GPU NUCLEAR

GPU Nuclear, Inc.
Three Mile Island
Nuclear Station
Route 441 South
Post Office Box 480
Middletown, PA 17057-0480
Tel 717-948-8461

September 4, 2003
E910-03-031

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

Gentlemen,

Subject: Saxton Nuclear Experimental Corporation (SNEC)
Operating License No., DPR-4
Docket No. 50-146
FSS Report for CV Interior, 774' Elev and Below, Revision 1

During your inspection period March to July 2003 a discussion was held on revisions that needed to be made to our FSS Report for the CV Interior, 774' Elev and Below. The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) made comments and recommendations to Revision 0 of this report. As a result these comments and recommendations were incorporated into Revision 1 of this FSS report. Attachments 1 & 2 provide our responses to the ORISE recommendations (Reference 1). Attachment 3 provides Revision 1 to the FSS Report for CV Interior 774' Elev. And Below.

Reference 1: ORISE Report, "Final Site-Specific Decommissioning Inspection Report No. 1 for the Saxton Nuclear Experimental Corporation, Saxton, Pennsylvania (Docket No. 50-146; Task 2)

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

Sincerely,

G. A. Kuehn
Program Director, SNEC

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

Attachments: 1. Responses to ORISE Recommendations
2. Additional Comments
3. Final Status Survey Report for Saxton Nuclear Experimental Corporation, CV Interior, 774' El. And Below

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ATTACHMENT 1

Responses to ORISE Recommendations

Recommendation 1: "SNEC calculations E900-03-003 (Appendix A, GPU 2003) and 6900-02-024 (Appendix B, GPU 2003) were reviewed. To address the concern stated in Appendix A, Section 4.11, that "Compass (version 1.0) does not perform well when using the gross activity option" and to make the section calculations more straightforward, ESSAP recommends the following changes to the document text and COMPASS data entry.

Create a table that shows the contaminants of concern and associated radionuclide mixture fractions. Each row would also include the instrument, surface, and subtotal total efficiencies. The summation of the subtotal total efficiency column will be the desired total efficiency value. Note that the fraction column must sum to one, and in the COMPASS software the gross activity DCGLw conversion from dpm/100 cm^2 to cpm cannot be performed unless this condition exists. With this format, the reviewer can easily determine the parameters used to calculate the total efficiency. This change would have no impact on the final result, but should make the process easier to implement for future calculations when more than one radionuclide is detectable for a gross activity measurement."

Response: A table will be included, as applicable, into future FSS reports listing the representative radionuclide mixtures in the survey unit(s) and how the corresponding efficiencies were determined. These efficiencies will include the instrument and surface parameters to determine total efficiency.

Recommendation 2: "SNEC calculations E900-03-003 and 6900-02-024 were reviewed. Scan and static MDC determinations were consistent with guidance and were calculated to be less than 50% of the DCGLw. However, for calculation E900-03-003, sections 4.15 and 4.16, the incorrect background value was used in the MDC calculations. The correct value to use would be the unshielded (or open window) background average from the survey unit because the scan survey was performed with an unshielded detector. These errors would not affect the conclusions of the final status survey."

Response: Future designs and FSS reports will use the unshielded background readings that are applicable to the type of survey and survey unit area.

Recommendation 3: "SNEC calculations E900-03-003 and 6900-02-024 were reviewed. No concerns were identified with the selection of the background reference area. Background contributions were accounted for during survey planning, but not during data assessment. Because survey unit gross activity levels were less than the DCGLw, use of the background reference area data in the application of the WRS Test was not required (see Comment 4, Attachment A)."

Response: Exhibit 2 of this letter lists the ORISE comments that were made to SNEC's draft FSS report. These comments were listed in Reference 1, Attachment A. These comments are also listed in Attachment 2 of this letter for clarification. Note response to Comment 4.

Attachment 2

Additional Comments
(From Attachment A of ORISE Report)

1) Executive Summary, Page 1, Paragraph 2: ESSAP recommends defining the purpose of the removable activity supplemental data. See Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) section 8.5.3.
Response: Comment included into revised report (see Attachment 3).

2) Executive Summary, Page 1, Paragraph 2: ESSAP recommends that the exposure rate measurements performed be mentioned in this section as also being "supplemental" in nature.
Response: Comment included into revised report (see Attachment 3).

3) Section 3.1.1.2: This section states that all static measurement results were less than 250 net cpm—the action level for scanning per calculation 6900-02-024. First, the action level should be changed to 580 net cpm for direct measurement comparison to the DCGLw. This change should also occur in sections 3.1.2.2, 3.1.3.2, and 3.1.4.2.
Response: Comment included into revised report (see Attachment 3).

4) Section 3.1.1.2: The table included in this section shows data for shielded and unshielded measurements with the net cpm difference calculated. As written, the data assessment appears to compare the net difference column to the DCGLw, which is not consistent with MARSSIM guidance for data assessment when using the WRS Test. The last sentence in the section should be rewritten to discuss only the unshielded (gross) measurement results and how they compare to the DCGLw. The shielded and net difference columns should be removed from the table. These suggestions also apply to the remaining sections titled "Static Measurements." Per calculation E900-03-003, section 4.14, shielded measurements were performed to correct background reference area ambient values to be consistent with the survey unit. Once the reference area measurements are corrected for the difference in the survey unit and reference area ambient backgrounds, additional shielded measurements are not required and including additional shielded measurement data could be confusing to the reader.
Response: Comment included into revised report (see Attachment 3).

5) Sections 3.1.1.2 and 3.1.1.3: ESSAP recommends that the discussions in these sections should be reversed in order because QC smears are discussed before the smear survey results are discussed. This recommendation would apply to many sections throughout the document.
Response: Comment included into revised report (see Attachment 3).

6) Section 3.1.5: ESSAP recommends adding a discussion of how the gamma spectroscopy data from the smears should be interpreted.
Response: Comment included into revised report (see Attachment 3).

7) Section 3.5, Table: ESSAP recommends reporting the actual value of each gamma spectroscopy measurement, with the minimum detectable concentration (MDC) reported using a standard background for the process or individually for each measurement.
Response: GPU Nuclear and NRC agreed that current reporting convention is satisfactory. This convention will continue to report the MDC value and not the net value for gamma spectroscopy measurements.

8) Section 5.0, Paragraph 5: ESSAP suggests rewording the summary written as "be backfilled to at least the 774' elevation" to clarify that the containment vessel (CV) will be backfilled no higher than the 774' elevation.
Response: Comment included into revised report (see Attachment 3).

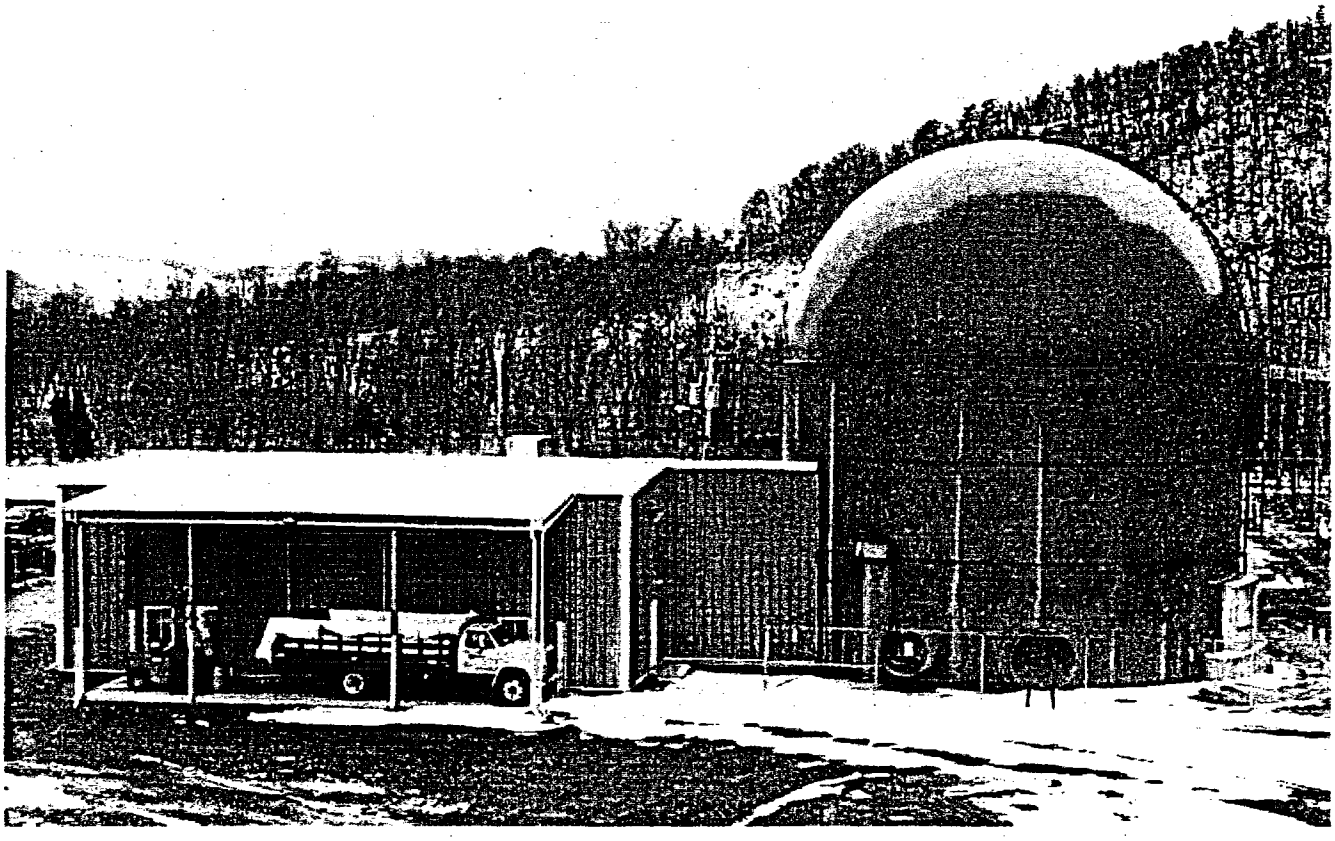
Final Status Survey Report

For

Saxton Nuclear Experimental Corporation

CV Interior, 774' El. And Below

Revision 1



Prepared by GPU Nuclear, Inc.

August 2003

1 REPORT

2 APPENDIX A

3 APPENDIX B

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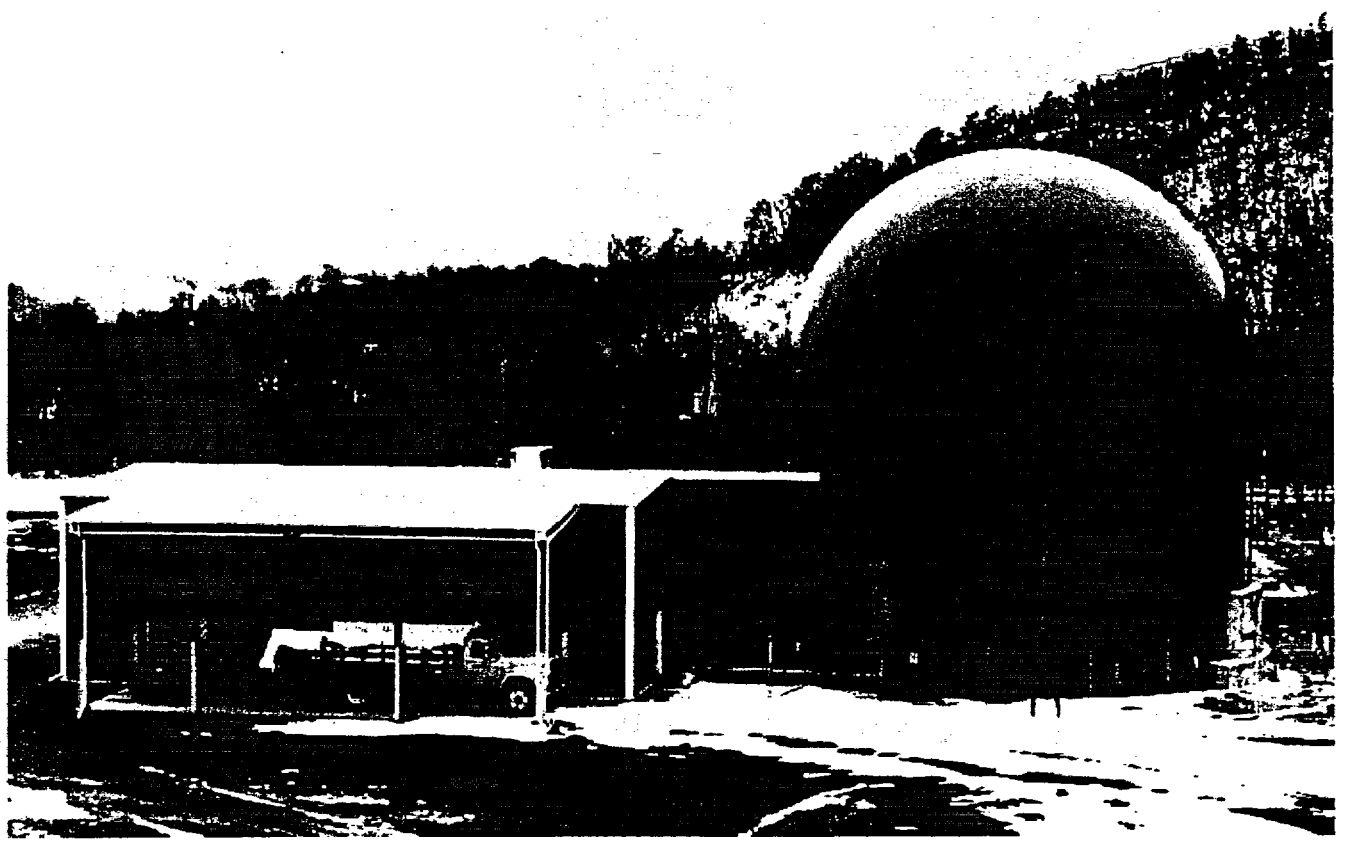
Final Status Survey Report

For

Saxton Nuclear Experimental Corporation

CV Interior, 774' El. And Below

Revision 1



Prepared by GPU Nuclear, Inc.

August 2003

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Executive Summary

This report presents the results and conclusions of the final status survey (FSS) conducted by GPU Nuclear, Inc. of the bottom interior of the Saxton Nuclear Experimental Corporation (SNEC) Containment Vessel (CV). This FSS specifically includes the results of structure surface measurements taken in the CV interior 774' elevation and areas below. The FSS for this area was started in March 2003 and completed in April 2003.

The FSS was performed in accordance with Revision 2 of the SNEC License Termination Plan (LTP). The CV structure surfaces were divided into eight (8) Class 1 survey units. Each survey unit was comprised of building structure surfaces and metal plates varying in shape and size. Survey data was collected from each survey unit according to data collection requirements specified in the FSS design criteria. The following types of measurements were performed:

1. Scan measurements were performed over 337 m^2 (100% of all accessible survey unit surface areas).
2. 92 static measurements were collected as final survey data.
3. In addition, 44 supplemental removable surface radioactivity measurements were collected. Although smear results are reported they are not used for determining compliance but for adherence to LTP section 6.2.1. Instead, they are used as a diagnostic tool to determine if the removable surface radioactivity is less than 10% of the surface area $DCGL_w$.
4. Exposure rate measurements (uR/hr) were performed. These are considered supplemental in nature and was used as a point of comparison with past release criteria.

The collected FSS data demonstrate that each survey unit meets the radiological criteria for unrestricted use specified in 10 CFR 20.1402. Based on the results of the CV final status survey, GPU Nuclear, Inc. concludes the CV interior 774' elevation and below meets the NRC requirements for release to unrestricted use.

1.0 Purpose and Scope

This report presents the results and conclusions of the final status survey of the SNEC Containment Vessel Interior 774' and areas below this elevation. It provides the information required by 10 CFR 50.82(a)(11) and SNEC's License Termination Plan (LTP) to demonstrate that this area meets the radiological criteria for unrestricted use specified in 10 CFR 20.1402.

This report describes the radiological data collected for eight (8) Class 1 survey units contained within the SNEC CV lower head area. SNEC personnel have decontaminated seven (7) of these survey units. Survey unit, CV2-23, (a steel support ring) was installed new to the CV to add structural stability to the building during the concrete removal project.

This report only addresses the final status survey performed on the interior structure surfaces located at and below the CV 774' elevation. Interior areas above 774' are not addressed in this report. The format of this report follows the guidance contained in Reference 6.13.

2.0 Final Status Survey Design for CV 774' and Areas Below

2.1 Description of Survey Units

The eight (8) survey units are listed below. These survey units are all designated as Class 1. The survey unit codes were taken from Table 5-2, of SNEC LTP Revision 2. These survey units are: CV2-19, CV2-20, CV2-21, CV2-22, CV2-23, CV3-1, CV3-2 and CV3-3.

Survey unit designations CV2-19 - CV2-22 comprises the CV shell surface area to which the steel support ring is welded. These survey units consist of a 360° annular area around the CV interior shell and are located directly behind the welded steel support ring. These survey units consist of four (4) quadrant regions, (Quadrants A-D), each approximately 3.04 m^2 (12.2 m^2 total).

Survey unit designation CV2-23, is a W14 x 74 W-beam support ring (centered at the 774'-9" elev.) that was welded to the CV shell to stiffen this structure after CV concrete removal. The W-beam did not have residual surface activity at the time of installation. Additionally, a small section of the D-plates, which make up the vertical section of the CV steel shell structure, is included. This area is ~5" high and is located just below the W-beam. The W-beam extends 360 degrees around the inner circumference of the CV shell. The total area of this survey unit is *74.5 m^2, which* includes the beam and the area just below the beam.

Survey unit designation *CV3-1*, is composed of ten (10) C-Plates (C1 through C10), starting at about the 773'-8" elev. just below the W-beam area, and extending down to the top of the B-plates. This survey unit is approximately *104.9 m^2* in total area.

Survey unit designation *CV3-2 is composed of* sixteen (16) B-Plates starting at about the 767' elev. and extending down near the base of the CV shell at the 760'-7" elev. This survey unit is approximately *124.4 m^2 in* total area.

Survey unit designation *CV3-3 is composed of two (2)* A-Plates that form the bottom of the SNEC CV shell. This survey unit is approximately *21.1 m^2* in total area.

2.2 Remediation History

Remediation of the SNEC CV began with gross decontamination and equipment removal, e.g. piping, steam generator, pressurizer and the reactor vessel (fall of 1998). Failed attempts to decontaminate the concrete inside the CV structure resulted in a decision to completely remove the concrete from the building. In order to accomplish this, a ground water abatement system around the exterior of the CV was installed. By the fall of 2002 the SNEC CV internal concrete structure was completely removed. However, several external and internal stiffener rings were necessary to maintain structural integrity and to prevent buckling of the building. These rings were welded to the steel shell to add rigidity and produce a safe working environment for remediation crews and survey personnel. The internal surface of the CV steel shell was then cleaned to remove radiological contamination, paint, residual concrete dirt, weld and surface scale. Original weld areas between the sections of steel plate that make up the steel shell were decontaminated along with prominent surface defects. Remediation efforts of the interior CV steel surface included combinations of the following techniques:

- Roto-peening
- Liquid paint remover (MIRACHEM)
- Surface grinding

- Needle gun
- Grit blasting
- Wire brush
- Vacuuming
- Surface wipe-down

A decontamination effectiveness check was performed during the cleaning effort by means of biased and unbiased measurements on the surface of the cleaned steel shell using a gas flow proportional counter (GFPC). The criteria for determining when an area was acceptably decontaminated was initially established at < 3 times the local background count rate as determined by closed window readings in the area. Areas above this value were re-cleaned.

