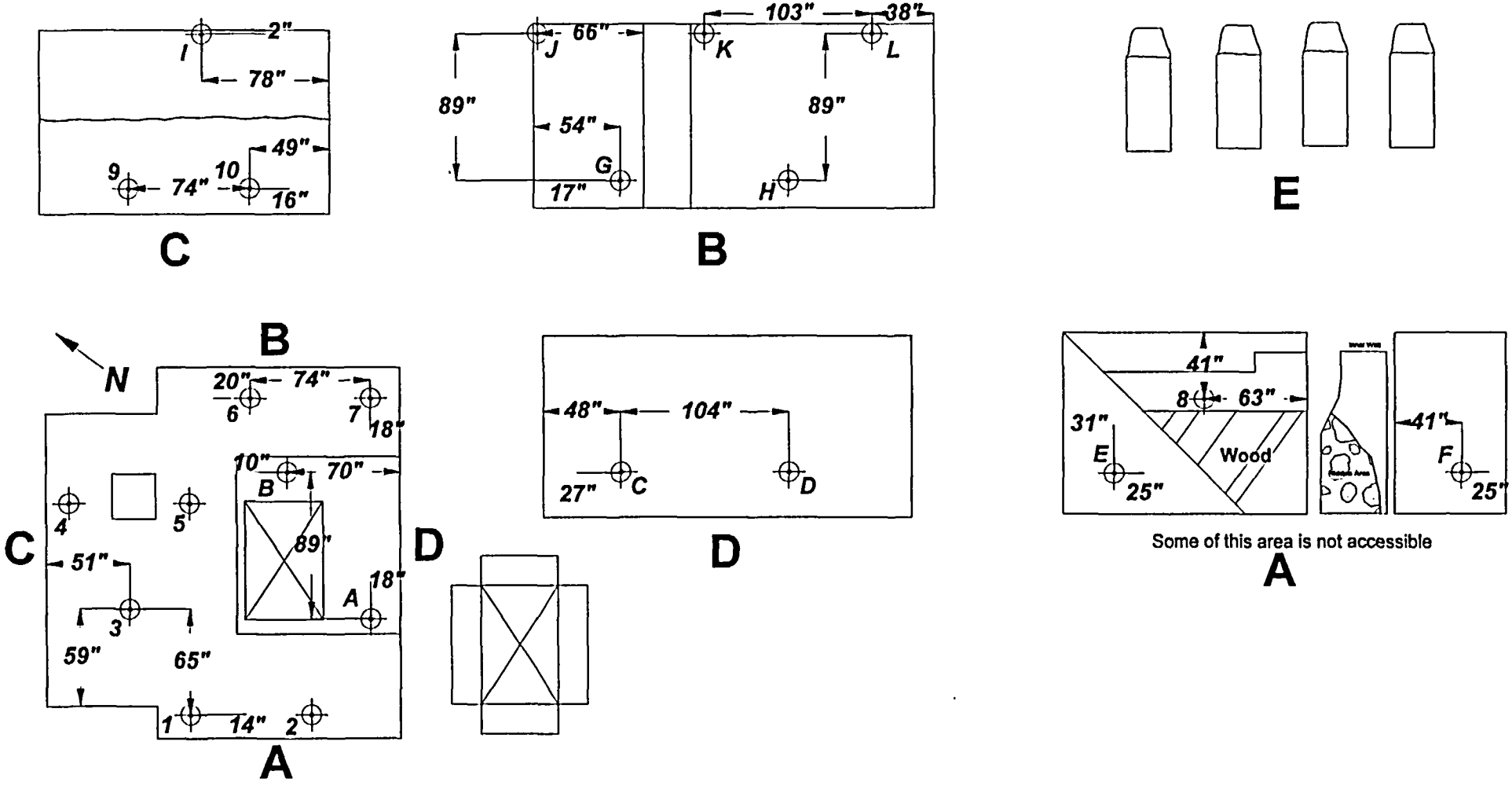
D

East Wall

ATTACHMENT 6 . 1

ENTRANCE TO DISCHARGE TUNNEL

SS23-1 & SS23-2



ATTACHMENT 6.2

SPRAY PUMP BLDG. 795' El. FLOOR & ABOVE - CONCRETE

	Instrument 126188	Lane/Graham						SR-108		FSS-491	BHB
No.	Location	Date	Time	Detector	Counts	Count Time (sec)	Mode	Designator		Shielded	Unshielded
4	SS9 FP1S	3/31/2004	13:47	1	2.56E+02	60	SCL	Shielded	β	2.56E+02	
5	SS9 FP1U	3/31/2004	13:48	1	3.43E+02	60	SCL	Unshielded	β		3.43E+02
6	SS9 FP2S	3/31/2004	14:03	1	2.61E+02	60	SCL	Shielded	β	2.61E+02	
7	SS9 FP2U	3/31/2004	14:05	1	3.36E+02	60	SCL	Unshielded	β		3.36E+02
8	SS9 FP3S	3/31/2004	14:07	1	2.60E+02	60	SCL	Shielded	β	2.60E+02	
10	SS9 FP3U	3/31/2004	14:10	1	3.78E+02	60	SCL	Unshielded	β		3.78E+02
11	SS9 FP4S	3/31/2004	14:12	1	2.55E+02	60	SCL	Shielded	β	2.55E+02	
12	SS9 FP4U	3/31/2004	14:15	1	3.64E+02	60	SCL	Unshielded	β		3.64E+02
13	SS9 FP5S	3/31/2004	14:17	1	2.60E+02	60	SCL	Shielded	β	2.60E+02	
14	SS9 FP5U	3/31/2004	14:19	1	3.34E+02	60	SCL	Unshielded	β		3.34E+02
15	SS11 FP6S	3/31/2004	14:21	1	2.07E+02	60	SCL	Shielded	β	2.07E+02	
16	SS11 FP6U	3/31/2004	14:24	1	3.07E+02	60	SCL	Unshielded	β		3.07E+02
17	SS11 FP7S	3/31/2004	14:26	1	2.08E+02	60	SCL	Shielded	β	2.08E+02	
18	SS11 FP7U	3/31/2004	14:27	1	2.85E+02	60	SCL	Unshielded	β		2.85E+02
19	SS11 FP8S	3/31/2004	14:29	1	2.10E+02	60	SCL	Shielded	β	2.10E+02	
20	SS11 FP8U	3/31/2004	14:31	1	3.05E+02	60	SCL	Unshielded	β		3.05E+02
21	SS11 FP9S	3/31/2004	14:32	1	2.07E+02	60	SCL	Shielded	β	2.07E+02	
22	SS11 FP9U	3/31/2004	14:34	1	2.75E+02	60	SCL	Unshielded	β		2.75E+02
23	SS9 FP10S	3/31/2004	14:36	1	1.95E+02	60	SCL	Shielded	β	1.95E+02	
24	SS9 FP10U	3/31/2004	14:37	1	3.00E+02	60	SCL	Unshielded	β		3.00E+02
								Minimum ⇒		1.95E+02	2.75E+02
								Maximum ⇒		2.61E+02	3.78E+02
								Mean ⇒		2.32E+02	3.23E+02
								Sigma ⇒		2.83E+01	3.38E+01

ATTACHMENT 7 . 1

ENTRANCE TO DISCHARGE TUNNEL CONCRETE

37122N21 Instrument 126188 BH4008

No.	Location	Date	Time	Detector	Counts	Count Time (sec)	Mode	Designator		FSS-912 Shielded	BHB Unshielded
2	SS23 EW1S	8/12/2004	10:56	1	1.99E+02	60	SCL	Shielded	β	1.99E+02	
3	SS23 EW1U	8/12/2004	10:58	1	2.56E+02	60	SCL	Unshielded	β		2.56E+02
4	SS23EW2S	8/12/2004	11:00	1	2.23E+02	60	SCL	Shielded	β	2.23E+02	
5	SS23EW2U	8/12/2004	11:01	1	3.06E+02	60	SCL	Unshielded	β		3.06E+02
6	SS23EW3S	8/12/2004	11:03	1	1.89E+02	60	SCL	Shielded	β	1.89E+02	
7	SS23EW3U	8/12/2004	11:04	1	2.61E+02	60	SCL	Unshielded	β		2.61E+02
8	SS23EW4S	8/12/2004	11:06	1	1.86E+02	60	SCL	Shielded	β	1.86E+02	
9	SS23EW4U	8/12/2004	11:07	1	2.53E+02	60	SCL	Unshielded	β		2.53E+02
10	SS23EW5S	8/12/2004	11:08	1	2.05E+02	60	SCL	Shielded	β	2.05E+02	
11	SS23EW5U	8/12/2004	11:12	1	2.40E+02	60	SCL	Unshielded	β		2.40E+02
15	SS23EW6S	8/12/2004	11:21	1	2.06E+02	60	SCL	Shielded	β	2.06E+02	
16	SS23EW6U	8/12/2004	11:23	1	2.23E+02	60	SCL	Unshielded	β		2.23E+02
17	SS23EW7S	8/12/2004	11:24	1	2.08E+02	60	SCL	Shielded	β	2.08E+02	
18	SS23EW7U	8/12/2004	11:26	1	2.38E+02	60	SCL	Unshielded	β		2.38E+02
19	SS23EW8S	8/12/2004	11:28	1	1.92E+02	60	SCL	Shielded	β	1.92E+02	
20	SS23EW8U	8/12/2004	11:29	1	2.52E+02	60	SCL	Unshielded	β		2.52E+02
24	SS23SW1S	8/12/2004	13:02	1	1.73E+02	60	SCL	Shielded	β	1.73E+02	
25	SS23SW1U	8/12/2004	13:03	1	2.31E+02	60	SCL	Unshielded	β		2.31E+02
26	SS23SW2S	8/12/2004	13:04	1	2.13E+02	60	SCL	Shielded	β	2.13E+02	
27	SS23SW2U	8/12/2004	13:06	1	2.50E+02	60	SCL	Unshielded	β		2.50E+02
28	SS23SW3S	8/12/2004	13:08	1	2.04E+02	60	SCL	Shielded	β	2.04E+02	
29	SS23SW3U	8/12/2004	13:09	1	2.50E+02	60	SCL	Unshielded	β		2.50E+02
30	SS23SW4S	8/12/2004	13:10	1	1.98E+02	60	SCL	Shielded	β	1.98E+02	
31	SS23SW4U	8/12/2004	13:12	1	2.70E+02	60	SCL	Unshielded	β		2.70E+02
32	SS23SW5S	8/12/2004	13:13	1	1.97E+02	60	SCL	Shielded	β	1.97E+02	
33	SS23SW5U	8/12/2004	13:14	1	2.87E+02	60	SCL	Unshielded	β		2.87E+02
34	SS23SW6S	8/12/2004	13:16	1	1.95E+02	60	SCL	Shielded	β	1.95E+02	
35	SS23SW6U	8/12/2004	13:17	1	2.81E+02	60	SCL	Unshielded	β		2.81E+02
36	SS23SW7S	8/12/2004	13:18	1	2.19E+02	60	SCL	Shielded	β	2.19E+02	
37	SS23SW7U	8/12/2004	13:19	1	2.73E+02	60	SCL	Unshielded	β		2.73E+02