A post remediation survey was conducted which included both surface scans and static measurements. It also included a surface smear survey and sampling of the steel surface in one suspect activation region. It was later determined that the suspect region was not activated. Alpha radiation measurements were also taken at select locations. Smears were counted for both beta-gamma and alpha contamination.

2.3 Site Release Criteria

The site release criteria applied to the CV interior correspond to the radiological dose criteria for unrestricted use per 10 CFR 20.1402. 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 were derived by analyses using the building occupancy scenario (e.g. direct radiation, inhalation and ingestion). The dose modeling for this scenario is explained in the SNEC LTP, Revision 2, Section 6.2.1. The derived concentration guideline levels (DCGLs) form the basis for satisfying the site release criteria.

Residual radioactivity sample results for non-activated surfaces inside the CV were compared to calculate gross activity DCGLs. These gross activity DCGLs were developed using the methodology described in SNEC LTP Section 5.2.3.2.4, based on radionuclide specific DCGLs listed in Table 5-1 of the LTP. Gross activity DCGLs were not applied to areas or materials containing volumetric residual radioactivity.

A correction to the gross activity DCGLw was made to address de-listed radionuclides and to correct for activated steel in the SNEC CV. The SNEC facility has instituted an administrative limit of 75% for the allowable dose (DCGL) for all measurement results. The de-listed radionuclide dose is accounted for within the 75% administrative limit, but the activated steel dose correction is not. Based on Microshield calculations for activated metal inside the CV, an additional 28.8% reduction was also made for measurements taken in these regions. These correction factors are reported in the SNEC LTP, Chapter 6.

2.4 Survey Designs

Survey unit designs are provided in Appendix A and B. Since all the survey units are Class 1 scan measurements were performed over 100% of the surfaces. The number of static measurement points was determined using the COMPASS computer program (Reference 6.3). These points were located on survey maps for each survey unit using the VSP, Visual Sample Plan (Reference 6.4) computer code.

Survey designs use a gross activity $DCGL_w$ value developed for these survey units from scrape samples of the interior surface of the SNEC CV. These samples were taken at five (5) different elevations in the CV. The sample result that produced the most conservative effective DCGLw value was then used as input to the Compass computer program. The nearest sample result to the lower head region was taken from the 774' elevation of the CV. However, scrape samples of surface contaminants have been collected from other internal CV shell support ring installation areas. These scrape samples consist largely of paint and concrete residual along with surface scale.

Cs-137, H-3 and Ni-63 account for the majority of radionuclides. Cs-137 is the predominate radionuclide and provides the only reasonably detectable radionuclide in this mix. The following table presents the data quality objectives (DQOs) and other relevant information, which went into the survey design packages.

DQO/Design Parameter	CV2-19, 20, 21,22 Areas behind ring	CV2-23 Ring	CV3-1 C- Plates	CV3-2 B-Plates	CV3-3 A-Plates
SNEC Design Calc. No.	6900-02-024	E900-03-003	E900-03-003	E900-03-003	E900-03-003
MARSSIM Classification	1	1	1	1	1
Area Size (m^2)	12.2	74.5	104.9	124.4	21.1
Statistical Test	WRS	WRS	WRS	WRS	WRS
Type I Decision Error (α)	0.05	0.05	0.05	0.05	0.05
Type I Decision Error (β)	0.10	0.10	0.10	0.10	0.10
LBGR (cpm)	525	290	290	290	290
Estimated σ (cpm)	23.3	38.7	38.7	38.7	38.7
Δ/σ	2.4	2.8	2.8	2.8	2.8
Number of Static Data Points	36	20	11	18	9
$DCGL_w$ (dpm/100 cm^2)	2100	2100	2100	2100	2100
$DCGL_w$ (cpm)	580	400	400	400	400
Scan MDC (dpm/100 cm^2)	425	737	737	737	737
Static MDC (dpm/100 cm^2)	219	337	337	337	337
Sample # used for nuclide mix	SXSMHAP8	SXSD3164	SXSD3164	SXSD3164	SXSD3164
SNEC Survey Request No.	46	60	59	58	57
Survey Instrument Model	Ludlum 2350-1 w/43-68 probe	Ludlum 2350-1 w/43-68 probe	Ludlum 2350-1 w/43-68 probe	Ludlum 2350-1 w/43-68 probe	Ludlum 2350-1 w/43-68 probe
Instrument Total Efficiency	0.225	0.15	0.15	0.15	0.15
Measurement Type	Scan/static	Scan/static	Scan/static	Scan/static	Scan/static

Even though both survey designs (see Appendix A & B) had the same $DCGL_w$ different assumptions were used in the calculations. These assumptions included differences in nuclide mix ratios and instrument efficiencies, use of a factor to correct for activated steel, and use of a conservative correction factor (0.2) to reduce the $DCGL_w$ due to uncertainty in the nuclide mix.

3.0 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 6.7 – 6.12 which are filed in the SNEC FSS history file.

3.1 Survey Units CV2-19, 20,21,22, "Interior CV Weld Ring Areas @ 774 ft El"

These surveys were performed on the CV steel liner, approximately 774' elevation, prior to the installation of an internal support ring. Surface scan and static measurements were performed using a Ludlum 2350-1 "datalogger" system. The metal surface area that was surveyed consisted of a single band measuring 10 inches wide and spans the circumference of the CV liner. The band was divided into four equal quadrants; namely "A", "B", "C", and "D". Each quadrant was a separate survey unit. These survey units were designated as CV2-19, CV2-20, CV2-21 and CV-22.

Prior to the survey static unshielded and shielded GFPC (gas-flow proportional counter) surface measurements were performed to determine an estimate for the mean and sigma of each survey unit. This calculation was documented in Calculation No. 6900-02-024 (See Appendix B).

The scan speed was set at 2.2 cm/second (1 detector width per 4 seconds). The effective $DCGL_w$ for this measurement plan is taken to be **2100 dpm/100 cm^2**. A net fixed point measurement result of about 580 cpm yields ~2100 dpm/100 cm^2 (the $DCGL_w$) for a 1 minute count time.

No WRS statistical analysis is necessary for this survey unit since all resulting static measurements are below the assigned DCGLw (580 net cpm per 100 cm^2 or 2100 dpm/100 cm^2).

Although the survey unit is ten inches wide, an additional four inches of shell has been cleaned above and below this region. Surface scan measurements included this additional area. It must be noted that some static measurements were made in this buffer region when the required survey point fell on the outside boundaries of the survey unit.

3.1.1 Summary of Results for Survey Unit "CV 2-19" (Quadrant "A")

3.1.1.1 Surface Scan Measurements

After establishing an average background (ABCR) for the survey (166 cpm), a 100% surface scan was performed using a Ludlum-2350-1 with a 43-68B probe. The action level was ≥250 ncpm. All measurement results indicated <250 ncpm.

3.1.1.2 Static Measurements

Nine survey points were surveyed in this quadrant. All measurement results are reported as unshielded readings (gross cpm). Measurement results all indicated <580 cpm.

CV2-19 QUAD 'A' SAMPLE POINTS	UNSHIELDED READING (CPM)
1	188
2	129
3	185
4	155
5	154
6	168
7	185
8	182
9	184
QC SAMPLE #5	148
MEAN	170
STANDARD DEVIATION	20.2
MAX	188
MIN	129
MEDIAN	182

3.1.1.3 Loose Surface Contamination (Smear Survey)

Five smears were taken in the quadrant. Since no elevated activity was detected during the scan and static survey measurements additional smears were not warranted. Smear results indicated <1K dpm/100 cm^2 beta-gamma and <MDC (11.6 dpm/100 cm^2) alpha.

3.1.1.4 Quality Control (QC) Measurements

A 5% re-sampling and re-survey requirement was performed. Scan measurements were performed in a four foot section between fixed points #2 and #3 to verify initial scan measurements were <250 ncpm. Measurement results were <250 ncpm. This re-survey area is approximately 10% of the total quadrant area.

A static measurement set was re-performed on survey point #5. Measurement results indicated a net difference <250 cpm.

A smear was taken at smear location #3. Smear results indicated <1K dpm/100 cm^2 beta-gamma and <MDC (11.6 dpm/100 cm^2) alpha.

3.1.2 Summary of Results for Survey Unit "CV 2-20"(Quadrant "B")

3.1.2.1 Surface Scan Measurements

After establishing an average background (ABCR) for the survey unit (170 cpm), 100% surface scan was performed using a Ludlum-2350-1 with a 43-68B probe. The action level was ≥250 ncpm. Measurement results were all <250 ncpm.

3.1.2.2 Static Measurements

Nine survey points were surveyed in this quadrant. All measurement results are reported as unshielded readings (gross cpm). Measurement results all indicated <580 cpm.

CV2-20 QUAD 'B' SAMPLE POINTS	UNSHIELDED READING (CPM)
1	170
2	210
3	173
4	171
5	151
6	158
7	150
8	172
9	149
QC SAMPLE #5	115
MEAN	167
STANDARD DEVIATION	19.0
MAX	210
MIN	149
MEDIAN	170

3.1.2.3 Loose Surface Contamination (Smear Survey)

Five smears were taken in the quadrant. Since no elevated activity was detected during scan and static survey measurements additional smears were not warranted. The results of the five smears taken indicated <1K dpm/100 cm^2 beta-gamma and <MDC (11.6 dpm/100 cm^2) alpha.

3.1.2.4 Quality Control (QC) Measurements

A 5% re-sampling and re-surveying requirement was performed. Scan measurements were performed in a four foot section in the proximity of fixed points #1 and #2 to verify initial scan measurements were <250 ncpm. Measurements results indicated <250 ncpm. This re-survey area represents approximately 10% of the total quadrant area.

A static measurement set was re-performed in the location of survey point #5. Measurement results indicated a net difference <250 ncpm.

A smear was taken at smear location #3. Smear results indicated <1K dpm/100 cm^2 beta-gamma and <MDC (11.6 dpm/100 $cm^{2)}$ alpha.

3.1.3 Summary of Results for Survey Unit "CV 2-21"(Quadrant "C")

3.1.3.1 Surface Scan Measurements

After establishing an average background (ABCR) for the survey unit (157 cpm), a 100% surface scan was performed using a Ludlum-2350-1 with a 43-68B probe. The action level was ≥250 ncpm. Measurement results in all areas indicated <250 ncpm.

3.1.3.2 Static Measurements

Nine survey points were required to be surveyed in this quadrant. All measurement results are reported as unshielded readings (gross cpm). Measurement results all indicated <580 cpm.

CV2-21 QUAD 'C' SAMPLE POINTS	UNSHIELDED READING (CPM)
1	131
2	168
3	162
4	131
5	135
6	159
7	153
8	146
9	162
QC SAMPLE #5	179
MEAN	149
STANDARD DEVIATION	14.4
MAX	168
MIN	131
MEDIAN	153

3.1.3.3 Loose Surface Contamination (Smear Survey)

Five smears were taken in this quadrant. Since no elevated activity was detected during scan and static survey measurements additional smears were not warranted. Results from the five smears taken indicated <1K dpm/100 cm^2 beta-gamma and <MDC (11.6 dpm /100 cm^2) alpha.

3.1.3.4 Quality Control (QC) Measurements

A 5% re-sampling and re-surveying requirement was performed. Scan measurements were performed in a four foot section in the proximity of fixed points #8 and #9 to verify

initial scan measurements were <250 ncpm. Measurements results indicated <250 ncpm. This re-survey area represents 10% of the total quadrant area.

A static measurement set was re-performed on survey point #5. Measurement results indicated a net difference <250 ncpm.

A smear was taken at smear location #3. Smear results indicated <1K dpm/100 cm^2 beta-gamma and <MDC (11.6 dpm/100 cm^2) alpha.

3.1.4 Summary of Results for Survey Unit "CV 2-22" (Quadrant "D")

3.1.4.1 Surface Scan Measurements

After establishing an average background (ABCR) for the survey unit (150 cpm), a 100% surface scan was performed using a Ludlum-2350-1 with a 43-68B probe. Action level was ≥250 ncpm. Measurement results for all areas indicated <250 ncpm.

3.1.4.2 Static Measurements

Nine survey points were required to be surveyed in this quadrant. All measurement results are reported as unshielded readings (gross cpm). Measurement results all indicated <580 cpm.

CV2-22 QUAD 'D' SAMPLE POINTS	UNSHIELDED READING (CPM)
1	185
2	153
3	118
4	144
5	129
6	139
7	134
8	167
9	144
QC SAMPLE @ #5	173
MEAN	146
STANDARD DEVIATION	20.3
MAX	185
MIN	118
MEDIAN	144

3.1.4.3 Loose Surface Contamination (Smear Survey)

Five smears were taken in the quadrant. Since no elevated activity was detected during scan and static survey measurements additional smears were not warranted. Results from the five smears indicated <1K dpm/100 cm^2 beta-gamma and <MDC (11.6 dpm/100 cm^2) alpha.

3.1.4.4 Quality Control (QC) Measurements

A 5% re-sampling and re-surveying requirement was performed. Scan measurements were performed in a four foot section in the proximity of fixed points #2 and #3 to verify initial scan measurements were <250 ncpm. Measurements results indicated <250 ncpm. This re-survey area represents approximately 10% of the total quadrant area.

A static measurement set was re-performed on survey point #5. This measurement set indicated a net difference <250 cpm.

A smear was taken at smear location #3. The smear result indicated <1K dpm/100 cm^2 beta-gamma and <MDC (11.6 dpm/100 cm^2) alpha.

3.1.5 Special Notes:

All smears taken for the previous survey units were composited and gamma scanned for 2000 seconds. (Reference sample # SX-SM-3194). Gamma scan results indicated <1.49 E-5 uCi/smear group for Cs-137, and <1.14 E-5 uCi/smear group for Co-60. Gamma scan analyses on smears was performed as a verification tool for derived isotopic mixes used in surrogate determinations in survey designs.

3.2 Survey Unit CV2-23, "W14 x 74 W-Beam Support Ring, @774' El"

This survey unit consists of the entire ring located at the 774' elevation and approximately 5 inches of the CV shell below the ring (D plate). The unit is divided into four quadrants (A, B, C, and D). "A" Quadrant is due south. The total surface area is 74.5 m^2. The following radiological surveys were conducted in accordance with the survey design documented as SNEC Calculation No.E900-03-003 (See Appendix A).

The scan speed was set at 2.2 cm/second (1 detector width per 4 seconds). The effective DCGLw for this measurement plan is taken to be **2100 dpm/100 cm^2**. A net fixed point measurement result of 400 cpm yields ~2100 dpm/100 cm^2 (the $DCGL_w$) for a 1 minute count time.

No WRS statistical analysis is necessary for this survey unit since all static measurements are below the assigned $DCGL_w$ (400 net cpm per 100 cm^2 or 2100 dpm/100 cm^2).

A gas flow proportional counter (GFPC) was used in the beta detection mode as the survey instrument (a Ludlum 2350-1 with a 43-68B probe).

Surface Scan Measurements for Beta/Gamma Activity – A 100% surface scan was performed on the survey unit (74.5 m^2 area). The action level for scanning was 200 NCPM.

Static Measurements for Beta/Gamma Activity – At least 20 static measurement pairs, (shielded and unshielded) were performed. The action level ($DCGL_w$) for static measurements was 400 NCPM.

Static Measurements for Gamma Activity Using the Bicron Micro-Rem Instrument – At least 8 general area static measurements using a Micro-Rem Meter were taken and spaced throughout the survey unit. These measurements were obtained approximately 3 feet from the ring surface.

QC Repeat Measurements – A minimum of 5% of all static and surface scan measurements were re-performed using identical methodology.

3.2.1 Summary of CV2-23 Results

3.2.1.1 Surface Scan Measurements

After establishing Average Background Count Rate (ABCR) for the ring (approximately 116 cpm), a 100% surface scan was performed on the ring and the 5-inch band of the CV shell directly below the ring. The action level was 200 NCPM. All results indicated levels below action level.

3.2.1.2 Static Measurements

Twenty (20) measurement pairs were obtained. All measurement results are reported as unshielded readings (gross cpm). Measurement results all indicated <400 cpm.

CV2-23 STATIC POINT NUMBER	UNSHIELDED READING (CPM)
1	97
2	113
3	119
4	118
5	129
6	80
7	97
8	92
9	104
10	101
11	96
12	103
13	112
14	117
15	122
16	124
17	109
18	115
19	122
20	125

QC Sample @ 3	88
QC Sample @ 17	100
MEAN	110
STANDARD DEVIATION	13.0
MAX	129
MIN	80
MEDIAN	113

3.2.1.3 Static Measurements for Gamma Activity Using the Bicron Micro-Rem Instrument

Eight static Micro-Rem measurements were obtained approximately 3 feet above the surface. All measurements were approximately 3 μR/hr.

3.2.1.4 Loose Surface Contamination (Smear Survey)

Three smears were taken as part of a post remediation survey. Since no elevated activity was detected during scan and static survey measurements additional smears were not warranted. Results from the three smears indicated <1K dpm/100 cm^2 beta-gamma and <MDC 13.1 dpm/100 cm^2 alpha. Also see section 3.6 for smear results.

3.2.1.5 Quality Control (QC) Measurements and Comparisons

Scan measurements were performed on approximately 6.6 m^2 (8.8% of the total survey unit surface area). Measurement results were <200 NCPM. This percentage meets the 5% requirement. Static measurements were obtained for points #3 and #17. Measurement results were <400 NCPM. This percentage, 2 of 20 (10%), meets the 5% requirement.

Static Measurement (Micro-Rem) was performed in the vicinity of the initial survey point location in "C" Quadrant. This percentage, 1 of 8 equals 12.5%, meets the 5% requirement.

3.2.1.6 Exceptions & Discrepancies

Static measurement point # 20 was re-located as per the survey designer. Initial location coordinates fell outside the survey unit.

Scan surveys could not be performed on some ring surfaces. These exceptions were due to ring support obstructions, connection joints and 90° bends in the ring. All areas not surveyed were noted on the documented surveys located in the SNEC history file. All areas not surveyed consisted of clean material installed during concrete demolition. Areas of joints between rings were originally sealed and maintained in an isolation condition. Additionally, the combined surface area of these unsurveyed areas is insignificant when compared to the total survey unit area, (0.23 m^2 of 74.5 m^2 equals 0.3%). Since the adjacent exposed surface areas were found to be less than the action level it is concluded that these inaccessible and protected areas are also less than the action level.

3.3 Survey Unit CV3-1, "10 C-Plates"

This survey unit is comprised of 10 steel plates, designated C1 through C10. The total surface area of the survey unit is approximately 104.9 m^2. The following radiological surveys were conducted in accordance with the survey design documented as SNEC Calculation No.E900-03-003 (See Appendix A).

The scan speed was set at 2.2 cm/second (1 detector width per 4 seconds). The effective $DCGL_w$ for this measurement plan is taken to be **2100 dpm/100 cm^2**. A net fixed point measurement result of 400 cpm yields ~2100 dpm/100 cm^2 (the DCGLw) for a 1 minute count time.

No WRS statistical analysis is necessary for this survey unit since all static measurements are below the assigned DCGLw (400 net cpm per 100 cm^2 or 2100 dpm/100 cm^2).

A gas flow proportional counter (GFPC) was used in the beta detection mode as the survey instrument (a Ludlum 2350-1 with a 43-68B probe).

Surface Scan Measurements for Beta/Gamma Activity – A 100% surface scan was performed on the survey unit (104.9 m^2 area). The surface scan action level was 200 NCPM.

Static Measurements for Beta/Gamma Activity – 11 static measurement pairs, (shielded and unshielded) were surveyed. The action level ($DCGL_w$) for static measurements is 400 NCPM.

Static Measurements for Gamma Activity Using the Bicron Micro-Rem Instrument – Obtained at least 10 general area static (1 per grid) measurements using a Micro-Rem Meter spaced throughout the survey unit. These measurements were obtained at a height of approximately 3 feet above the surface.

QC Repeat Measurements – A minimum of 5% of all static and surface scan measurements were re-performed using identical methodology.

3.3.1 Summary of CV3-1 Results (10 C-Plates)

3.3.1.1 Surface Scan Measurements

After establishing Average Background Count Rate (ABCR) values for the C-plate areas, a 100% surface scan was performed. The action level was 200 NCPM. All results indicated levels below the action level.

3.3.1.2 Static Measurements

Eleven (11) measurement pairs were obtained. All measurement results are reported as unshielded readings (gross cpm). Measurement results all indicated <400 cpm.

CV3-1 STATIC POINT NUMBER	UNSHIELDED READING (CPM)
1	139
2	122
3	127
4	117
5	137
6	121
7	131
8	107
9	121
10	104
11	106
QC Sample @ 2	124
QC Sample @ 10	106
MEAN	121
STANDARD DEVIATION	12.0
MAX	139
MIN	104
MEDIAN	121

3.3.1.3 Static Measurements for Gamma Activity Using the Bicron Micro-Rem Instrument

Ten (10) static Micro-Rem measurements were obtained (1 per grid). All measurements indicated approximately 3 μR/hr.

3.3.1.4 Loose Surface Contamination (Smear Survey)

Thirteen smears were taken as part of a post remediation survey. Since no elevated activity was detected during scan and static survey measurements additional smears were not warranted. Results from these smears indicated <1K dpm/100 cm^2 beta-gamma and <MDC 13.1 dpm/100 cm^2 alpha. Also see section 3.6 for smear results.

3.3.1.5 Quality Control (QC) Measurements and Comparisons

Scan measurements were performed on approximately 10.5 m^2 or 10% of the total survey unit surface area. Measurement results were < 200 NCPM. Static measurements were obtained for points #2 and #10. Measurement results were <400 NCPM. This percentage, 2 of 11, (18.2%), meets the 5% requirement.

Static Measurement (Micro-Rem) was performed in the vicinity of the initial survey point location in grid #3. This percentage, 1 of 10, (10%), meets the 5% requirement.

3.4 Survey Unit CV3-2, "16 B-Plates"

This unit is comprised of 16 steel plates (designated as B1 through B16) that form the bottom of the CV shell. The total surface area of the survey unit is approximately 124.4 m^2. The following radiological surveys were conducted in accordance with the survey design documented as SNEC Calculation No.E900-03-003 (See Appendix A).

The scan speed was set at 2.2 cm/second (1 detector width per 4 seconds). The effective $DCGL_w$ for this measurement plan is taken to be **2100 dpm/100 cm^2**. A net fixed point measurement result of 400 cpm yields ~2100 dpm/100 cm^2 (the DCGLw) for a 1 minute count time.

No WRS statistical analysis is necessary for this survey unit since all static measurements are below the assigned $DCGL_w$ (400 net cpm per 100 cm^2 or 2100 dpm/100 cm^2).

A gas flow proportional counter (GFPC) was used in the beta detection mode as the survey instrument (a Ludlum 2350-1 with a 43-68B probe).

Surface Scan Measurements for Beta/Gamma Activity – A 100% surface scan was performed on the survey unit (area 124.4 m^2).

Static Measurements for Beta/Gamma Activity – 18 static measurement pairs, (shielded and unshielded) were surveyed. In addition, 18 general area static gamma measurements, using a Micro-Rem Meter spaced throughout the survey unit, were taken at a height of approximately 3 feet above the surface.

A minimum of 5% of all static and surface scan measurements were re-performed using identical methodology to satisfy QC requirements.

3.4.1 Summary of CV3-2, "16 B-Plates" Results

3.4.1.1 Surface Scan Measurements

After establishing Average Background Count Rate (ABCR) values for the panels surveyed, a 100% surface scan was performed on the plates. The action level was 200 NCPM. All results indicated levels below the action level.

3.4.1.2 Static Measurements

18 measurement pairs were obtained. All measurement results are reported as unshielded readings (gross cpm). Measurement results all indicated <400 cpm.

CV3-2 STATIC POINT NUMBER	UNSHIELDED READING (CPM)
1	155
2	145
3	155
4	145
5	157
6	144
7	175
8	150
9	147
10	146
11	142
12	166
13	153
14	176
15	172
16	162
17	176
18	151
QC Sample @ 1	129
QC Sample @ 14	155
QC Sample @ 17	166
MEAN	156
STANDARD DEVIATION	11.8
MAX	176
MIN	142
MEDIAN	154

3.4.1.3 Static Measurements for Gamma Activity Using the Bicron Micro-Rem Instrument

18 static Micro-Rem measurements were obtained. The values ranged from 3 to 5 μR/hr.

3.4.1.4 Loose Surface Contamination (Smear Survey)

Three smears were taken as part of a post remediation survey. Since no elevated activity was detected during scan and static survey measurements additional smears were not warranted. Results from these smears indicated <1K dpm/100 cm^2 beta-gamma and <MDC 12.7 dpm/100 cm^2 alpha. Also see section 3.6 for smear results.

3.4.1.5 Quality Control (QC) Measurements and Comparisons

Scan measurements were performed on approximately 14 m^2 or 11.25% of the total surface area. Measurement results were <200 NCPM. Static measurements were obtained for points 1, 14 and 17. Measurement results were >400 NCPM. This percentage, 3 of 18, (16.7%), meets the 5% requirement.

3.5 Survey Unit CV3-3, "2 A-Plates"

This survey unit is divided into two semi-circular steel plates (A1, A2) that form the bottom of the CV shell for a total surface area of 21.1 m^2. The following radiological surveys were conducted in accordance with the survey design documented as SNEC Calculation No.E900-03-003 (See Appendix A). In the original design this area was sized as 26.3 m^2. This value was later corrected (21.1 m^2) prior to performing the final survey.

The scan speed was set at 2.2 cm/second (1 detector width per 4 seconds). The effective DCGLw for this measurement plan is taken to be **2100 dpm/100 cm^2**. A net fixed point measurement result of about 400 cpm yields ~2100 dpm/100 cm^2 (the $DCGL_w$) for a 1 minute count time.

No WRS statistical analysis is necessary for this survey unit since all static measurements are below the assigned $DCGL_w$ (400 net cpm per 100 cm^2 or 2100 dpm/100 cm^2).

A gas flow proportional counter (GFPC) was used in the beta detection mode as the survey instrument (a Ludlum 2350-1 with a 43-68B probe).

Surface Scan Measurements for Beta/Gamma Activity – A 100% surface scan was performed on the survey unit (area 21.1 m^2).

Static Measurements for Beta/Gamma Activity – 9 static measurement pairs, (shielded and unshielded) were surveyed. In addition, 6 general area static gamma measurements, using a Micro-Rem Meter spaced throughout the survey unit, were taken at a height of approximately 3 feet above the surface.

A minimum of 5% of all static and surface scan measurements were re-performed using identical methodology to satisfy QC requirements.

3.5.1 Summary of Plate (A1 & A2) Measurement Results

3.5.1.1 Surface Scan Measurements

After establishing Average Background Count Rate (ABCR) values for the plates, a 100% surface scan was performed on the plates. The action level was 200 NCPM. All areas indicated levels below the action level.

3.5.1.2 Static Measurements

Nine (9) measurement pairs were obtained. All measurement results are reported as unshielded readings (gross cpm). Measurement results all indicated <400 cpm.

CV3-3 STATIC POINT NUMBER	UNSHIELDED READING (CPM)
1	138
2	134
3	148
4	157
5	143
6	143
7	150
8	153
9	160
QC Sample @ #7	166
QC Sample @ #9	181
MEAN	147
STANDARD DEVIATION	8.6
MAX	160
MIN	134
MEDIAN	148

3.5.1.3 Static Measurements for Gamma Activity Using the Bicron Micro-Rem Instrument

Six (6) static Micro-Rem measurements were obtained. The values ranged from 3 to 5 μR/hr.

3.5.1.4 Loose Surface Contamination (Smear Survey)

One smear was taken as part of a post remediation survey. Since no elevated activity was detected during scan and static survey measurements additional smears were not warranted. Results from the this smear indicated <1K dpm/100 cm^2 beta-gamma and <MDC 13.5 dpm/100 cm^2 alpha. Also see section 3.6 for smear results.

3.5.1.5 Quality Control (QC) Measurements and Comparisons

Scan measurements were performed on approximately 4 m^2 of surface area or 18.9%, of the total area. Measurement results were <200 NCPM. Static measurements were obtained for points #7 and #9. This percentage, 2 of 9 (22%), meets the 5% requirement. Measurement results were <400 NCPM.

3.6 Lower Head CV Smear Results

Post decontamination loose surface contamination activity in the following SNEC CV survey units is less than 10% of the effective DCGLw value for the applicable survey unit.

CALCULATIONS

Five sets of smears were taken in this region on representative surfaces of four survey units. Each smear sampled ~100 cm^2 of surface area. The calculated effective DCGLw value for this area of the CV is 2100 dpm/100 cm^2 (10% ≅ 210 dpm/100 cm^2). The five smear sets are described below:

1. SXSM3349 – (3 smears); Survey Unit CV3-1, Plates C-8, C-9 & C-10.

2. SXSM3355 – (4 smears); Survey Unit CV3-1, Plates C-5, C-6 & C-7.

3. SXSM3356 – (7 smears); Survey Units CV3-1, CV3-2 and CV2-23, Plates B-8, B-9, C-3, C-4 and the 774' El Support Ring.

4. SXSM3361 – (5 smears); Survey Units CV2-23 and CV3-1, Miscellaneous C-Plates and the 774' El Support Ring.

5. SXSM3387 – (3 smears); Survey Units CV3-2 and CV3-3, Plates B-10, B-16, A-1 and A-2.

The above sets of composite smears were gamma scanned and yielded the following results for Cs-137.

Composite Smear Gamma Scan results

Smear No.	Gamma Log No.	Cs-137 (uCi)	No. of Smears	Cs-137 (dpm)	Total dpm	*dpm/100 cm^2
SXSM3349	1-13213	< 1.0E-05	3	< 23.3	< 37.6	< 12.5
SXSM3355	1-13216	< 9.2E-06	4	< 20.4	< 32.9	< 8.2
SXSM3356	1-13220	< 9.6E-06	7	< 21.3	< 34.4	< 4.9
SXSM3361	1-13239	< 9.2E-06	5	< 20.4	< 32.9	< 6.6
SXSM3387	1-13257	< 1.13E-05	3	< 25.1	< 40.5	< 13.5

NOTE: The fraction of Cs-137 in the mix for this area of the CV is taken to be 62%.
***Average per smear.**

4.0 Data Assessment

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

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

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, where required, after instrument use each day data was collected.

4. Survey team personnel were properly trained in the applicable survey techniques, and this 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 measurement 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 laboratory analysis, were tracked from the point of collection until the final results were obtained, and

9. The final status survey data consists of qualified measurement results representative of current facility status 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 actions 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 site release criteria. The survey unit clearly meets the criterion because of the following:

1. All measurements in the survey units are less than or equal to the $DCGL_W$, or

2. A background reference area was used and the difference between the maximum survey unit measurement and the minimum background reference area measurement is less than or equal to the DCGL.

5.0 Final Survey Conclusions

The CV Interior, 774' EL and below final status survey was performed in accordance with Revision 2 of the SNEC LTP and site implementing procedures. Final status survey data was collected to meet and/or exceed the quantity and quality specified for each survey unit as prescribed by the applicable survey design. The survey data for each survey unit met the following conditions:

1. The average residual radioactivity inside the lower CV was less than the assigned $DCGL_w$.

2. Since all measurements were less than the $DCGL_w$ no EMC DCGL criteria needed to be applied.

3. Remediation was performed to reduce the levels of residual radioactivity to below the concentrations necessary to meet the DCGLs.

These conditions satisfy the release criteria established in the SNEC LTP and the radiological criteria for unrestricted use given in 10 CFR 20.1402. Therefore, it is concluded that the SNEC CV Interior, 774' El. and below is suitable for unrestricted release and can therefore, be backfilled no higher than the 774' elevation.

6.0 References

6.1 SNEC License Termination Plan, Revision 2, December 2002.

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

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

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

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

6.6 SNEC procedure E900-IMP-4520.04, "Survey Methodology to Support SNEC License Termination".

6.7 SNEC Survey Request (SR) # 46 – Survey Units CV2-19, CV2-20, CV2-21, & CV2-22

6.8 SNEC Survey Request (SR) # 60 – Survey Unit CV2-23

6.9 SNEC Survey Request (SR) # 59 – Survey Unit CV3-1

6.10 SNEC Survey Request (SR) #58 – Survey Unit CV3-2

6.11 SNEC Survey Request (SR) # 57 – Survey Unit CV3-3

6.12 SNEC Survey Request (SR) # 52 – Post Remediation for Survey Units CV3-1, CV3-2, CV3-3 and CV2-23

6.13 SNEC Procedure E900-ADM-4500.60, "Final Status Survey Report"

7.0 Appendices

Appendix A - SNEC Calculation #E900-03-003, "CV Interior, 774' El. And Below, FSS Survey Design."

Appendix B - SNEC Calculation #6900-02-024, "Interior CV Weld Ring Areas @774 ft. El – Survey Plan."

FirstEnergy

SNEC CALCULATION COVER SHEET

CALCULATION DESCRIPTION

Calculation Number	Revision Number	Effective Date	Page Number
E-6900-02-003 03 SW 3/7/03	0	3/20/03	1 of 70

Subject

CV Interior, 774' El. and Below, FSS 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	3/7/03
Technical Reviewer	P. Donnachie/ J. P. Donnachie, Jr.	Date	3/7/03
Additional Review	FOR: A. Paynter/ W. Stower / Per Telecon	Date	3/18/03
Additional Review		Date	
SNEC Management Approval		Date	

1.0 PURPOSE

1.1 The purpose of this calculation is to develop a survey design for four (4) Class 1 survey units contained within the SNEC CV lower head area. Three of these survey units have been aggressively decontaminated by SNEC personnel using methods described in section 4.8. The fourth survey unit (a steel support ring), was installed new to the CV to add structural stability to the building during the internal concrete removal project.

1.2 The four (4) survey units are composed of the items shown on **Attachment 1-1** (from **Reference 3.1**), through **1-4** (and are listed below). The "Location Codes" (taken from Table 5-2, of **Reference 3.2**) for these survey units are: CV2-23, CV3-1, CV3-2 and CV3-3.

1.3 Survey unit designation CV2-23, is one W14 x 74 W-beam support ring (centered at the 774'-9" El) that was welded to the CV shell to stiffen this structure after CV concrete removal. The area under the W-beam was surveyed IAW an "at risk" survey design (FirstEnergy/GPU Calculation No. 6900-02-024, **Reference 3.3**). The W-beam was a radiologically clean member at the time of installation. Additionally, a small section of the D-plates, which make up the vertical section of the CV steel shell structure, is included. This area is ~5" high and is located just below the W-beam. The W-beam extends 360 degrees around the inner circumference of the CV shell. The total area includes the beam and the area just below the beam which form one survey unit of approximately ***74.5 square meters***.

1.3.1 Survey unit designation ***CV3-1***, is composed of 10 C-Plates (C1 through C10), starting at about the 773'-8" El just below the W-beam area, and extending down to the top of the B-plates. This survey unit is approximately ***104.9 square meters*** in total area.

1.3.2 Survey unit designation ***CV3-2***, The 16 B-Plates start at about the 767' El and extend down near the base of the CV shell at the 760'-7" El. This survey unit is approximately ***124.4 square meters*** in total area.

1.3.3 Survey unit designation ***CV3-3***, The 2 A-Plates form the bottom of the SNEC CV shell. This survey unit is approximately ***26.3 square meters*** in total area.

1.4 This calculation also establishes a working gross activity DCGLw (in dpm/100 cm^2) for these survey units.

2.0 SUMMARY OF RESULTS

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

2.1.1 The survey area is divided into ***4 Class 1 survey units***.

2.1.2 The "Location Codes" for these survey units are: ***CV2-23, CV3-1, CV3-2*** and ***CV3-3***.

2.1.3 The area of each survey unit is:

- ***CV2-23 = 74.5 square meters (774' El Support Ring)***
- ***CV3-1 = 104.9 square meters (C-Plates)***
- ***CV3-2 = 124.4 square meters (B-Plates)***
- ***CV3-3 = 26.3 square meters (A-Plates)***

2.1.4 The number of static measurement points developed for each survey unit is:

- *774' El Support Ring = 20 (see Attachment 2-1 to 2-4)*
- *C-Plates = 11 (see Attachment 3-1)*
- *B-Plates = 18 (see Attachment 3-2)*
- *A-Plates = 9 (see Attachment 3-3)*

2.1.5 The suggested starting point (0, 0) for physically locating each survey point (as listed in **Attachments 2-1 to 2-4 and 3-1 to 3-3**), is shown below (see **Attachment 1-3** for additional guidance in locating points on the 774' El support ring):

- *774' El Support Ring, QAD A = Upper left hand corner of region where static points are marked (section of W-Beam facing the center of the CV also called the top flange),*
- *774' El Support Ring, QAD B = Upper left hand corner of region where static points are marked (lowest flange area, also facing the center of the CV),*
- *774' El Support Ring, QAD C = Same location as QAD A*
- *774' El Support Ring QAD D = Lower left hand corner of web section, in the region where the measurement points are located.*
- *C-Plates = Upper left hand corner of diagram*
- *B-Plates = Upper left hand corner of diagram*
- *A-Plates = Lower left hand corner of diagram*

2.1.6 The scan speed is set at *2 cm/sec*. *Scan coverage is set at 100%* (Class 1 area).

2.1.7 This survey design requires the detector be in *contact with the surface* during all measurement phases except in areas where this is not possible.