38	SS23SW8S	8/12/2004	13:22	1	2.07E+02	60	SCL	Shielded	β	2.07E+02	
39	SS23SW8U	8/12/2004	13:23	1	2.79E+02	60	SCL	Unshielded	β		2.79E+02
40	SS23SW9S	8/12/2004	13:24	1	2.14E+02	60	SCL	Shielded	β	2.14E+02	
41	SS23SW9U	8/12/2004	13:26	1	2.54E+02	60	SCL	Unshielded	β		2.54E+02
42	SS23SW10S	8/12/2004	13:27	1	2.18E+02	60	SCL	Shielded	β	2.18E+02	
43	SS23SW10U	8/12/2004	13:28	1	2.88E+02	60	SCL	Unshielded	β		2.88E+02
47	SS23WW1S	8/12/2004	13:39	1	1.88E+02	60	SCL	Shielded	β	1.88E+02	
48	SS23WW1U	8/12/2004	13:40	1	2.75E+02	60	SCL	Unshielded	β		2.75E+02
49	SS23WW2S	8/12/2004	13:41	1	2.04E+02	60	SCL	Shielded	β	2.04E+02	
50	SS23WW2U	8/12/2004	13:43	1	3.03E+02	60	SCL	Unshielded	β		3.03E+02
51	SS23WW3S	8/12/2004	13:44	1	2.60E+02	60	SCL	Shielded	β	2.60E+02	
52	SS23WW3U	8/12/2004	13:45	1	3.29E+02	60	SCL	Unshielded	β		3.29E+02
53	SS23WW4S	8/12/2004	13:47	1	2.80E+02	60	SCL	Shielded	β	2.80E+02	
54	SS23WW4U	8/12/2004	13:48	1	3.12E+02	60	SCL	Unshielded	β		3.12E+02
55	SS23WW5S	8/12/2004	13:49	1	2.26E+02	60	SCL	Shielded	β	2.26E+02	
56	SS23WW5U	8/12/2004	13:51	1	3.13E+02	60	SCL	Unshielded	β		3.13E+02
57	SS23WW6S	8/12/2004	13:52	1	2.55E+02	60	SCL	Shielded	β	2.55E+02	
58	SS23WW6U	8/12/2004	13:53	1	2.95E+02	60	SCL	Unshielded	β		2.95E+02
63	SS-23 NW1S	8/16/2004	9:02	1	1.83E+02	60	SCL	Shielded	β	1.83E+02	
64	SS-23 NW1U	8/16/2004	9:04	1	2.32E+02	60	SCL	Unshielded	β		2.32E+02
65	SS-23 NW2S	8/16/2004	9:06	1	1.87E+02	60	SCL	Shielded	β	1.87E+02	
66	SS-23 NW2U	8/16/2004	9:07	1	2.76E+02	60	SCL	Unshielded	β		2.76E+02
67	SS-23 NW3S	8/16/2004	9:08	1	2.06E+02	60	SCL	Shielded	β	2.06E+02	
68	SS-23 NW3U	8/16/2004	9:10	1	2.91E+02	60	SCL	Unshielded	β		2.91E+02
69	SS-23 NW4S	8/16/2004	9:11	1	2.01E+02	60	SCL	Shielded	β	2.01E+02	
70	SS-23 NW4U	8/16/2004	9:13	1	2.29E+02	60	SCL	Unshielded	β		2.29E+02
71	SS-23 NW5S	8/16/2004	9:14	1	2.44E+02	60	SCL	Shielded	β	2.44E+02	
72	SS-23 NW5U	8/16/2004	9:15	1	3.20E+02	60	SCL	Unshielded	β		3.20E+02
73	SS-23 NW6S	8/16/2004	9:17	1	2.14E+02	60	SCL	Shielded	β	2.14E+02	
74	SS-23 NW6U	8/16/2004	9:18	1	2.77E+02	60	SCL	Unshielded	β		2.77E+02
								Minimum ⇒		1.73E+02	2.23E+02
								Maximum ⇒		2.80E+02	3.29E+02
								Mean ⇒		2.10E+02	2.71E+02
								Sigma ⇒		2.39E+01	2.91E+01