2.1.8 Static measurement points are to be *clearly marked/identified* in each survey unit.

2.1.9 Scanning efforts shall be based on *audible speaker output* levels. Earphones are recommended.

2.1.10 The DCGLw in cpm is *400 cpm above background*.

2.1.11 The action level during first phase scanning is *200 cpm above background*. If this level is reached, the surveyor should stop and perform *a count of at least 1/2 minute* duration to identify the actual count rate.

2.1.12 *Areas greater than the DCGLw (400 ncpm) must be identified, documented, marked, and bounded to include an area estimate*.

2.1.13 Remediation is indicated when any area exceeds 3 x the DCGLw for any scan or discrete measurement or when the average value for any area of ~1 square meter is greater than the DCGLw. When remediation is performed the current survey design is void.

2.1.14 When an obstruction is encountered during the static measurement phase that will not allow placement of a static survey point, contact the cognizant SR coordinator for

permission to delete that survey point. Document the reason for the deletion. Note that up to three survey points in any survey unit (except the A-Plate region), may be deleted without reducing the survey designs effectiveness.

2.1.15 A gas flow proportional counter (GFPC) will be used in the beta detection mode as the survey instrument (a Ludlum 2350-1 with a 43-68B probe).

2.1.16 ***Other Instruments of the type specified in 2.1.15 above may be used during the FSS but they must demonstrate an efficiency at or above the value listed in Attachment 6-1 (23.6%).***

3.0 REFERENCES

3.1 "Inside Stiffener Rings for Buckling Protection", SNEC-S6, GTS Technologies, Inc., 12/20/01.

3.2 SNEC Facility License Termination Plan.

3.3 SNEC Calculation No. 6900-02-024, Interior CV Weld Ring Areas @ 774' El – Survey Plan.

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

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

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

3.7 Westinghouse Electric Corporation, Gilbert Associates, Inc., Drawing No. D-37798, Saxton Reactor Project, "Containment Vessel Penetration Access", 7/21/60.

3.8 GPU Nuclear, SNEC Facility, "Containment Vessel Survey", SNECRM-019, Rev 1, 1/18/02.

3.9 Ryerson Structural Products Handbook, Joseph T. Ryerson & Son, Inc., 1972.

3.10 SNEC procedure E900-IMP-4520.04, "Survey Methodology to Support SNEC License Termination".

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

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

3.13 RadDecay for Windows, Version 1.13, Grove Engineering, Rockville, MD, October 1996.

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

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

4.0 ASSUMPTIONS AND BASIC DATA

4.1 A gas flow proportional counter (GFPC) will be used in the beta detection mode as the survey instrument (a Ludlum 2350-1 with a 43-68B probe).

4.2 The Compass computer program is used to develop the number of fixed point measurement locations to be taken within each Class 1 survey unit.

4.3 The WRS statistical testing criteria will be used for this survey design.

4.4 The number of points chosen by Compass was located on survey maps for each survey unit by using the Visual Sample Plan (VSP) computer code (Reference 3.5).

4.5 VSP is used to plot random start systematically spaced fixed point survey locations on diagrams used in the field by survey personnel. The coordinates of the survey points are provided for each survey unit. Because of edge effects and a desire to error on the conservative side, additional measurement points have been forced by increasing the overage from the required 20% to as much as 100% for one case. This was done to ensure that at least one measurement point was located within each CV structural plate, and that a significant frequency of point placements were attained along the structural support beam.

The result is that the bounded regions are less then that calculated by Compass which indicated that 8 survey points were adequate for each survey unit. In the case of the support ring, the four quadrants were stacked in pairs graphically before plotting out the survey points. The triangular grid was split between two ring sections resulting in differing vertical point placements along each quadrants.

4.6 Reference 3.6 was used as guidance during the survey design development phase.

4.7 The construction/assembly drawings used to determine the physical extent of these areas are listed as Reference 3.1, 3.7, and 3.8. In addition, Reference 3.9 was used to establish the surface area of a steel W-beam (see Attachment 1-3):

- Flange thickness is 0.783" (4 areas of exposed thickness are considered). Then 4 x 0.783" = 3.132".
- Top width of Flange area is 10.072" wide.
- Bottom Flange area is welded to CV.
- Four areas of exposed Flange are located adjacent to the Web. Then 4 x 4.811" = 19.244".
- Height of Web is taken to be 14.19" – (2 x 0.783") = 12.624" x 2 = 25.248".
- Then the total vertical section is: 3.132" + 10.072" + 19.244" + 25.248" = 57.696"

Adding the lower 5" section of D-plates yields 57.696" + 5" = ***62.696"***

The circumference of the CV is 50 ft x 12"/ft x π = ***1885"*** which is at the welded area of the W-beam (at the surface of the CV). However, since the W-beam is 14.19" in height, the exposed top Flange area of the W-beam is only [(50 ft x 12"/ft) – (2 x 14.19")] x π = ***1796"*** in circumference.

4.8 Remediation History

Remediation of the SNEC CV began with gross decontamination and equipment removal e.g., piping, the steam generator, the pressurizer and the reactor vessel (fall of 1998). Extensive attempts at clean-up of the internal concrete structure indicated that the concrete had to be removed from the facility. In order to accomplish this, ground water abatement around the exterior of the CV was necessary and established. By the fall of 2002 the SNEC CV internal concrete structure was removed in total. However, several external and internal stiffener rings were necessary to maintain structural integrity. These assemblies were welded to the steel shell to add rigidity and produce a safe working environment for remediation crews and survey personnel. The internal surface of the CV steel shell was

then cleaned to remove radiological contamination, paint, residual concrete dirt and weld and surface scale. Original weld areas between the sections of steel plate that make up the steel shell were vigorously decontaminated along with apparent surface defects. Remediation efforts of the interior CV steel surface included combinations of the following techniques:

- roto-peening
- liquid paint remover (MIRACHEM)
- surface grinding
- needle gun
- grit blasting
- wire brush
- vacuuming
- surface wipe-down

A decontamination effectiveness check was performed during the cleaning effort by means of biased and unbiased measurements on the surface of the cleaned steel shell using a gas flow proportional counter (GFPC). The criteria for determining when an area was acceptably decontaminated was initially established at < 3 times the local background count rate as determined by closed window readings in the area. Areas above this value were re-cleaned.

A separate Post Remediation Survey (PRS) was conducted under the guidance of Survey Request (SR) SR-0052 and 0053 (**Reference 3.10**). The post remediation survey included both surface scans and static measurements. It also included a surface smear survey and sampling of the steel surface in one suspect activation region. Alpha radiation measurements were also taken at select locations. Smears were counted for both beta-gamma and alpha contamination. The results of the PRS survey effort were reviewed before the start of the Final Status Survey (FSS) in this area. The area was then inspected IAW criteria established in **Reference 3.11**, before being approved for FSS activities.

4.9 This survey design uses a gross activity DCGLw value developed for these survey units from scrape samples of the interior surface of the SNEC CV. These samples were taken at five (5) different elevations in the CV. The sample result that produced the most conservative effective DCGLw value was then used as input to the Compass computer program (see **Reference 3.4**).

The nearest sample result to the lower head region was taken from the 774' elevation of the CV. However, scrape samples of surface contaminants have been collected from other internal CV shell support ring installation areas. These scrape samples are listed below along with their initial weights and consist largely of paint and concrete residual along with surface scale.

- SNEC Sample No. SXSD3054 (quadrant A & B) – 792' El., 122 gram sample.
- SNEC Sample No. SXSD3055 (quadrant C & D) – 792' El., 93 gram sample.
- SNEC Sample No. SXSD3124 – 787' El., 55 gram sample.
- SNEC Sample No. SXSD3164 - 782' El., 90 gram sample.
- SNEC Sample No. SXSD3176 – 778' El., 52 gram sample.

- SNEC Sample No. SXSD3193 – 774' El., 130 gram sample.

The above samples were analyzed by Teledyne Brown Engineering. The results are shown in **Attachment 4-1** through **4-6**. The gross activity DCGLw is then calculated for each sample result as shown in **Attachment 4-7** through **4-12**. All samples were decayed to ***March 1, 2003*** (see **Attachment 4-13**).

A gross activity DCGLw was then developed from the relative ratios of the nuclides in the samples. The following values were calculated:

- SNEC Sample No. SXSD3054 16830 dpm/100 cm^2.
- SNEC Sample No. SXSD3055 5365 dpm/100 cm^2.
- SNEC Sample No. SXSD3124 12877 dpm/100 cm^2.
- SNEC Sample No. SXSD3164 3880 dpm/100 cm^2.
- SNEC Sample No. SXSD3176 12813 dpm/100 cm^2.
- SNEC Sample No. SXSD3193 10714 dpm/100 cm^2.

SNEC sample No. SXSD3164 resulted in the lowest calculated gross activity DCGLw value based on the results of these six samples (3880 dpm/100 cm^2), and was chosen to represent the lower head area survey units.

A further correction to the gross activity DCGLw is necessary to address de-listed radionuclides and to correct for activated steel in the SNEC CV. These correction factors are reported in the SNEC LTP (Chapter 6 – **Reference 3.2**). In addition, the SNEC facility has instituted an administrative limit of 75% for the allowable dose for all measurement results. The de-listed radionuclide dose is accounted for within the 75% administrative limit, but the activated steel dose correction is not. Therefore, the 3880 dpm/100 cm^2 gross activity DCGLw is lowered by the fraction (25 mrem/y-7.2 mrem/y)/25 mrem/y, which results in 2763 dpm/100 cm^2 as the effective limit. The 75% administrative limit is then applied as follows: 0.75 x 2763 dpm/100 cm^2 = 2072 dpm/100 cm^2. This value is rounded to ***2100 dpm/100 cm^2***. See **Attachment 5-1**.

4.10 Cs-137, H-3 and Ni-63 account for the majority of radionuclides in the above listed samples:

- SNEC Sample No. SXSD3054 (95.5% Cs-137 + 0.42% H-3 + 3.4% Ni-63) = 99.2%.
- SNEC Sample No. SXSD3055 (89.6% Cs-137 + 1.98% H-3 + 6.8% Ni-63) = 98.3%.
- SNEC Sample No. SXSD3124 (84.7% Cs-137 + 4.36% H-3 + 10.2% Ni-63) = 99.2%.
- SNEC Sample No. SXSD3164 (62.0% Cs-137 + 13.4% H-3 + 22.5% Ni-63) = 97.9%.
- SNEC Sample No. SXSD3176 (73.8% Cs-137 + 16.8% H-3 + 8.1% Ni-63) = 98.7%.
- SNEC Sample No. SXSD3193 (57.6% Cs-137 + 19.9% H-3 + 21.1% Ni-63) = 98.5%.

H-3 and Ni-63 provide no additional counting efficiency for this survey design. Cs-137 provides the only reasonably detectable radionuclide in this mix. Cs-137's detection efficiency has been checked by SNEC personnel using ISO standard 7503-1 methodology (**Reference 3.15**). The SNEC facility uses only the lowest reported efficiency from the available instruments as input to the survey design process. **Attachment 6-1** indicates an

Instrument efficiency of 0.471. The ***ISO value of 0.5*** is used as the source efficiency. The instrument S/N is 120583 and the probe S/N is 92508.

Other instruments may be used during the FSS but they must demonstrate an efficiency at or above the value listed above for the instrument efficiency.

4.11 The current version of Compass (version 1.0) does not perform well when using the gross activity option. Therefore, an alternative will be implemented for this survey design. The alternative approach involves several small changes that will not negatively impact the survey design process. These changes are:

4.11.1 For this survey design, the efficiency will be input as follows:

- $\varepsilon_i = 0.471$
- ε_s = [0.5 (ISO for Cs-137 energy betas)] x [the fraction of Cs-137 in the source area, which would be 1 for the Cs-137 calibration source or 0.62 for Cs-137 in the CV lower head survey units] x [any surface condition that impacts efficiency e.g., the impact from an increase in the average distance between the detector and source caused by a rough surface].

4.11.2 A radionuclide will be created in the library of Compass called "Gross Activity". This radionuclide will have the same nuclear parameters as Cs-137 (half-life, decay time, etc.). The effect will be (when called up) that "Gross Activity" will replace Cs-137 on the print-out from the Compass program (administrative impact only).

4.11.3 Only "Gross Activity" will be used in the Compass program for this survey design. However, the Area Factors (AF) input to Compass will be for Co-60, which is the more conservative of all the AF values for radionuclides present in the chosen mix. Co-60 AF values are very close to Cs-137 AF values.

4.12 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 2100 dpm/100 cm^2 x (126 cm^2 physical probe area/100 cm^2) = 2646 x (0.62 disintegrations Cs-137/disintegrations in mix) x ε_i (0.471) x ε_s (0.5) which yields ~386 net cpm above background (Compass calculates 397 ncpm as the gross beta DCGLw). The 0.146 count per disintegration counting efficiency considers only the Cs-137 contaminant present in the sample material matrix, and is calculated by: ε_i (0.471) x ε_s (0.5) x 0.62 disintegrations Cs-137/total disintegrations in mix = 0.146.

4.13 No corrections for backscatter are made for this steel surface. Therefore, the source term will be overestimated in all areas where there is no loss in efficiency due to surface defects. Since all areas of the CV are rigorously decontaminated using the same technique(s), it is assumed that areas having significant surface defects (dents, weld buildup, etc.), are well represented by adjacent areas that do not have significant surface defects. Defect areas represent a very small fraction of the total surface area of these survey units. Therefore no additional efficiency correction factors will be applied to this survey design.

4.14 **Attachment 7-1** provides some initial measurement values from the lower bowl section of the SNEC CV (post-decontamination). The average closed window reading is 161 cpm and the average open window reading is 175 cpm. **Attachment 7-2** is reference area steel background values taken from the Williamsburg site. The average closed window reading is 200 cpm. The open window background reference area reading is corrected to approximate

the ambient background level in the SNEC CV (which is 50' feet below grade level) by subtracting the closed window mean value of 161 cpm in the survey area from the closed window mean reference area reading of 200 cpm which results in a difference of 39 cpm. This value is then assumed to represent the additional ambient level in the open window readings in the off-site reference area at Williamsburg, PA. The result is a true open window background value corrected for the difference in shielding created by the CV lower head elevation below the surface.

4.15 The static beta-gamma MDC calculation is as shown in **Attachment 8-1**, and assumes a typical background level of ~161 cpm (CV area closed window reading). The value calculated is ~337 dpm/100 cm^2.

4.16 The scan MDC calculation is determined based on a 2 cm/sec scan rate, a 1.38 index of sensitivity (95% correct detection probability and 60% false positive), 0.146 counts/disintegration and a 126 cm^2 probe area. This calculation is shown in **Attachment 8-2** and **8-3**. The value calculated is ~737 dpm/100 cm^2 (Compass calculates a value of 934 dpm/100 cm^2 which is largely because it does not use the 126 cm^2 probe correction factor in the equation). Since the scan MDC is less than the gross activity DCGLw there is no additional survey points added to the survey design for any survey area.

4.17 The background reference area for this survey is the Williamsburg Coal Fired Steam plant decommissioned site. This site area contains construction residual and facilities of a similar age or older than the Saxton site. The results of this survey are shown in **Attachment 7-2**.

4.18 The survey units described in this survey design were inspected after remediation efforts were shown effective. A copy of the SNEC facility post-remediation inspection report (**Reference 3.11**), is included as **Attachment 9-1** to **9-15**.

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

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

4.21 Special measurements including gamma-ray spectroscopy are not included in this survey design.

4.22 No additional sampling will be performed IAW this survey design.

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

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

5.0 CALCULATIONS

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

5.2 See attachments for Compass output (**Attachment 10-1** to **Attachment 10-11**).

5.3 The bounded areas for each survey area as calculated by Compass is:

774' El Ring Area = 74.5 m^2/8 = 9.3 m^2

C-Plates = 104.8 m^2/8 = 13.1 m^2

B-Plates = 124.4 m^2/8 = 15.6 m^2

A-Plates = 26.3 m^2/8 = 3.3 m^2

After the number of survey points was increased by increasing the overage, the bounded areas were as follows:

774' El Ring Area = 74.5 m^2/14 = 5.3 m^2

C-Plates = 104.8 m^2/8 = 13.1 m^2

B-Plates = 124.4 m^2/12 = 10.4 m^2

A-Plates = 26.3 m^2/9 = 2.9 m^2

The required scan MDC for the above is estimated from **Attachment 10-1**, as follows:

774' El Ring Area = 5.3 m^2 = AF of ~2.5 x 2100 dpm/100 cm^2 = 5250 dpm/100 cm^2.

C-Plates = 13.1 m^2 = AF of ~1.8 x 2100 dpm/100 cm^2 = 3780 dpm/100 cm^2

B-Plates = 10.4 m^2 = AF of ~2 x 2100 dpm100 cm^2 = 4200 dpm/100 cm^2

A-Plates = 2.9 m^2 = AF of ~6.5 x 2100 dpm/100 cm^2 = 13650 dpm/100 cm^2

The actual scan MDC is listed on **Attachment 10-11** as ***934 dpm/100 cm^2*** (Compass). Therefore the scan MDC is adequate. No additional measurement points are necessary in any survey unit.

6.0 APPENDICES

6.1 **Attachment 1-1**, is a drawing of the SNEC CV showing "inside stiffener rings that were installed for buckling protection", SNEC-S6.

6.2 **Attachment 1-2**, is the exploded diagram of the SNEC CV lower head steel plate sections.

6.3 **Attachment 1-3**, is a cut section of the W-Beam support ring area as it is laid out for survey work.

6.4 **Attachment 1-4**, one quadrant of the 774' El support ring with dimensions.

6.5 **Attachment 2-1**, Quadrant A of the 774' El ring support showing the VSP plotted points with their dimensions.

6.6 **Attachment 2-2**, Quadrant B of the 774' El ring support showing the VSP plotted points with their dimensions.

6.7 **Attachment 2-3**, Quadrant C of the 774' El ring support showing the VSP plotted points with their dimensions.

6.8 **Attachment 2-4**, Quadrant D of the 774' El ring support showing the VSP plotted points with their dimensions.

6.9 **Attachment 3-1**, C-Plates showing the VSP plotted points with their dimensions.

6.10 **Attachment 3-2**, B-Plates showing the VSP plotted points with their dimensions.

6.11 **Attachment 3-3**, B-Plates showing the VSP plotted points with their dimensions.

6.12 **Attachment 4-1 to 4-6**, Teledyne Brown SNEC sample results summary sheets.

6.13 **Attachment 4-7 to 4-12**, Excel Spreadsheet used to correct for the various radionuclides in a mix and determine an effective DCGLw as well as the SNEC Administrative Limit impact.

6.14 **Attachment 4-13**, Excel Spreadsheet used to correct the radionuclide mix for decay.

6.15 **Attachment 5-1**, DCGLw correction factor sheet used to adjust the DCGLw IAW regulatory guidance and site commitments.

6.16 **Attachment 6-1**, Calibration sheet from the SNEC for a representative survey instrument.

6.17 **Attachment 7-1**, CV post decontamination measurement data used for variability input.

6.18 **Attachment 7-2**, Williamsburg, PA coal fired steam plant site steel background values (reference area).

6.19 **Attachment 8-1 to 8-3**, Static MDC and Scan MDC calculation sheet used to estimate initial survey parameters.

6.20 **Attachment 9-1 to 9-15**, post decontamination inspection report summary sheets.

6.21 **Attachment 10-1 to 10-11**, Compass output files for the four (4) survey units previously described.

Exhibit 1

SNEC Facility 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).

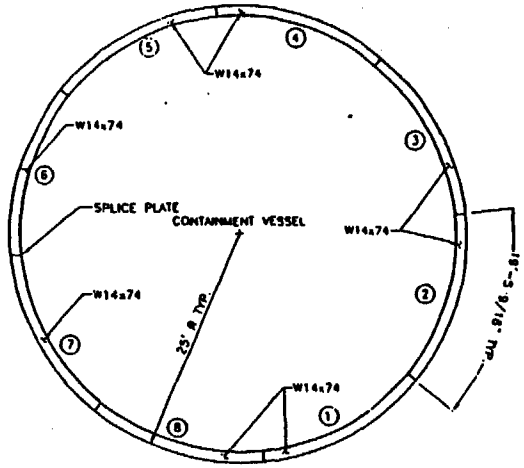
FirstEnergy	SNEC CALCULATION SHEET	
Calculation Number E6900-03-003 BB 3/7/03	Revision Number 0	Page Number Page 13 of 70
Subject **CV Interior, 774' El. and Below, FSS Survey Design**		

Exhibit 2
Survey Design Checklist

Calculation No. 6900-03-	Location Code CV2-23, CV3-1, CV3-2 & CV3-3		
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	3/7/03
2	Are drawings/diagrams adequate for the subject area (drawings should have compass headings)?	(Yes) N/A	
3	Are boundaries properly identified and is the survey area classification clearly indicated?	(Yes) N/A	
4	Has the survey area(s) been properly divided into survey units IAW EXHIBIT 10	(Yes) N/A	
5	Are physical characteristics of the area/location or system documented?	(Yes) N/A	
6	Is a remediation effectiveness discussion included?	(Yes) N/A	
7	Have characterization survey and/or sampling results been converted to units that are comparable to applicable DCGL values?	(Yes) N/A	
8	Is survey and/or sampling data that was used for determining survey unit variance included?	(Yes) N/A	
9	Is a description of the background reference areas (or materials) and their survey and/or sampling results included along with a justification for their selection?	(Yes) N/A	
10	Are applicable survey and/or sampling data that was used to determine variability included?	(Yes) N/A	
11	Will the condition of the survey area have an impact on the survey design, and has the probable impact been considered in the design?	(Yes) N/A	
12	Has any special area characteristic including any additional residual radioactivity (not previously noted during characterization) been identified along with its impact on survey design?	(Yes) N/A	
13	Are all necessary supporting calculations and/or site procedures referenced or included?	(Yes) N/A	
14	Has an effective DCGLw been identified for the survey unit(s)?	(Yes) N/A	
15	Was the appropriate $DCGL_{EMC}$ included in the survey design calculation?	(Yes) N/A	
16	Has the statistical tests that will be used to evaluate the data been identified?	(Yes) N/A	
17	Has an elevated measurement comparison been performed (Class 1 Area)?	(Yes) N/A	
18	Has the decision error levels been identified and are the necessary justifications provided?	(Yes) N/A	
19	Has scan instrumentation been identified along with the assigned scanning methodology?	(Yes) N/A	
20	Has the scan rate been identified, and is the MDCscan adequate for the survey design?	(Yes) N/A	
21	Are special measurements e.g., in-situ gamma-ray spectroscopy required under this design, and is the survey methodology, and evaluation methods described?	Yes, (N/A)	
22	Is survey instrumentation calibration data included and are detection sensitivities adequate?	(Yes) N/A	
23	Have the assigned sample and/or measurement locations been clearly identified on a diagram or CAD drawing of the survey area(s) along with their coordinates?	(Yes) N/A	
24	Are investigation levels and administrative limits adequate, and are any associated actions clearly indicated?	(Yes) N/A	
25	For sample analysis, have the required MDA values been determined.?	Yes (N/A)	
26	Has any special sampling methodology been identified other than provided in Reference 6.3?	Yes, (N/A)	

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

ATTACHMENT 1 - 1



PLAN
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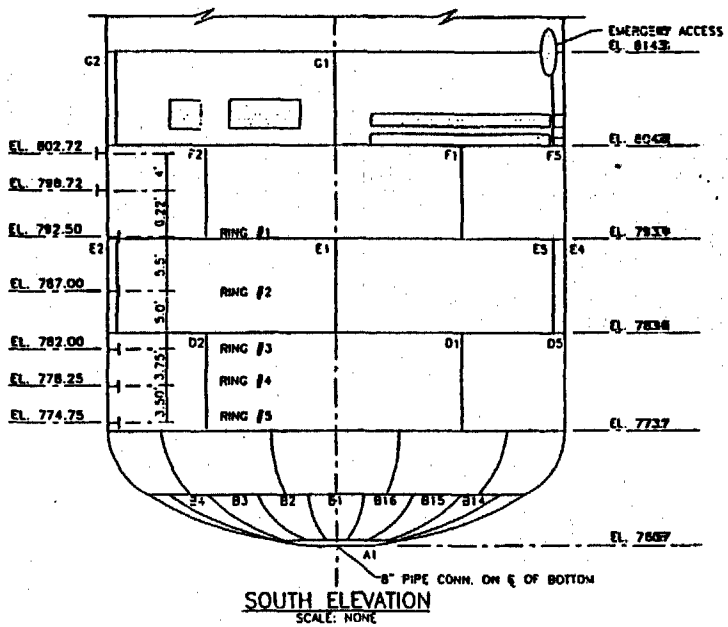

SOUTH ELEVATION
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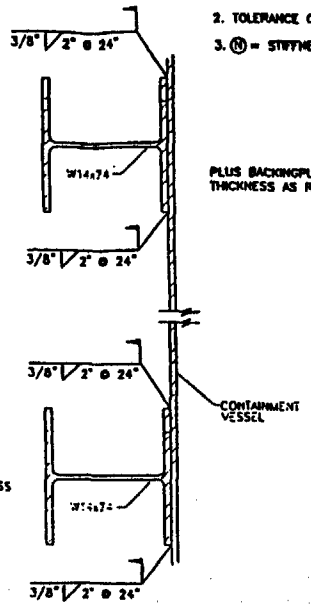
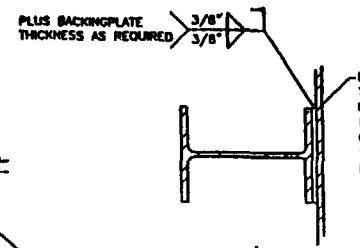


ELEVATION
SCALE: NONE

NOTES:
1. TOLERANCE ON THE ℄ EL. OF RINGS IS ±2"
2. TOLERANCE ON THE TOP OF CONCRETE EL. IS 12"
3. Ⓝ = STIFFNER RING SEGMENT NUMBER



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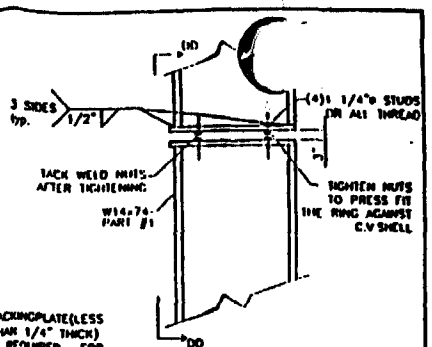
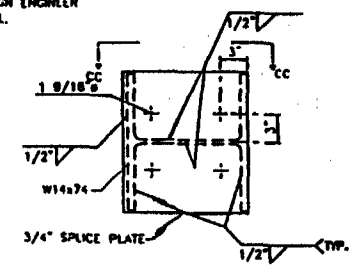


SECTION CC-CC
SCALE: NONE



SPLICE PLATE DETAIL
SCALE: NONE

FABRICATION PARTS

PART NO.	DESCRIPTION	THICKNESS	WIDTH	LENGTH	NUMBER	MATERIAL
1	W14x74	–	–	20'	40	A36
2	STEEL SPLICE PLATE	3/4"	–	–	80	A36
3	STUD OR ALL THREAD	1 1/4"ø	–	–	180	A36
4	TIGHTENING NUT	1 1/4"ø	–	–	350	A563
5	WASHER	–	–	–	380	F436

ELEVATION	RING No.	MEMBER SIZE
774.75	5	W14x74
778.25	4	W14x74
782.0	3	W14x74
787.0	2	W14x74
792.5	1	W14x74

SAXTON NUCLEAR EXPERIMENTAL CORPORATION FACILITY
REMOVAL OF CONTAINMENT VESSEL CONCRETE
CONTRACT NO. 55001170

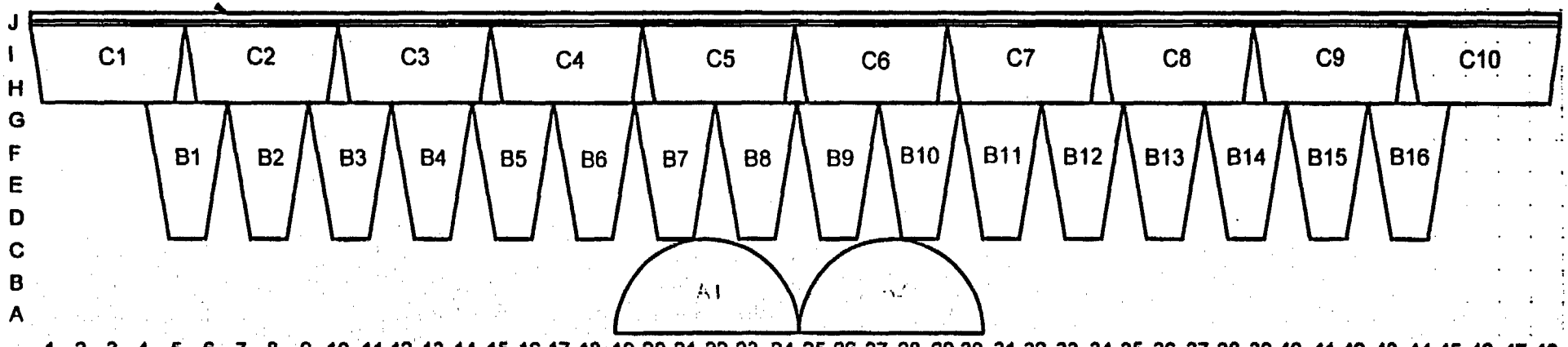
INSIDE STIFFENER RINGS FOR BUCKLING PROTECTION

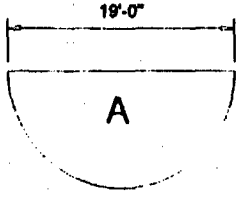
DATE: DECEMBER 28, 1999
SCALE: AS SHOWN
PREPARED BY: GTS TECHNOLOGIES, INC.
SW-01-001.1
ATTACHMENT 7.1.1
DRAWN BY: TPC
CHECKED BY:
DRAWING SNEC-S6
H:\4100\4138-2\CADD\GTS\FIGURES\4138FABRIC_14.DWG

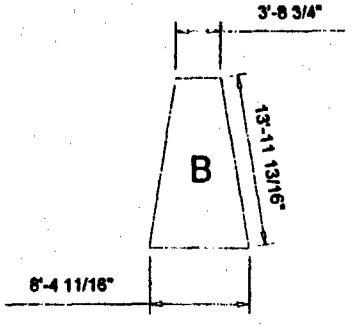
14 of 20
E900-03-003

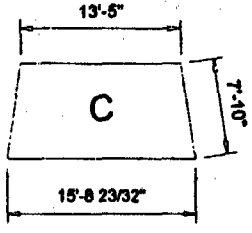
LOWER HEAD SURVEY OF SNEC CV

Steel W-Beam









Steel W-Beam + one 5" region below beam (68.4 + 6.1 = 74.5 square meters total) (1 Survey Unit)

C Plates = 10.486 square meters per plate (104.9 square meters total) (1 Survey Unit)

B Plates = 7.772 square meters per plate (124.4 square meters total) (1 Survey Unit)

A Plates = 13.17 square meters per plate (26.3 square meters total) (1 Survey Unit)

ATTACHMENT 1 . 2

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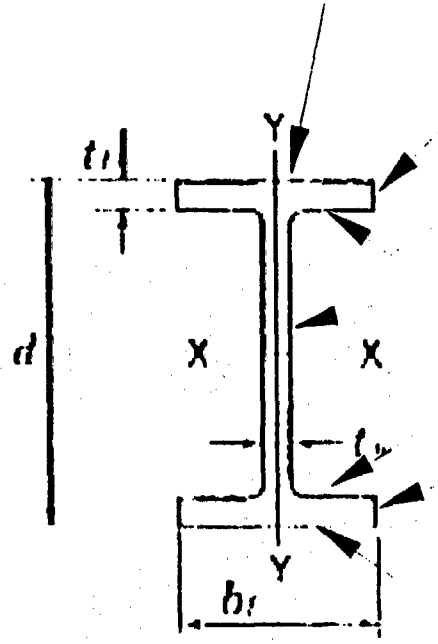
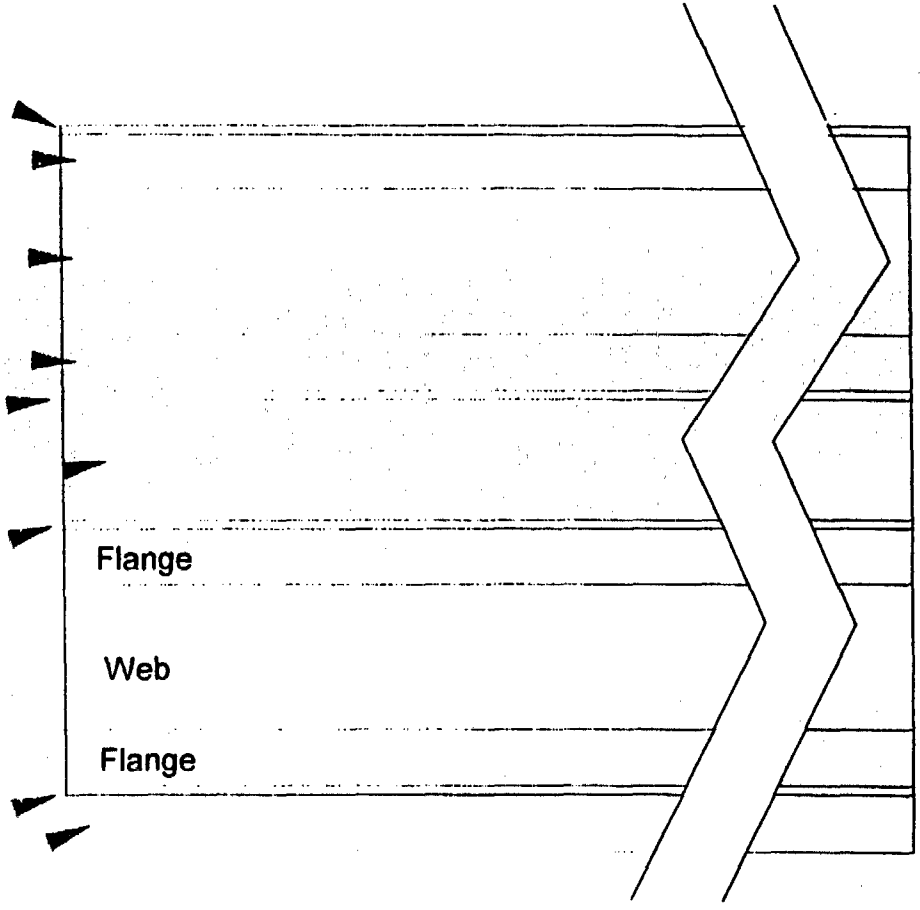
Internal Ring Support Beam Survey Diagram

W-Beam Ring Shown Flattened Out With Additional CV Shell Area Added Below Beam Area



W-Beam

From Ryerson, Product Manual



Bottom ~5" CV Shell Addition

ATTACHMENT 1 . 3

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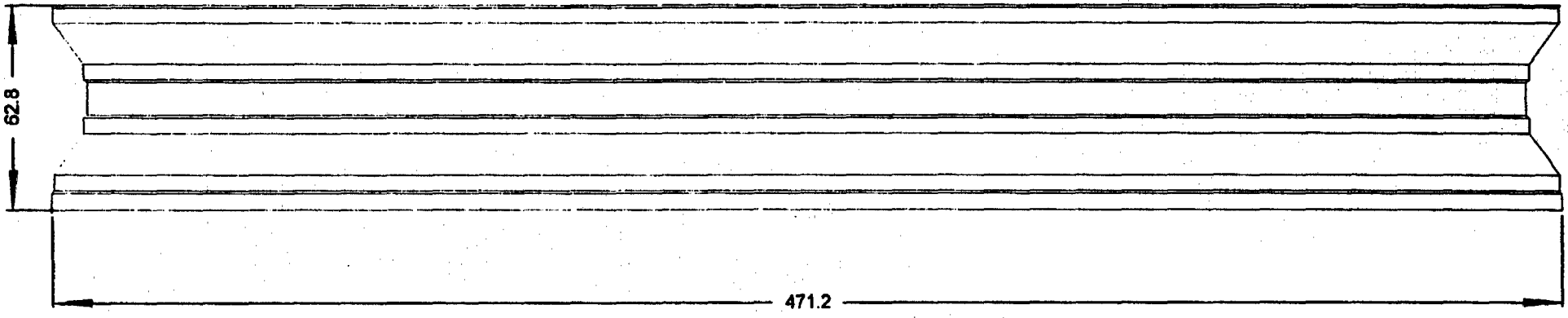
EQ00-03-001

Internal Ring Support Beam

1 Quadrant of W-beam is ~18.6 Square Meters



ATTACHMENT 1 . 4

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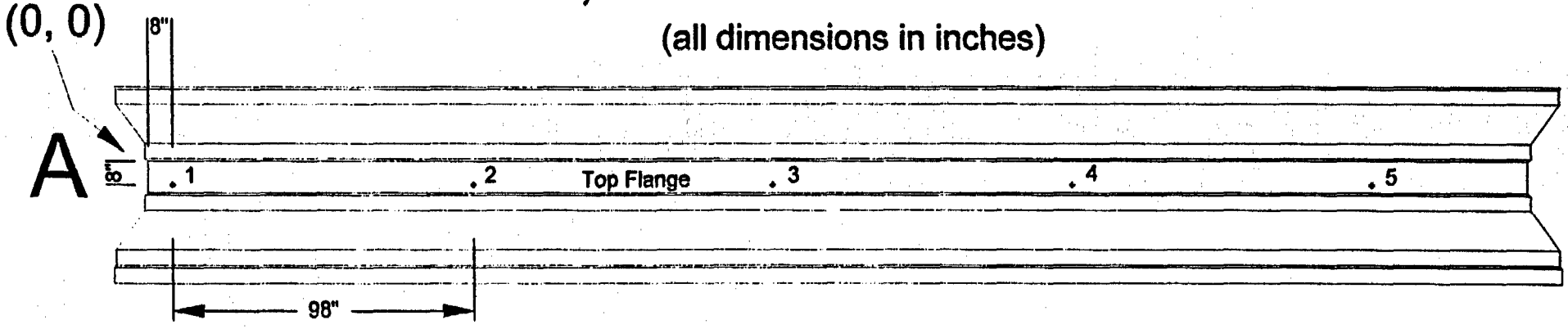
QAD A, 774' EI W-Beam Section