ATTACHMENT 7 . 2

Williamsburg Concrete Background Measurements

37122N21	Instrument 95348	RLM6220	Time	Detector	Counts	Count Time (sec)	Mode	Designator		FSS-001	BHB
0	BKGND	1/4/2002	8:52	1	7.26E+03	1800	SCL	Inital Background	β		
1	Source Check	1/4/2002	9:07	1	1.79E+05	60	SCL	Source	β		
2	BKGND	1/4/2002	10:05	2	4.40E+01	1800	SCL	Inital Background	α	Concrete CF(cpm) ⇒	0
14	Source Check	1/4/2002	10:39	2	1.51E+05	60	SCL	Source	α	Shielded	Unshielded
15	CON A1S	1/4/2002	13:00	1	2.78E+02	60	SCL	Shielded	β	2.78E+02	
16	CON A1U	1/4/2002	13:02	1	3.88E+02	60	SCL	Unshielded	β		3.88E+02
17	CON A2S	1/4/2002	13:20	1	2.39E+02	60	SCL	Shielded	β	2.39E+02	
18	CON A2U	1/4/2002	13:21	1	2.22E+02	60	SCL	Unshielded	β		2.22E+02
19	CON A3S	1/4/2002	13:28	1	2.39E+02	60	SCL	Shielded	β	2.39E+02	
20	CON A3U	1/4/2002	13:30	1	2.62E+02	60	SCL	Unshielded	β		2.62E+02
21	CON A4S	1/4/2002	13:36	1	2.45E+02	60	SCL	Shielded	β	2.45E+02	
22	CON A4U	1/4/2002	13:38	1	2.71E+02	60	SCL	Unshielded	β		2.71E+02
23	CON A5S	1/4/2002	13:58	1	2.00E+02	60	SCL	Shielded	β	2.00E+02	
24	CON A5U	1/4/2002	14:00	1	2.82E+02	60	SCL	Unshielded	β		2.82E+02
25	CON A6S	1/4/2002	14:03	1	1.84E+02	60	SCL	Shielded	β	1.84E+02	
26	CON A6U	1/4/2002	14:05	1	3.10E+02	60	SCL	Unshielded	β		3.10E+02
27	CON A7S	1/4/2002	14:09	1	1.98E+02	60	SCL	Shielded	β	1.98E+02	
28	CON A7U	1/4/2002	14:10	1	3.15E+02	60	SCL	Unshielded	β		3.15E+02
29	CON A8S	1/4/2002	14:19	1	2.34E+02	60	SCL	Shielded	β	2.34E+02	
30	CON A8S	1/4/2002	14:22	1	2.31E+02	60	SCL	Shielded	β	2.31E+02	
31	CON A8U	1/4/2002	14:24	1	2.88E+02	60	SCL	Unshielded	β		2.88E+02
32	CON A9S	1/4/2002	14:31	1	2.65E+02	60	SCL	Shielded	β	2.65E+02	
33	CON A9U	1/4/2002	14:33	1	2.89E+02	60	SCL	Unshielded	β		2.89E+02
34	CON A10S	1/4/2002	14:42	1	2.46E+02	60	SCL	Shielded	β	2.46E+02	
35	CON A10U	1/4/2002	14:43	1	3.16E+02	60	SCL	Unshielded	β		3.16E+02
36	CON A11S	1/4/2002	15:10	1	1.95E+02	60	SCL	Shielded	β	1.95E+02	
37	CON A11U	1/4/2002	15:12	1	2.94E+02	60	SCL	Unshielded	β		2.94E+02
38	CON A12S	1/4/2002	15:13	1	2.21E+02	60	SCL	Shielded	β	2.21E+02	
39	CON A12U	1/4/2002	15:14	1	2.84E+02	60	SCL	Unshielded	β		2.84E+02
40	CON A13S	1/4/2002	15:23	1	1.74E+02	60	SCL	Shielded	β	1.74E+02	
41	CON A13U	1/4/2002	15:24	1	2.94E+02	60	SCL	Unshielded	β		2.94E+02
42	CON A14S	1/4/2002	15:25	1	1.96E+02	60	SCL	Shielded	β	1.96E+02	
43	CON A14U	1/4/2002	15:26	1	3.33E+02	60	SCL	Unshielded	β		3.33E+02
44	CON A15S	1/4/2002	15:28	1	2.16E+02	60	SCL	Shielded	β	2.16E+02	