(all dimensions in inches)



ATTACHMENT 2.1

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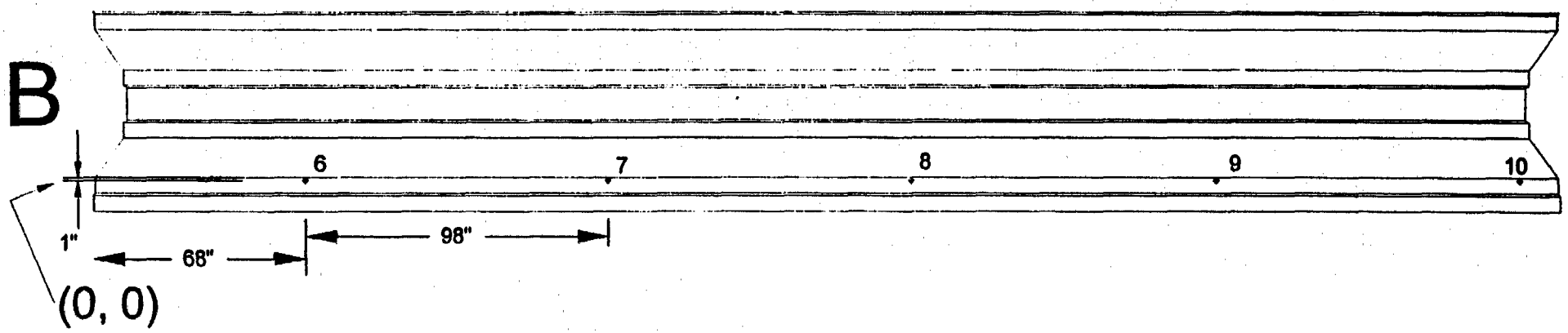
QAD B, 774' EI W-Beam Section

(all dimensions in inches)



ATTACHMENT 2.2

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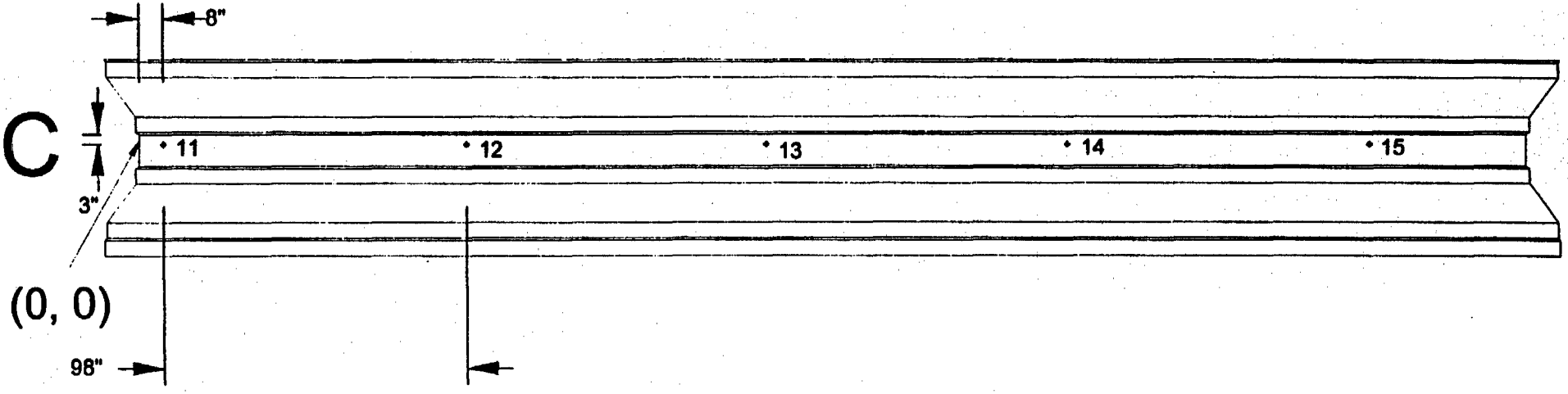
QAD C, 774' EI W-Beam Section

(all dimensions in inches)



ATTACHMENT 2.3

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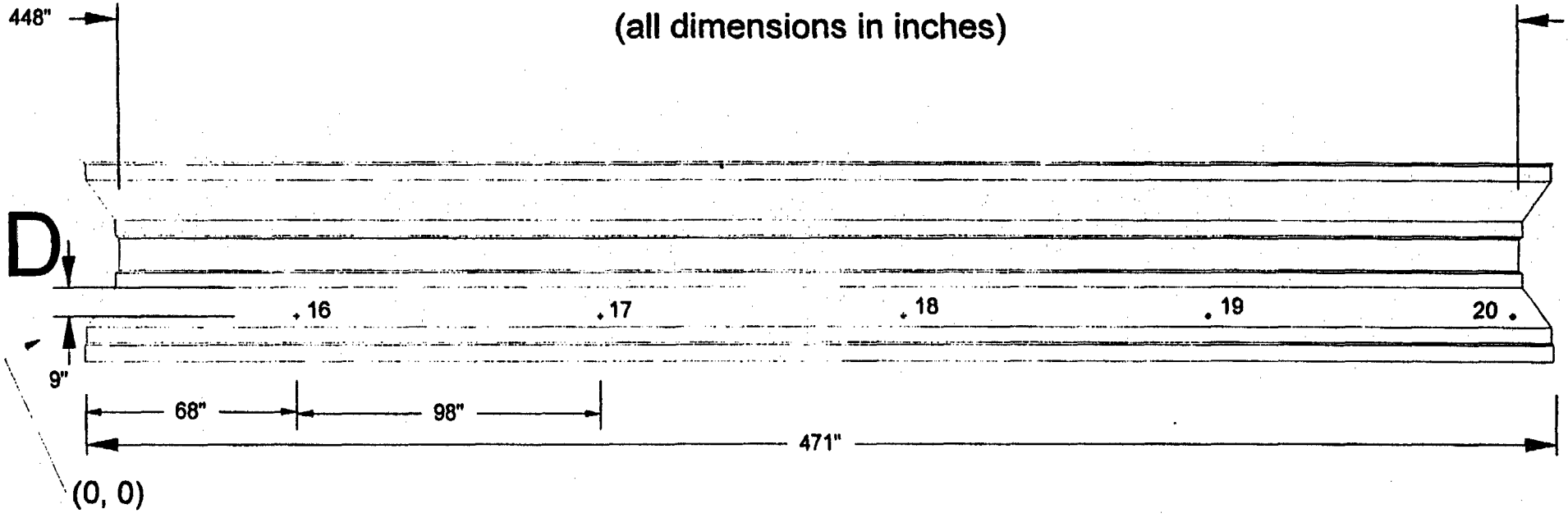
QAD D, 774' EI W-Beam Section

(all dimensions in inches)



ATTACHMENT 2.4

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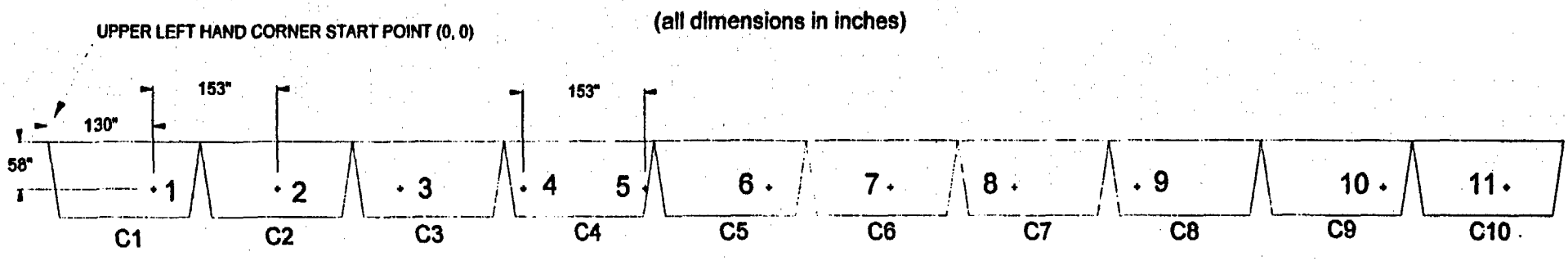
C - Plates

(all dimensions in inches)



ATTACHMENT 3.1

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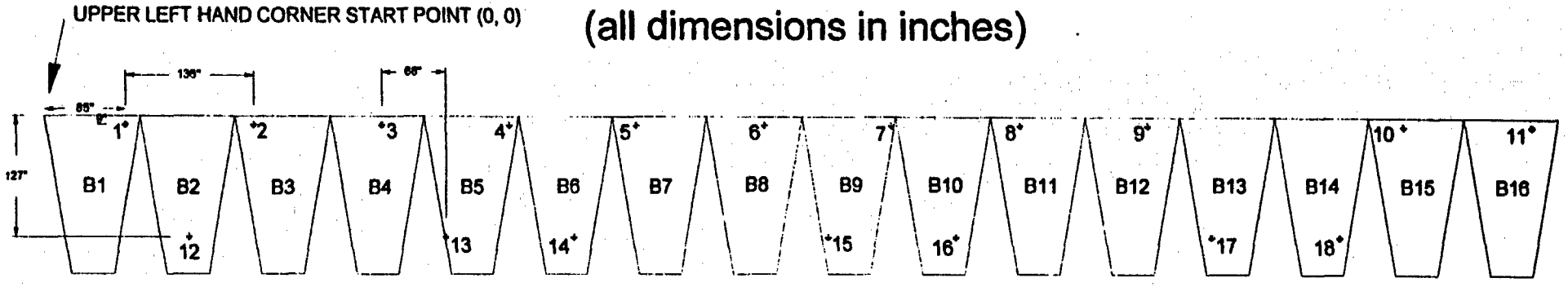
B - Plates

(all dimensions in inches)



ATTACHMENT 3 . 2

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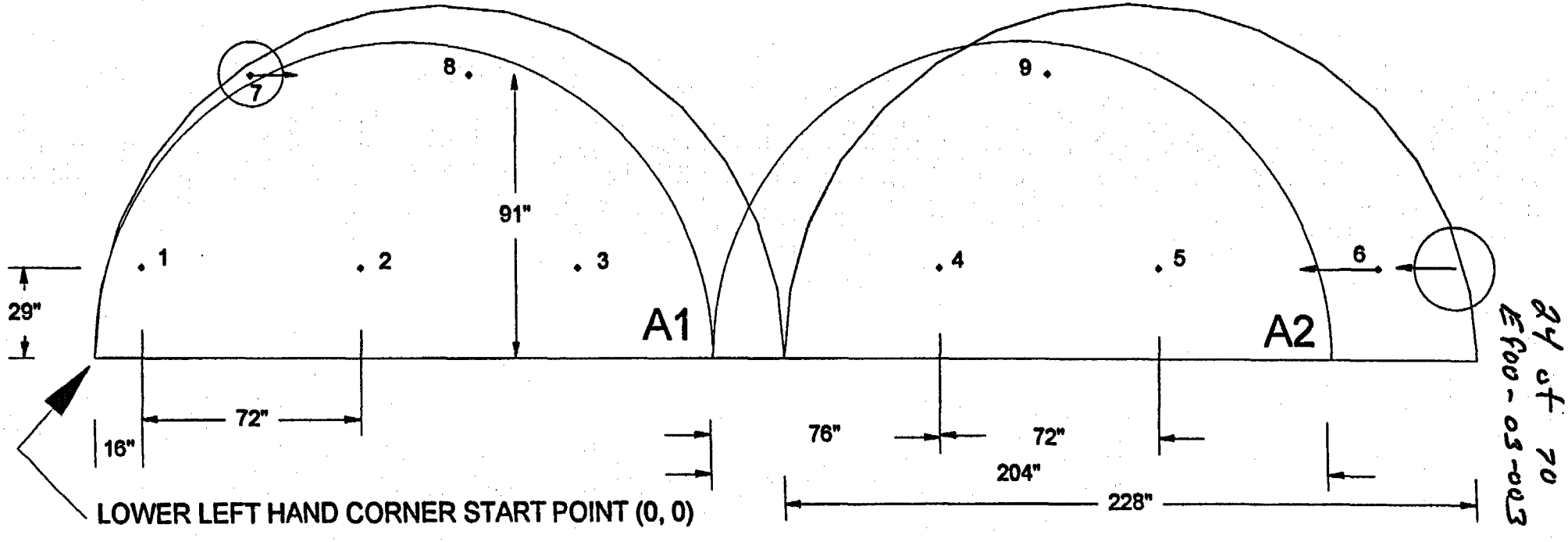
26.3 Square Meters

21.1 Square Meters
(Corrected)

A - Plates

(all dimensions in inches)
Points 6 & 7 were re-located



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Attachment 3-3

SNEC SAMPLE RESULTS

LAB or LAB No.	Location/Description
Teledyne-78729; L19065-1	CV Steel Shell Scrapings - Interior @ ~792' El (A & B QAD)
SNEC Sample No.	387
SXSD3054	Comments:
Other Identifier	
Revised/Repeat	
Analysis Date=>	*June 18, 2002*

	Isotope	pCi/g (solids) or pCi/l (if water) or pCi (if smears)
1	Am-241	0.333
2	C-14	1.33
3	Cm-243	< 0.0947
4	Cm-244	< 0.0947
5	Co-60	6.67
6	Cs-134	< 1.17E-01
7	Cs-137	1120
8	Eu-152	---
9	Eu-154	---
10	Eu-155	---
11	Fe-55	< 11.2
12	H-3	5.02
13	Nb-94	---
14	Ni-59	---
15	Ni-63	39
16	Pu-238	< 0.458
17	Pu-239	0.447
18	Pu-240	0.447
19	Pu-241	< 4.24
20	Pu-242	---
21	Sb-125	---
22	Sr-90	0.497
23	Tc-99	< 0.644
24	U-234	0.702
25	U-235	< 0.0418
26	U-238	0.626
	Other Isotopes	**pCi/g (solids) or pCi/l (if water) or pCi (if smears)**
	On-site Analysis for Cs-137	919
	On-site Analysis for Co-60	5.29
	On-site Analysis for H-3	---
	I-129	< 0.0609
	Gross Alpha	---
	Gross Beta	---
	K-40	2.69
	Ra-226	9.12
	Th-232	---
	Cm-242	< 0.101
	Th-228	< 0.729
	Np-237	< 0.0699
	Ce-144	< 1.65

ATTACHMENT 4-1

SNEC SAMPLE RESULTS

LAB or LAB No.	Location/Description
Teledyne-78730; L19065-2	CV Steel Shell Scrapings - Interior @ ~792' El (C & D QAD)
SNEC Sample No.	388
SXSD3055	Comments:
Other Identifier	
Revised/Repeat	
Analysis Date=>	*June 18, 2002*

	Isotope	pCi/g (soilids) or pCi/l (if water) or pCi (if smears)
1	Am-241	< 0.498
2	C-14	0.49
3	Cm-243	< 0.179
4	Cm-244	< 0.179
5	Co-60	1.21
6	Cs-134	< 8.99E-02
7	Cs-137	127
8	Eu-152	---
9	Eu-154	---
10	Eu-155	---
11	Fe-55	< 16.1
12	H-3	2.88
13	Nb-94	---
14	Ni-59	---
15	Ni-63	< 9.53
16	Pu-238	< 0.112
17	Pu-239	0.0833
18	Pu-240	0.0833
19	Pu-241	< 3.85
20	Pu-242	---
21	Sb-125	---
22	Sr-90	0.155
23	Tc-99	< 0.322
24	U-234	0.824
25	U-235	< 1.28E-02
26	U-238	0.754

Other Isotopes	pCi/g (soilids) or pCi/l (if water) or pCi (if smears)
On-site Analysis for Cs-137	132
On-site Analysis for Co-60	1.1
On-site Analysis for H-3	---
I-129	< 0.0692
Gross Alpha	---
Gross Beta	---
K-40	2.6
Ra-226	< 3.5
Th-232	---
Cm-242	< 0.196
Th-228	< 0.837
Np-237	< 0.0452
Ce-144	< 6.75E-01

ATTACHMENT 4.2

SNEC SAMPLE RESULTS

LAB or LAB No.	Location/Description
Teledyne-80205; L19215-2	CV Steel Shell Internal Scrapings @ 787' El
SNEC Sample No.	390
SXSD3124	Comments:
Other Identifier	
Revised/Repeat	
Analysis Date=>	*July 30, 2002*

	Isotope	pCi/g (soilids) or pCi/l (if water) or pCi (if smears)
1	Am-241	< 0.11
2	C-14	< 0.225
3	Cm-243	---
4	Cm-244	---
5	Co-60	0.449
6	Cs-134	< 0.117
7	Cs-137	98.5
8	Eu-152	< 0.285
9	Eu-154	---
10	Eu-155	---
11	Fe-55	---
12	H-3	5.17
13	Nb-94	< 0.085
14	Ni-59	---
15	Ni-63	< 11.7
16	Pu-238	< 0.0954
17	Pu-239	< 0.0361
18	Pu-240	---
19	Pu-241	< 4.85
20	Pu-242	---
21	Sb-125	< 0.585
22	Sr-90	< 0.163
23	Tc-99	---
24	U-234	---
25	U-235	---
26	U-238	---
	Other Isotopes	pCi/g (soilids) or pCi/l (if water) or pCi (if smears)
	On-site Analysis for Cs-137	112
	On-site Analysis for Co-60	0.49
	On-site Analysis for H-3	---
	I-129	---
	Gross Alpha	---
	Gross Beta	---
	K-40	2.77
	Ra-226	< 3.47
	Th-232	< 0.441
	Cm-242	---
	Th-228	< 0.818
	Np-237	---
	Ce-144	< 0.79

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SNEC SAMPLE RESULTS

LAB or LAB No.	Location/Description
Teledyne-80204; L19215-1	CV Steel Shell Internal Scrapings @ 782' El
SNEC Sample No.	393
SXSD3164	Comments:
Other Identifier	
Revised/Repeat	
Analysis Date=>	*September 24, 2002*

	Isotope	pCi/g (soilids) or pCi/l (if water) or pCi (if smears)
1	Am-241	< 0.167
2	C-14	< 0.201
3	Cm-243	---
4	Cm-244	---
5	Co-60	0.141
6	Cs-134	< 0.071
7	Cs-137	23.5
8	Eu-152	< 0.135
9	Eu-154	---
10	Eu-155	---
11	Fe-55	---
12	H-3	5.14
13	Nb-94	< 0.0562
14	Ni-59	---
15	Ni-63	< 8.47
16	Pu-238	< 0.127
17	Pu-239	< 0.0735
18	Pu-240	---
19	Pu-241	< 6.64
20	Pu-242	---
21	Sb-125	< 0.26
22	Sr-90	< 0.223
23	Tc-99	---
24	U-234	---
25	U-235	---
26	U-238	---