45	CON A15U	1/4/2002	15:29	1	3.45E+02	60	SCL	Unshielded	β		3.45E+02
46	CON A16S	1/4/2002	15:30	1	1.83E+02	60	SCL	Shielded	β	1.83E+02	
47	CON A16U	1/4/2002	15:31	1	3.13E+02	60	SCL	Unshielded	β		3.13E+02
48	CON A17S	1/4/2002	15:33	1	1.82E+02	60	SCL	Shielded	β	1.82E+02	
49	CON A17U	1/4/2002	15:34	1	3.22E+02	60	SCL	Unshielded	β		3.22E+02
50	CON A18S	1/4/2002	15:35	1	1.84E+02	60	SCL	Shielded	β	1.84E+02	
51	CON A18U	1/4/2002	15:36	1	3.24E+02	60	SCL	Unshielded	β		3.24E+02
52	CON A19S	1/4/2002	15:37	1	1.91E+02	60	SCL	Shielded	β	1.91E+02	
53	CON A19U	1/4/2002	15:39	1	3.07E+02	60	SCL	Unshielded	β		3.07E+02
54	CON A20S	1/4/2002	15:40	1	1.94E+02	60	SCL	Shielded	β	1.94E+02	
55	CON A20U	1/4/2002	15:41	1	3.33E+02	60	SCL	Unshielded	β		3.33E+02
56	CON A21S	1/4/2002	15:57	1	2.23E+02	60	SCL	Shielded	β	2.23E+02	
57	CON A21U	1/4/2002	15:58	1	2.92E+02	60	SCL	Unshielded	β		2.92E+02
58	CON A22S	1/4/2002	15:59	1	1.72E+02	60	SCL	Shielded	β	1.72E+02	
59	CON A22U	1/4/2002	16:00	1	2.80E+02	60	SCL	Unshielded	β		2.80E+02
60	CON A23S	1/4/2002	16:01	1	1.94E+02	60	SCL	Shielded	β	1.94E+02	
61	CON A23U	1/4/2002	16:02	1	3.29E+02	60	SCL	Unshielded	β		3.29E+02
62	CON A24S	1/4/2002	16:04	1	1.87E+02	60	SCL	Shielded	β	1.87E+02	
63	CON A24U	1/4/2002	16:05	1	3.48E+02	60	SCL	Unshielded	β		3.48E+02
64	CON A25S	1/4/2002	16:06	1	2.07E+02	60	SCL	Shielded	β	2.07E+02	
65	CON A25U	1/4/2002	16:07	1	3.72E+02	60	SCL	Unshielded	β		3.72E+02
66	CON A26S	1/4/2002	16:09	1	2.09E+02	60	SCL	Shielded	β	2.09E+02	
67	CON A26U	1/4/2002	16:10	1	3.26E+02	60	SCL	Unshielded	β		3.26E+02
68	CON A27S	1/4/2002	16:11	1	2.07E+02	60	SCL	Shielded	β	2.07E+02	
69	CON A27U	1/4/2002	16:12	1	3.30E+02	60	SCL	Unshielded	β		3.30E+02
70	CON A28S	1/4/2002	16:14	1	2.30E+02	60	SCL	Shielded	β	2.30E+02	
71	CON A28U	1/4/2002	16:15	1	3.06E+02	60	SCL	Unshielded	β		3.06E+02
72	CON A29S	1/4/2002	16:20	1	2.13E+02	60	SCL	Shielded	β	2.13E+02	
73	CON A29U	1/4/2002	16:21	1	2.58E+02	60	SCL	Unshielded	β		2.58E+02
74	CON A30S	1/4/2002	16:24	1	2.33E+02	60	SCL	Shielded	β	2.33E+02	
75	CON A30U	1/4/2002	16:25	1	2.89E+02	60	SCL	Unshielded	β		2.89E+02
76	CON A31S	1/4/2002	16:28	1	1.84E+02	60	SCL	Shielded	β	1.84E+02	
77	CON A31U	1/4/2002	16:29	1	2.63E+02	60	SCL	Unshielded	β		2.63E+02
—	Source Check	1/4/2002	17:27	1	1.70E+05	60	SCL	—	β		
									Minimum ⇒	1.72E+02	2.22E+02
									Maximum ⇒	2.78E+02	3.88E+02
									Mean ⇒	2.11E+02	3.06E+02
									Sigma ⇒	2.69E+01	3.45E+01

ATTACHMENT 6.1

ORIGINAL

Exhibit 1
Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	SS23-1/2			Survey Unit Location	Discharge Tunnel Access Area – Floor and Walls
Date	8/25/04	Time	1300	Inspection Team Members	D. Sarge

SECTION 2 - SURVEY UNIT INSPECTION SCOPE

Inspection Requirements (Check the appropriate Yes/No answer.)	Yes	No	N/A
1. Have sufficient surveys (i.e., post remediation, characterization, etc.) been obtained for the survey unit?	X		
2. Do the surveys (from Question 1) demonstrate that the survey unit will most likely pass the FSS?	X		
3. Is the physical work (i.e., remediation & housekeeping) in or around the survey unit complete?		X	
4. Have all tools, non-permanent equipment, and material not needed to perform the FSS been removed?		X	
5. Are the survey surfaces relatively free of loose debris (i.e., dirt, concrete dust, metal filings, etc.)?	X		
6. Are the survey surfaces relatively free of liquids (i.e., water, moisture, oil, etc.)?	X		
7. Are the survey surfaces free of all paint, which has the potential to shield radiation?	X		
8. Have the Surface Measurement Test Areas (SMTA) been established? (Refer to Exhibit 2 for instructions.)	X		
9. Have the Surface Measurement Test Areas (SMTA) data been collected? (Refer to Exhibit 2 for instructions.)	X		
10. Are the survey surfaces easily accessible? (No scaffolding, high reach, etc. is needed to perform the FSS)	X		
11. Is lighting adequate to perform the FSS?	X		
12. Is the area industrially safe to perform the FSS? (Evaluate potential fall & trip hazards, confined spaces, etc.)		X	
13. Have photographs been taken showing the overall condition of the area?	X		
14. Have all unsatisfactory conditions been resolved?		X	

NOTE: If a "No" answer is obtained above, the inspector should immediately correct the problem or initiate corrective actions through the responsible site department, as applicable. Document actions taken and/or justifications in the "Comments" section below. Attach additional sheets as necessary.

Comments:

Response to Question #3: Miscellaneous rope, supplies, sock filters, trash, herculite remains in area.

Response to Question #4: Scaffolding, "A" Frame hoist, stairway remain in area.

Survey Unit Inspector (print/sign)	David Sarge / [signature]	Date	8/25/04
Survey Designer (print/sign)	B. BROSEN / [signature]	Date	8/25/04

ATTACHMENT 9.1

ORIGINAL

EXHIBIT 3

Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION					
SMTA Number	SMTA-SS23-2-1	Survey Unit Number	SS23-2		
SMTA Location	Discharge Tunnel Access Area – South Wall				
Survey Unit Inspector	D. Sarge	Date	8/25/04	Time	1245

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED					
Caliper Manufacturer	Mitotoyo	Caliper Model Number	CD-6" CS		
Caliper Serial Number	763893	Calibration Due Date (as applicable)	N/A		
Rad Con Technician	D.Sarge	Date	8/25/04	Time	1245
Survey Unit Inspector Approval	D. Sarge /	Date	8/25/04		

SECTION 3 - MEASUREMENT RESULTS

SMTA Grid Map & Measurement Results in Units of mm
(Insert Results in White Blocks Below)

1 3.6	7 4.0	13 3.5	19 3.8	25 1.5	31 1.1
2 2.3	8 7.4	14 0.6	20 1.7	26 0.5	32 0.4
3 1.2	9 0.3	15 1.3	21 3.0	27 2.3	33 1.9
4 3.7	10 0.4	16 2.7	22 5.5	28 10.8	34 2.8
5 3.0	11 3.0	17 3.4	23 3.5	29 2.8	35 5.2
6 3.0	12 1.5	18 2.2	24 4.5	30 2.1	36 6.3

Average Measurement - 3.3 mm

Comments

Concrete surfaces throughout the survey unit were formed in the same fashion and exhibit similar surface characteristics. Therefore these readings are representative of the typical range of concrete surfaces to be surveyed during FSS.