Other Isotopes	pCi/g (soilids) or pCi/l (if water) or pCi (if smears)
On-site Analysis for Cs-137	27.7
On-site Analysis for Co-60	< 0.19
On-site Analysis for H-3	---
I-129	---
Gross Alpha	---
Gross Beta	---
K-40	< 1.28
Ra-226	< 1.81
Th-232	< 0.349
Cm-242	---
Th-228	< 0.518
Np-237	---
Ce-144	< 0.38

ATTACHMENT 4-4

E900-03-003

SNEC SAMPLE RESULTS

LAB or LAB No.	Location/Description
Teledyne-80206; L19215-3	CV Steel Shell Internal Scrapings @ 778' El
SNEC Sample No.	392
SXSD3176	Comments:
Other Identifier	
Revised/Repeat	
Analysis Date=>	*September 4, 2002*

	Isotope	pCi/g (solids) or pCi/l (if water) or pCi (if smears)
1	Am-241	< 0.051
2	C-14	< 0.231
3	Cm-243	---
4	Cm-244	---
5	Co-60	0.592
6	Cs-134	< 0.142
7	Cs-137	63.9
8	Eu-152	< 0.267
9	Eu-154	---
10	Eu-155	---
11	Fe-55	---
12	H-3	14.8
13	Nb-94	< 0.108
14	Ni-59	---
15	Ni-63	< 6.92
16	Pu-238	< 0.0964
17	Pu-239	< 0.0682
18	Pu-240	---
19	Pu-241	< 5.29
20	Pu-242	---
21	Sb-125	< 0.592
22	Sr-90	0.217
23	Tc-99	---
24	U-234	---
25	U-235	---
26	U-238	---
	Other Isotopes	pCi/g (solids) or pCi/l (if water) or pCi (if smears)
	On-site Analysis for Cs-137	73
	On-site Analysis for Co-60	0.6
	On-site Analysis for H-3	---
	I-129	---
	Gross Alpha	---
	Gross Beta	---
	K-40	< 2.64
	Ra-226	< 3.94
	Th-232	< 0.421
	Cm-242	---
	Th-228	< 0.965
	Np-237	---
	Ce-144	< 0.736

ATTACHMENT 4.5

SNEC SAMPLE RESULTS

LAB or LAB No.	Location/Description
Teledyne-81489; L19442-1	CV Steel Shell Internal Scrapings @ 774' El
SNEC Sample No.	379
SXSD3193	Comments:
Other Identifier	
CV Dome Other	
Analysis Date=>	*September 24, 2002*

	Isotope	pCi/g (solids) or pCi/l (if water) or pCi (if smears)
1	Am-241	< 0.0492
2	C-14	< 0.163
3	Cm-243	—
4	Cm-244	—
5	Co-60	0.154
6	Cs-134	< 0.0279
7	Cs-137	24.9
8	Eu-152	< 0.111
9	Eu-154	—
10	Eu-155	—
11	Fe-55	—
12	H-3	8.74
13	Nb-94	< 0.0175
14	Ni-59	—
15	Ni-63	< 9.05
16	Pu-238	< 0.0286
17	Pu-239	< 0.035
18	Pu-240	—
19	Pu-241	< 3.61
20	Pu-242	—
21	Sb-125	< 0.135
22	Sr-90	< 0.236
23	Tc-99	—
24	U-234	—
25	U-235	—
26	U-238	—

Other Isotopes	pCi/g (solids) or pCi/l (if water) or pCi (if smears)
On-site Analysis for Cs-137	23.4
On-site Analysis for Co-60	< 0.114
On-site Analysis for H-3	—
I-129	—
Gross Alpha	—
Gross Beta	—
K-40	3.11
Ra-226	< 0.742
Th-232	0.229
Cm-242	—
Th-228	0.214
Np-237	—
Ce-144	< 0.198

ATTACHMENT 4.6

ATTACHMENT 4-7

Effective DCGL Calculator for Cs-137 (dpm/100 cm^2)

Gross Activity DCGLw		Gross Activity Administrative Limit	
16830	dpm/100 cm^2	8987	dpm/100 cm^2

25.0 mrem/y TEDE Limit

SAMPLE NO(s)⇒ SXSD3054 - 792' El SNEC CV (A&B) Scrape Sample

Cs-137 Limit		Cs-137 Administrative Limit	
16067	dpm/100 cm^2	8580	dpm/100 cm^2

SNEC AL	53%

	Isotope	Sample Input (pCi/g, uCi, etc.)	% of Total	Individual Limits (dpm/100 cm^2)	Allowed dpm/100 cm^2	mrem/y TEDE	Beta dpm/100 cm^2	Alpha dpm/100 cm^2	
1	Am-241	3.33E-01	0.029%	27	4.85	4.50	N/A	4.85	Am-241
2	C-14	1.33E+00	0.115%	3,700,000	19.39	0.00	19.39	N/A	C-14
3	Co-60	6.08E+00	0.527%	7,100	88.68	0.31	88.68	N/A	Co-60
4	Cs-137	1.10E+03	95.468%	28,000	16067.26	14.35	16067.3	N/A	Cs-137
5	Eu-152		0.000%	13,000	0.00	0.00	0.00	N/A	Eu-152
6	H-3	4.83E+00	0.418%	120,000,000	70.34	0.00	Not Detectable	N/A	H-3
7	Ni-63	3.88E+01	3.362%	1,800,000	565.81	0.01	Not Detectable	N/A	Ni-63
8	Pu-238		0.000%	30	0.00	0.00	N/A	0.00	Pu-238
9	Pu-239	4.47E-01	0.039%	28	6.52	5.82	N/A	6.52	Pu-239
10	Pu-241		0.000%	880	0.00	0.00	Not Detectable	N/A	Pu-241
11	Sr-90	4.89E-01	0.042%	8,700	7.13	0.02	7.13	N/A	Sr-90
			100.000%		16830	25.0	16182	11	
					Maximum Permissible dpm/100 cm^2				

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ATTACHMENT 4-8

Effective DCGL Calculator for Cs-137 (dpm/100 cm^2)

Gross Activity DCGLw		Gross Activity Administrative Limit	
5365	dpm/100 cm^2	2865	dpm/100 cm^2

25.0 mrem/y TEDE Limit

Cs-137 Limit		Cs-137 Administrative Limit	
4804	dpm/100 cm^2	2565	dpm/100 cm^2

SAMPLE NO(s)⇒ SXSD3055 - 792' El SNEC CV (C&D) Scrape Sample

SNEC AL	53%

	Isotope	Sample Input (pCi/g, uCi, etc.)	% of Total	Individual Limits (dpm/100 cm^2)	Allowed dpm/100 cm^2	mrem/y TEDE	Beta dpm/100 cm^2	Alpha dpm/100 cm^2	
1	Am-241	4.97E-01	0.356%	27	19.11	17.69	N/A	19.11	Am-241
2	C-14	4.90E-01	0.351%	3,700,000	18.84	0.00	18.84	N/A	C-14
3	Co-60	1.10E+00	0.790%	7,100	42.40	0.15	42.40	N/A	Co-60
4	Cs-137	1.25E+02	89.554%	28,000	4804.17	4.29	4804.2	N/A	Cs-137
5	Eu-152		0.000%	13,000	0.00	0.00	0.00	N/A	Eu-152
6	H-3	2.77E+00	1.984%	120,000,000	106.41	0.00	Not Detectable	N/A	H-3
7	Ni-63	9.48E+00	6.796%	1,800,000	364.58	0.01	Not Detectable	N/A	Ni-63
8	Pu-238		0.000%	30	0.00	0.00	N/A	0.00	Pu-238
9	Pu-239	8.30E-02	0.059%	28	3.19	2.85	N/A	3.19	Pu-239
10	Pu-241		0.000%	880	0.00	0.00	Not Detectable	N/A	Pu-241
11	Sr-90	1.52E-01	0.109%	8,700	5.84	0.02	5.84	N/A	Sr-90
			100.000%		5365	25.0	4871	22	
					Maximum Permissible dpm/100 cm^2				

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Effective DCGL Calculator for Cs-137 (dpm/100 cm^2)

Gross Activity DCGLw		Gross Activity Administrative Limit	
12877	dpm/100 cm^2	6876	dpm/100 cm^2

25.0 mrem/y TEDE Limit

SAMPLE NO(s)⇒ SXSD3124 - 787' El SNEC CV Shell Scrape Sample

Cs-137 Limit		Cs-137 Administrative Limit	
10902	dpm/100 cm^2	6822	dpm/100 cm^2

SNEC AL	53%

	Isotope	Sample Input (pCi/g, uCi, etc.)	% of Total	Individual Limits (dpm/100 cm^2)	Allowed dpm/100 cm^2	mrem/y TEDE	Beta dpm/100 cm^2	Alpha dpm/100 cm^2	
1	Am-241	1.10E-01	0.096%	27	12.34	11.43	N/A	12.34	Am-241
2	C-14	2.25E-01	0.196%	3,700,000	25.24	0.00	25.24	N/A	C-14
3	Co-60	4.16E-01	0.362%	7,100	46.67	0.16	46.67	N/A	Co-60
4	Cs-137	9.72E+01	84.665%	28,000	10901.94	9.73	10901.9	N/A	Cs-137
5	Eu-152		0.000%	13,000	0.00	0.00	0.00	N/A	Eu-152
6	H-3	5.00E+00	4.358%	120,000,000	561.12	0.00	Not Detectable	N/A	H-3
7	Ni-63	1.17E+01	10.152%	1,800,000	1307.23	0.02	Not Detectable	N/A	Ni-63
8	Pu-238		0.000%	30	0.00	0.00	N/A	0.00	Pu-238
9	Pu-239	3.60E-02	0.031%	28	4.04	3.61	N/A	4.04	Pu-239
10	Pu-241		0.000%	880	0.00	0.00	Not Detectable	N/A	Pu-241
11	Sr-90	1.61E-01	0.140%	8,700	18.06	0.05	18.06	N/A	Sr-90
			100.000%		12877	25.0	10992	16	
					Maximum Permissible dpm/100 cm^2				

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Effective DCGL Calculator for Cs-137 (dpm/100 cm^2)

Gross Activity DCGLw		Gross Activity Administrative Limit	
3880	dpm/100 cm^2	2072	dpm/100 cm^2

25.0 mrem/y TEDE Limit

SAMPLE NO(s)⇒ SXSD3164 - 782' El SNEC CV Shell Scrape Sample

Cs-137 Limit		Cs-137 Administrative Limit	
2406	dpm/100 cm^2	1285	dpm/100 cm^2

SNEC AL	53%

	Isotope	Sample Input (pCi/g, uCi, etc.)	% of Total	Individual Limits (dpm/100 cm^2)	Allowed dpm/100 cm^2	mrem/y TEDE	Beta dpm/100 cm^2	Alpha dpm/100 cm^2	
1	Am-241	1.67E-01	0.445%	27	17.27	15.99	N/A	17.27	Am-241
2	C-14	2.01E-01	0.536%	3,700,000	20.78	0.00	20.78	N/A	C-14
3	Co-60	1.33E-01	0.354%	7,100	13.75	0.05	13.75	N/A	Co-60
4	Cs-137	1.23E+01	62.008%	28,000	2405.64	2.15	2405.64	N/A	Cs-137
5	Eu-152		0.000%	13,000	0.00	0.00	0.00	N/A	Eu-152
6	H-3	5.02E+00	13.367%	120,000,000	518.60	0.00	Not Detectable	N/A	H-3
7	Ni-63	8.45E+00	22.506%	1,800,000	873.12	0.01	Not Detectable	N/A	Ni-63
8	Pu-238		0.000%	30	0.00	0.00	N/A	0.00	Pu-238
9	Pu-239	7.30E-02	0.195%	28	7.55	6.74	N/A	7.55	Pu-239
10	Pu-241		0.000%	880	0.00	0.00	Not Detectable	N/A	Pu-241
11	Sr-90	2.21E-01	0.589%	8,700	22.85	0.07	22.85	N/A	Sr-90
			100.000%		3880	25.0	2463	25	
					Maximum Permissible dpm/100 cm^2				

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Effective DCGL Calculator for Cs-137 (dpm/100 cm^2)

Gross Activity DCGLw		Gross Activity Administrative Limit	
12813	dpm/100 cm^2	6842	dpm/100 cm^2

25.0 mrem/y TEDE Limit

SAMPLE NO(s)⇒ SXSD3176 - 778' El SNEC CV Shell Scrape Sample

Cs-137 Limit		Cs-137 Administrative Limit	
9458	dpm/100 cm^2	5051	dpm/100 cm^2

SNEC AL: 53%

	Isotope	Sample Input (pCi/g, uCi, etc.)	% of Total	Individual Limits (dpm/100 cm^2)	Allowed dpm/100 cm^2	mrem/y TEDE	Beta dpm/100 cm^2	Alpha dpm/100 cm^2	
1	Am-241	5.10E-02	0.060%	27	7.63	7.07	N/A	7.63	Am-241
2	C-14	2.31E-01	0.270%	3,700,000	34.58	0.00	34.58	N/A	C-14
3	Co-60	5.55E-01	0.648%	7,100	83.07	0.29	83.07	N/A	Co-60
4	Cs-137	6.32E+01	73.815%	28,000	9458.03	8.44	9458.0	N/A	Cs-137
5	Eu-152		0.000%	13,000	0.00	0.00	0.00	N/A	Eu-152
6	H-3	1.44E+01	16.820%	120,000,000	2155.22	0.00	Not Detectable	N/A	H-3
7	Ni-63	6.90E+00	8.057%	1,800,000	1032.33	0.01	Not Detectable	N/A	Ni-63
8	Pu-238		0.000%	30	0.00	0.00	N/A	0.00	Pu-238
9	Pu-239	6.80E-02	0.078%	28	10.18	9.09	N/A	10.18	Pu-239
10	Pu-241		0.000%	880	0.00	0.00	Not Detectable	N/A	Pu-241
11	Sr-90	2.14E-01	0.250%	8,700	32.03	0.09	32.03	N/A	Sr-90
			100.000%		12813	25.0	9608	18	
					Maximum Permissible dpm/100 cm^2				

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Effective DCGL Calculator for Cs-137 (dpm/100 cm^2)

Gross Activity DCGLw		Gross Activity Administrative Limit	
10714	dpm/100 cm^2	5721	dpm/100 cm^2

25.0 mrem/y TEDE Limit

SAMPLE NO(s)⇒ SXSD3193 - 774' El SNEC CV Shell Scrape Sample

Cs-137 Limit		Cs-137 Administrative Limit	
6167	dpm/100 cm^2	3293	dpm/100 cm^2

SNEC AL	53%

	Isotope	Sample Input (pCi/g, uCi, etc.)	% of Total	Individual Limits (dpm/100 cm^2)	Allowed dpm/100 cm^2	mrem/y TEDE	Beta dpm/100 cm^2	Alpha dpm/100 cm^2	
1	Am-241	4.90E-02	0.114%	27	12.26	11.35	N/A	12.26	Am-241
2	C-14	1.63E-01	0.381%	3,700,000	40.77	0.00	40.77	N/A	C-14
3	Co-60	1.45E-01	0.339%	7,100	36.27	0.13	36.27	N/A	Co-60
4	Cs137	2.47E+01	57.560%	28,000	6166.95	5.51	6167.0	N/A	Cs-137
5	Eu-152		0.000%	13,000	0.00	0.00	0.00	N/A	Eu-152
6	H-3	8.53E+00	19.913%	120,000,000	2133.44	0.00	Not Detectable	N/A	H-3
7	Ni-63	9.02E+00	21.066%	1,800,000	2257.01	0.03	Not Detectable	N/A	Ni-63
8	Pu-238		0.000%	30	0.00	0.00	N/A	0.00	Pu-238
9	Pu-239	3.50E-02	0.082%	28	8.75	7.82	N/A	8.75	Pu-239
10	Pu-241		0.000%	880	0.00	0.00	Not Detectable	N/A	Pu-241
11	Sr-90	2.34E-01	0.546%	8,700	58.53	0.17	58.53	N/A	Sr-90
			100.000%		10714	25.0	6303	21	
					Maximum Permissible dpm/100 cm^2				

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Sample Number	Am-241	C-14	Co-60	Cs-137	Eu-152	H-3	Ni-63	Pu-238	Pu-239	Pu-241	Sr-90	Decay Date
SXSD3193 - 774' El	0.0492	0.163	0.154	24.9	0.111	6.74	9.05	0.0286	0.035	3.61	0.236	9/24/2002
SXSD3176 - 778' El	0.051	0.231	0.592	63.9	0.267	14.9	6.92	0.0964	0.0662	5.29	0.217	9/4/2002
SXSD3164 - 782' El	0.167	0.201	0.141	23.5	0.135	5.14	8.47	0.127	0.0735	6.64	0.223	9/24/2002
SXSD3124 - 787' El	0.11	0.225	0.449	96.6	0.265	5.17	11.7	0.0954	0.0361	4.65	0.163	7/30/2002
SXSD3055 - 792' El (C&D)	0.496	0.49	1.21	127	—	2.69	9.53	0.112	0.0933	3.85	0.185	6/18/2002
SXSD3054 - 792' El (A&B)	0.333	1.33	6.67	1120	—	5.02	39	0.456	0.447	4.24	0.497	6/18/2002
Mean ⇒	2.01E-01	4.40E-01	1.54E+00	2.43E+02	2.00E-01	6.96E+00	1.41E+01	1.63E-01	1.24E-01	4.75E+00	2.49E-01	
Standard Deviation ⇒	1.79E-01	4.51E-01	2.55E+00	4.32E+02	8.92E-02	4.28E+00	1.23E+01	1.53E-01	1.60E-01	1.12E+00	1.26E-01	
2 Sigma ⇒	3.58E-01	9.03E-01	5.09E+00	8.63E+02	1.78E-01	8.56E+00	2.46E+01	3.06E-01	3.19E-01	2.23E+00	2.52E-01	
Mean + 2 Sigma ⇒	5.60E-01	1.34E+00	6.63E+00	1.11E+03	3.78E-01	1.55E+01	3.87E+01	4.69E-01	4.43E-01	6.98E+00	5.01E-01	
25th Percentile ⇒	6.58E-02	2.07E-01	2.28E-01	3.47E+01	1.29E-01	5.05E+00	8.62E+00	9.67E-02	4.41E-02	3.95E+00	1.77E-01	
75th Percentile ⇒	3.00E-01	4.78E-01	1.45E+00	2.14E+02	2.72E-01	6.51E+00	1.35E+01	1.46E-01	1.14E-01	5.18E+00	2.42E-01	