Additional Measurements Required

ATTACHMENT 9.2

ORIGINAL

EXHIBIT 3

Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION					
SMTA Number	SMTA-SS23-1-1	Survey Unit Number	SS23-1		
SMTA Location	Discharge Tunnel Access Area – Pillar				
Survey Unit Inspector	D. Sarge	Date	8/25/04	Time	1300

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED					
Caliper Manufacturer	Mitotoyo	Caliper Model Number	CD-6" CS		
Caliper Serial Number	763893	Calibration Due Date (as applicable)	N/A		
Rad Con Technician	D.Sarge	Date	8/25/04	Time	1245
Survey Unit Inspector Approval	D. Sarge /	Date	8/25/04		

SECTION 3 - MEASUREMENT RESULTS

SMTA Grid Map & Measurement Results in Units of mm
(Insert Results in White Blocks Below)

1	7	13	19	25	31
2	8	14	20	26	32
3	9	15	21	27	33
4	10	16	22	28	34
5	11	17	23	29	25
6	12	18	24	30	36

Average Measurement - mm

Comments

- Readings taken with caliper without the use of plastic grid template in various surfaces throughout the pillar.
- Eleven readings obtained throughout concrete surfaces, as follows (in mm): 16, 10, 15, 27, 42, 35, 1.5, 2.0, 14, 12, and 28.

  Average depth: 18.4 mm.

Additional Measurements Required

ATTACHMENT 9 . 3

ORIGINAL

EXHIBIT 3

Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION					
SMTA Number	SMTA-SS23-2-2	Survey Unit Number	SS23-2		
SMTA Location	Discharge Tunnel Access Area – West Wall –North Side				
Survey Unit Inspector	D. Sarge	Date	8/25/04	Time	1215

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED					
Caliper Manufacturer		Caliper Model Number			
Caliper Serial Number		Calibration Due Date (as applicable)			
Rad Con Technician	D.Sarge	Date	8/25/04	Time	1215
Survey Unit Inspector Approval	D. Sarge / Daf	Date	8/25/04		

SECTION 3 - MEASUREMENT RESULTS

SMTA Grid Map & Measurement Results in Units of mm
(Insert Results in White Blocks Below)

1	7	13	19	25	31
2	8	14	20	26	32
3	9	15	21	27	33
4	10	16	22	28	34
5	11	17	23	29	35
6	12	18	24	30	36

Average Measurement - mm

Comments

- Readings taken with a tape measure using a detector template to simulate actual radiation survey distances.
- Ten readings obtained throughout concrete surfaces, as follows (in inches): 2.0, 2.5, 2.0, 1.25, 1.0, 1.0, 0.75, 1.25, 2.0, 1.25

  Average depth = 1.5 inches.
- Concrete has imbedded metal.

Additional Measurements Required

ATTACHMENT 9 . 4

ORIGINAL

EXHIBIT 3

Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION					
SMTA Number	SMTA-SS23-2-3	Survey Unit Number	SS23-2		
SMTA Location	Discharge Tunnel Access Area – West Wall -South Side				
Survey Unit Inspector	D. Sarge	Date	8/25/04	Time	1200

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED					
Caliper Manufacturer		Caliper Model Number			
Caliper Serial Number		Calibration Due Date (as applicable)			
Rad Con Technician	D.Sarge	Date	8/25/04	Time	1200
Survey Unit Inspector Approval	D. Sarge /	Date	8/25/04		

SECTION 3 - MEASUREMENT RESULTS

SMTA Grid Map & Measurement Results in Units of mm
(Insert Results in White Blocks Below)

1	7	13	19	25	31
2	8	14	20	26	32
3	9	15	21	27	33
4	10	16	22	28	34
5	11	17	23	29	25
6	12	18	24	30	36

Average Measurement - mm

Comments

- Readings taken with a tape measure using a detector template to simulate actual radiation survey distances.
- Twelve readings obtained throughout concrete surfaces, as follows (in inches):

  2.5, 2.0, 2.25, 2.0, 2.0, 1.75, 2.25, 3.0, 1.0, 1.75

  2.0, 2.25. Average depth = 2.1 inches.
- Concrete has imbedded metal.

Additional Measurements Required

ATTACHMENT 9.5

ORIGINAL

Exhibit 1
Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	SS9-1, SS10, SS11	Survey Unit Location	Spray Pump Pit Floor, Walls Below & Above 795' el

Date	7/29/04	Time	0800	Inspection Team Members	D. Sarge

SECTION 2 - SURVEY UNIT INSPECTION SCOPE

Inspection Requirements (Check the appropriate Yes/No answer.)	Yes	No	N/A
1. Have sufficient surveys (i.e., post remediation, characterization, etc.) been obtained for the survey unit?	X		
2. Do the surveys (from Question 1) demonstrate that the survey unit will most likely pass the FSS?	X		
3. Is the physical work (i.e., remediation & housekeeping) in or around the survey unit complete?	X		
4. Have all tools, non-permanent equipment, and material not needed to perform the FSS been removed?	X		
5. Are the survey surfaces relatively free of loose debris (i.e., dirt, concrete dust, metal filings, etc.)?	X		
6. Are the survey surfaces relatively free of liquids (i.e., water, moisture, oil, etc.)?	X		
7. Are the survey surfaces free of all paint, which has the potential to shield radiation?	X		
8. Have the Surface Measurement Test Areas (SMTA) been established? (Refer to Exhibit 2 for instructions.)	X		
9. Have the Surface Measurement Test Areas (SMTA) data been collected? (Refer to Exhibit 2 for instructions.)	X		
10. Are the survey surfaces easily accessible? (No scaffolding, high reach, etc. is needed to perform the FSS)	X		
11. Is lighting adequate to perform the FSS?	X		
12. Is the area industrially safe to perform the FSS? (Evaluate potential fall & trip hazards, confined spaces, etc.)	X		
13. Have photographs been taken showing the overall condition of the area?	X		
14. Have all unsatisfactory conditions been resolved?	X		

NOTE: If a "No" answer is obtained above, the inspector should immediately correct the problem or initiate corrective actions through the responsible site department, as applicable. Document actions taken and/or justifications in the "Comments" section below. Attach additional sheets as necessary.

Comments:

Survey Unit Inspector (print/sign)	D. Sarge / [signature]	Date	7/29/04
Survey Designer (print/sign)	B. BROSEY / B. Brosey	Date	8/3/04

ATTACHMENT 9.6

ORIGINAL

EXHIBIT 3
Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION					
SMTA Number	SMTA-SS11-1	Survey Unit Number	SS11		
SMTA Location	Spray Pump House Floor				
Survey Unit Inspector	D. Sarge	Date	7/29/04	Time	0800

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED					
Caliper Manufacturer	Mitotoyo	Caliper Model Number	CD-6" CS		
Caliper Serial Number	763893	Calibration Due Date (as applicable)	N/A		
Rad Con Technician	D. Sarge / DS	Date	7/29/04	Time	0800
Survey Unit Inspector Approval	D. Sarge / DS	Date	0800		

SECTION 3 - MEASUREMENT RESULTS

SMTA Grid Map & Measurement Results in Units of mm
(Insert Results in White Blocks Below)

1 0.8	7 0.1	13 0.6	19 0.4	25 3.7	31 4.4
2 1.0	8 3.2	14 1.0	20 1.9	26 10.3	32 17.3
3 0.9	9 1.0	15 3.0	21 6.3	27 0.9	33 16.2
4 1.2	10 0.9	16 1.5	22 1.1	28 10.0	34 0.9
5 1.4	11 1.0	17 2.6	23 1.0	29 1.0	25 0.5
6 4.6	12 7.1	18 5.9	24 6.2	30 4.0	36 0.6

Average Measurement – 3.5 mm

Comments

- Floor surfaces indicate similar depth irregularity similar to these readings.
- Two ground straps for equipment protrude from floor surface. These areas will pose survey obstructions. Notified D & D to remove exposed wires.

Additional Measurements Required

1) **Pump Pedestal has been chiseled causing surface irregularities:**
   10 depth readings using a tape measure were obtained throughout surface. Results ranged from 0.4 – 2.0 inches with an average of 1 inch.
2) **Drain Trough is cut across outside edge of floor:**
   Trough is approx. 3 inches wide and varies in depth between 1.375 to 1.75 inches deep.
3) **Core Bores Holes are present in floor.**
   Three 3-inch holes vary in depth between 4.75 to 6.5 inches. One 4-inch hole is approx. 5.5 inches deep.

ATTACHMENT 9.7

EXHIBIT 3
Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION					
SMTA Number	SMTA-SS11-2	Survey Unit Number	SS11		
SMTA Location	Spray Pump House West Wall (Southwest corner)				
Survey Unit Inspector	D. Sarge	Date	7/29/04	Time	0815

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED					
Caliper Manufacturer	Mitotoyo	Caliper Model Number	CD-6" CS		
Caliper Serial Number	763893	Calibration Due Date (as applicable)	N/A		
Rad Con Technician	D. Sarge	Date	7/29/04	Time	0815
Survey Unit Inspector Approval	D. Sarge	Date	0815		

SECTION 3 - MEASUREMENT RESULTS

SMTA Grid Map & Measurement Results in Units of mm
(Insert Results in White Blocks Below)

1 1.3	7 2.6	13 1.1	19 0.6	25 4.1	31 0.7
2 1.0	8 4.8	14 0.5	20 0.6	26 1.4	32 1.0
3 7.2	9 15.6	15 0.3	21 0.3	27 2.6	33 3.6
4 5.7	10 25.4	16 1.3	22 0.8	28 4.6	34 0.3
5 11.6	11 15.4	17 3.0	23 2.3	29 7.5	25 0
6 11.3	12 11.1	18 8.8	24 2.6	30 12.5	36 1.2

Average Measurement – 4.9 mm

Comments

- Wall surfaces indicate similar depth irregularity similar to these readings.
- Steel Bolts/Mounting Brackets are protruding from the wall in various areas.
- Pump Discharge Line (30-inch diameter) indicates surface flaking.

Additional Measurements Required

ATTACHMENT 9.8