	T 1/2 (d)	T 1/2 (d)	T 1/2 (d)	T 1/2 (d)		T 1/2 (d)	T 1/2 (d)		T 1/2 (d)		T 1/2 (d)	Decay Date
	157861.05	2092882.5	1925.23	11019.59	Deleted	4485.27	36561.525	Deleted	8813847.75	Deleted	10446.15	3/1/2003
Sample Number	Am-241	C-14	Co-60	Cs-137	Eu-152	H-3	Ni-63	Pu-238	Pu-239	Pu-241	Sr-90	ET in days
SXSD3193 - 774' El	0.049	0.163	0.146	24.654	Deleted	8.529	9.023	Deleted	0.035	Deleted	0.234	158
SXSD3176 - 778' El	0.051	0.231	0.555	63.189	Deleted	14.399	6.897	Deleted	0.066	Deleted	0.214	178
SXSD3164 - 782' El	0.167	0.201	0.133	23.268	Deleted	5.016	8.445	Deleted	0.073	Deleted	0.221	158
SXSD3124 - 787' El	0.110	0.225	0.416	97.183	Deleted	5.002	11.653	Deleted	0.036	Deleted	0.161	214
SXSD3055 - 792' El (C&D)	0.497	0.490	1.103	124.972	Deleted	2.768	9.484	Deleted	0.093	Deleted	0.182	256
SXSD3054 - 792' El (A&B)	0.333	1.330	6.063	1102.113	Deleted	4.825	38.811	Deleted	0.447	Deleted	0.469	256
Mean ⇒	0.2012	0.4400	1.4060	239.2297	N/A	6.7565	14.0520	N/A	0.1238	N/A	0.2451	
Standard Deviation ⇒	1.79E-01	4.51E-01	2.32E+00	4.25E+02	N/A	4.18E+00	1.22E+01	N/A	1.60E-01	N/A	1.24E-01	
2 Sigma ⇒	3.58E-01	9.03E-01	4.64E+00	8.49E+02	N/A	8.36E+00	2.45E+01	N/A	3.19E-01	N/A	2.48E-01	
Mean + 2 Sigma ⇒	5.59E-01	1.34E+00	6.04E+00	1.09E+03	N/A	1.51E+01	3.85E+01	N/A	4.43E-01	N/A	4.93E-01	
25th Percentile ⇒	6.67E-02	2.07E-01	2.13E-01	3.43E+01	N/A	4.87E+00	8.59E+00	N/A	4.41E-02	N/A	1.74E-01	
75th Percentile ⇒	3.00E-01	4.77E-01	1.33E+00	2.11E+02	N/A	6.32E+00	1.35E+01	N/A	1.14E-01	N/A	2.39E-01	

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ATTACHMENT 4 . 13

CV Shell Area			Admin. Limit=>	75%
	mrem/y			
Activated Steel =>	7.2			
Misc. Radionuclides =>	Included in AL	Remaining mrem/y	Remaining mrem/y after AL	
Total=>	7.200	17.80	13.35	
			Required Correction Factor	
			53.4%	

SSGS & DT			
	mrem/y		
SSGS. Pipe =>	0.611		
Misc. Radionuclides =>	Included in AL	Remaining mrem/y	Remaining mrem/y after AL
Total=>	0.611	N/A B&C 24.39	18.29
			Required Correction Factor
			73.2%

NOTE: Admin. Limit includes de-listed radionuclides dose of 0.8625 mrem/y

ATTACHMENT 5 - 1

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ORIGINAL

GFPC Radiation Measurement Instrument Calibration Worksheet

Performed By:	R J Reheard RJ Reheard	Date:	2/11/03
Instrument S/N:	120583	Probe S/N:	92508
Instrument Vendor Cal. Date:	5/21/03	Cal. Due Date:	5/21/03

Am-241 (GO 535) S-023	0.25	4/8/99 12:00 GMT	4.24E-01	7.43E+03	☐ Am-241
Cs-137 (GO 536) S-024	0.50	4/8/99 12:00 GMT	3.11E-01	8.89E+03	☑ Cs-137

Source Radionuclide	Decay Date
Cs-137	2/11/03

Decay Factor⇒	9.154E-01	Elapsed Time (days)⇒	1405
		Activity (μCi)⇒	2.845E-01
		Source dpm⇒	6.316E+05
		Source dpm/in Probe Area (cm^2)⇒	5.306E+05
		2π Emission Rate (sec-1)⇒	6.307E+03
		2π Emission Rate (min-1)⇒	3.784E+05
		2π Emission Rate in Probe Area (min-1)⇒	3.178E+05

Probe Area (cm^2)
128

Record of 1 Minute Source & Background Counting Results

No.	OW Source Gross CPM	OW Background CPM	OW Source Net CPM
1	1.50E+05	205	1.495E+05
2	1.49E+05	208	1.487E+05
3	1.50E+05	209	1.495E+05
4	1.49E+05	168	1.489E+05
5	1.50E+05	192	1.500E+05
6	1.50E+05	206	1.495E+05
7	1.50E+05	205	1.495E+05
8	1.51E+05	199	1.503E+05
9	1.50E+05	220	1.498E+05
10	1.50E+05	185	1.501E+05
	Mean⇒	199.5	1.496E+05

☑ Check if using ISO 7503-1 Value

RESULTS
Counts/Emission (εi)
47.1%
2π Emission/Disintigration (εs)
2/19/03 53.0% 50%
Counts/Disintigration (εt)
2/19/03 22.2% 23.6

Approved: JBustin 2/19/03

Date: 2/19/03

ATTACHMENT 6-1

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CV Lower Head Steel Varibility Measurements - SR-52, FSS-008

CV3-1	Instrument 126188	R. Reheard	Time	Detector	Counts	Count Time (sec)	Mode	Designator		Shielded	Unshielded	Difference
0	BKGND	2/19/2003	7:54	1	6.36E+03	1800	SCL	—	β			
1	BKGND	2/19/2003	9:43	2	6.80E+01	1800	SCL	—	α			
2	Source Check	2/19/2003	9:46	2	1.61E+05	60	SCL	—	α			
3	Source Check	2/19/2003	9:50	1	1.82E+05	60	SCL	—	β			
4	773ABCR1	2/19/2003	10:53	1	1.48E+02	60	SCL	Shielded	β			
5	773ABCR2	2/19/2003	10:55	1	1.62E+02	60	SCL	Shielded	β			
6	773ABCR3	2/19/2003	10:57	1	1.38E+02	60	SCL	Shielded	β			
7	773A ABCR1	2/19/2003	11:04	2	9.00E+00	300	SCL	Shielded	α			
8	773A ABCR2	2/19/2003	11:12	2	1.40E+00	300	SCL	Shielded	α			
9	773A ABCR3	2/19/2003	11:20	2	1.30E+00	300	SCL	Shielded	α			
10	773FP1S	2/19/2003	15:08	1	1.52E+02	60	SCL	Shielded	β	1.52E+02		
11	773FP1U	2/19/2003	15:09	1	1.42E+02	60	SCL	Unshielded	β		1.42E+02	-1.00E+01
12	773FP2S	2/19/2003	15:11	1	1.55E+02	60	SCL	Shielded	β	1.55E+02		
13	773FP2U	2/19/2003	15:12	1	1.72E+02	60	SCL	Unshielded	β		1.72E+02	1.70E+01
14	773FP3S	2/19/2003	15:14	1	1.57E+02	60	SCL	Shielded	β	1.57E+02		
15	773FP3U	2/19/2003	15:16	1	1.62E+02	60	SCL	Unshielded	β		1.62E+02	5.00E+00
16	773A FP3	2/19/2003	15:22	2	1.20E+01	300	SCL	Unshielded	α			
17	773A FP2	2/19/2003	15:27	2	1.80E+01	300	SCL	Unshielded	α			
18	773A FP1	2/19/2003	15:33	2	1.40E+01	300	SCL	Unshielded	α			
19	Source Check	2/19/2003	15:56	2	1.59E+05	60	SCL	—	α			
20	Source Check	2/19/2003	16:00	1	1.78E+05	60	SCL	—	β			

CV3-1	Instrument 126206	K. Lane	Time	Detector	Counts	Count Time (sec)	Mode	Designator		Shielded	Unshielded	Shielded	Unshielded	Difference
0	BKGND	2/19/2003	7:57	1	5.41E+03	1800	SCL	—	β					
1	BKGND	2/19/2003	9:45	2	5.40E+01	1800	SCL	—	α					
2	Source Check	2/19/2003	9:46	2	1.62E+05	60	SCL	—	α					
3	Source Check	2/19/2003	9:51	1	1.83E+05	60	SCL	—	β					
4	773 ABCR1	2/19/2003	10:55	1	1.20E+02	60	SCL	Unshielded	β					
5	773 ABCR2	2/19/2003	10:58	1	1.12E+02	60	SCL	Unshielded	β					
6	773 ABCR3	2/19/2003	11:01	1	1.08E+02	60	SCL	Unshielded	β					
7	773A ABCR3	2/19/2003	11:03	1	1.05E+02	300	SCL	Wrong Detector	β					
8	773A ABCR3	2/19/2003	11:09	2	5.00E+00	300	SCL	Unshielded	α					
9	773A ABCR2	2/19/2003	11:11	2	5.00E+00	300	SCL	Unshielded	α					
10	773A ABCR1	2/19/2003	11:13	2	1.00E+01	300	SCL	Unshielded	α					
11	773A FP1S	2/19/2003	11:20	2	7.00E+00	300	SCL	Shielded	α			7.00E+00		
12	773A FP1U	2/19/2003	11:27	2	1.20E+01	300	SCL	Unshielded	α				1.20E+01	
13	773A FP2S	2/19/2003	11:34	2	3.00E+00	300	SCL	Shielded	α			3.00E+00		
14	773A FP2U	2/19/2003	11:41	2	9.00E+00	300	SCL	Unshielded	α				9.00E+00	
15	773A FP3S	2/19/2003	11:48	2	2.00E+00	300	SCL	Shielded	α			2.00E+00		
16	773A FP3U	2/19/2003	11:54	2	8.00E+00	300	SCL	Unshielded	α				8.00E+00	
17	773 FP3S	2/19/2003	14:09	1	1.19E+02	60	SCL	Shielded	β	1.19E+02				
18	773 FP3U	2/19/2003	14:11	1	1.21E+02	60	SCL	Unshielded	β		1.21E+02			2.00E+00
19	773 FP2S	2/19/2003	14:15	1	1.18E+02	60	SCL	Shielded	β	1.18E+02				
20	773 FP2U	2/19/2003	14:16	1	1.20E+02	60	SCL	Unshielded	β		1.20E+02			2.00E+00
21	773 FP1S	2/19/2003	14:19	1	1.09E+02	60	SCL	Shielded	β	1.09E+02				
22	773 FP1U	2/19/2003	14:20	1	1.19E+02	60	SCL	Unshielded	β		1.19E+02			1.00E+01
23	773 FP1U	2/19/2003	14:37	1	1.76E+02	0	RAT	Unshielded	β					
24	773 FP1U	2/19/2003	15:06	1	1.36E+02	0	RAT	Unshielded	β					
25	773 FP1U	2/19/2003	15:12	1	1.69E+02	0	RAT	Unshielded	β					
26	Source Check	2/19/2003	15:55	2	1.47E+05	60	SCL	—	α					
27	Source Check	2/19/2003	16:05	1	1.83E+05	60	SCL	—	β					

CV3-2 & 3	Instrument 126206	R. Reheard	Time	Detector	Counts	Count Time (sec)	Mode	Designator 900-03 8192		Shielded	Unshielded	Difference
0	BKGND	2/10/2003	8:55	1	7.21E+03	1800	SCL	—	β			
1	Source Check	2/10/2003	9:28	1	1.85E+05	60	SCL	—	β			
2	BKGND	2/10/2003	10:10	2	4.90E+01	1800	SCL	—	α			
3	Source Check	2/10/2003	10:27	2	1.62E+05	60	SCL	—	α			
4	CV760P81S	2/10/2003	11:39	1	1.75E+02	60	SCL	Shielded	β	1.75E+02		
5	CV760P81U	2/10/2003	11:41	1	1.76E+02	60	SCL	Unshielded	β		1.76E+02	1.00E+00
6	CV760P82S	2/10/2003	11:43	1	1.49E+02	60	SCL	Shielded	β	1.49E+02		
7	CV760P82U	2/10/2003	11:44	1	2.01E+02	60	SCL	Unshielded	β		2.01E+02	5.20E+01
8	CV760P83S	2/10/2003	11:46	1	1.84E+02	60	SCL	Shielded	β	1.84E+02		
9	CV760P83U	2/10/2003	11:47	1	1.81E+02	60	SCL	Unshielded	β		1.81E+02	-3.00E+00
10	CV760P84S	2/10/2003	11:49	1	1.85E+02	60	SCL	Shielded	β	1.85E+02		
11	CV760P84U	2/10/2003	11:51	1	1.85E+02	60	SCL	Unshielded	β		1.85E+02	0.00E+00
12	CV760P85S	2/10/2003	11:52	1	1.71E+02	60	SCL	Shielded	β	1.71E+02		
13	CV760P85U	2/10/2003	11:53	1	1.65E+02	60	SCL	Unshielded	β		1.65E+02	-6.00E+00
14	CV760P86S	2/10/2003	11:55	1	1.85E+02	60	SCL	Shielded	β	1.85E+02		
15	CV760P86U	2/10/2003	11:56	1	2.93E+02	60	SCL	Unshielded	β		2.93E+02	1.08E+02
16	CV760P87S	2/10/2003	11:59	1	1.65E+02	60	SCL	Shielded	β	1.65E+02		
17	CV760P87U	2/10/2003	12:00	1	1.69E+02	60	SCL	Unshielded	β		1.69E+02	4.00E+00
18	CV760P88S	2/10/2003	12:02	1	1.68E+02	60	SCL	Shielded	β	1.68E+02		
19	CV760P88U	2/10/2003	12:03	1	1.86E+02	60	SCL	Unshielded	β		1.86E+02	1.80E+01
20	CV760P99S	2/10/2003	12:14	1	1.70E+02	60	SCL	Shielded	β	1.70E+02		
21	CV760P99U	2/10/2003	12:15	1	1.66E+02	60	SCL	Unshielded	β		1.66E+02	-4.00E+00
22	CV760A 10S	2/10/2003	12:17	1	1.79E+02	60	SCL	Shielded	β	1.79E+02		
23	CV760A 10U	2/10/2003	12:18	1	1.95E+02	60	SCL	Unshielded	β		1.95E+02	1.60E+01
24	CV760A211S	2/10/2003	12:22	1	1.94E+02	60	SCL	Shielded	β	1.94E+02		
25	CV760A211U	2/10/2003	12:25	1	2.06E+02	60	SCL	Unshielded	β		2.06E+02	1.20E+01
26	CV7601312S	2/10/2003	12:26	1	1.75E+02	60	SCL	Shielded	β	1.75E+02		
27	7601312U	2/10/2003	12:27	1	1.88E+02	60	SCL	Unshielded	β		1.88E+02	1.30E+01
28	760P1613S	2/10/2003	12:30	1	1.52E+02	60	SCL	Shielded	β	1.52E+02		
29	760P1613U	2/10/2003	12:31	1	1.69E+02	60	SCL	Unshielded	β		1.69E+02	1.70E+01
30	2nd Source Check	2/10/2003	12:52	1	1.82E+05	60	SCL	—	β			

	Shielded	Unshielded		Difference
Minimum ⇒	1.09E+02	1.19E+02	*Minimum ⇒*	-1.00E+01
Maximum ⇒	1.94E+02	2.93E+02	*Maximum ⇒*	1.08E+02
Mean ⇒	1.61E+02	1.75E+02	*Mean ⇒*	1.34E+01
Sigma ⇒	2.40E+01	3.87E+01	*Sigma ⇒*	2.66E+01

3/12/03

ATTACHMENT 1

Williamsburg Steel Background Measurements SR-48

37122N21	Instrument 95348	RJR9291	Time	Detector	Counts	Count Time (sec)	Mode	Designator		FSS-004	BHB
0	BKGND	11/14/2002	6:47	1	6.64E+03	1800	SCL	Initial Background	β		39
1	Source Check	11/14/2002	9:54	1	1.70E+05	60	SCL	Source	β	Shielded	Unshielded
2	STEELA1S	11/14/2002	10:32	1	2.13E+02	60	SCL	Shielded	β	2.13E+02	
3	STEELA1U	11/14/2002	10:33	1	2.04E+02	60	SCL	Unshielded	β		1.65E+02
4	STEELA2S	11/14/2002	10:37	1	2.03E+02	60	SCL	Shielded	β	2.03E+02	
5	STEELA2U	11/14/2002	10:38	1	2.25E+02	60	SCL	Unshielded	β		1.86E+02
6	STEELA3S	11/14/2002	10:39	1	1.85E+02	60	SCL	Shielded	β	1.85E+02	
7	STEELA3U	11/14/2002	10:40	1	2.09E+02	60	SCL	Unshielded	β		1.70E+02
8	STEELA4S	11/14/2002	10:42	1	2.03E+02	60	SCL	Shielded	β	2.03E+02	
9	STEELA4U	11/14/2002	10:43	1	1.67E+02	60	SCL	Unshielded	β		1.28E+02
10	STEELA5S	11/14/2002	10:44	1	1.55E+02	60	SCL	Shielded	β	1.55E+02	
11	STEELA5U	11/14/2002	10:45	1	2.26E+02	60	SCL	Unshielded	β		1.87E+02
12	STEELA6S	11/14/2002	10:46	1	1.92E+02	60	SCL	Shielded	β	1.92E+02	
13	STEELA6U	11/14/2002	10:47	1	1.95E+02	60	SCL	Unshielded	β		1.56E+02
14	STEELA7S	11/14/2002	10:48	1	1.96E+02	60	SCL	Shielded	β	1.96E+02	
15	STEELA7U	11/14/2002	10:50	1	2.01E+02	60	SCL	Unshielded	β		1.62E+02
16	STEELA8S	11/14/2002	10:51	1	2.15E+02	60	SCL	Shielded	β	2.15E+02	
17	STEELA8U	11/14/2002	10:52	1	2.38E+02	60	SCL	Unshielded	β		1.99E+02
18	STEELA9S	11/14/2002	10:53	1	2.00E+02	60	SCL	Shielded	β	2.00E+02	
19	STEELA9U	11/14/2002	10:54	1	1.92E+02	60	SCL	Unshielded	β		1.53E+02
20	STEELA10S	11/14/2002	10:56	1	1.83E+02	60	SCL	Shielded	β	1.83E+02	
21	STEELA10U	11/14/2002	10:57	1	2.25E+02	60	SCL	Unshielded	β		1.86E+02
22	STEELA11S	11/14/2002	10:58	1	1.95E+02	60	SCL	Shielded	β	1.95E+02	
23	STEELA11U	11/14/2002	10:59	1	2.15E+02	60	SCL	Unshielded	β		1.76E+02
24	STEELA12S	11/14/2002	11:00	1	1.77E+02	60	SCL	Shielded	β	1.77E+02	
25	STEELA12U	11/14/2002	11:01	1	2.34E+02	60	SCL	Unshielded	β		1.95E+02
26	STEELA13S	11/14/2002	11:03	1	2.02E+02	60	SCL	Shielded	β	2.02E+02	
27	STEELA13U	11/14/2002	11:05	1	2.18E+02	60	SCL	Unshielded	β		1.79E+02
28	STEELA14S	11/14/2002	11:06	1	1.89E+02	60	SCL	Shielded	β	1.89E+02	
29	STEELA14U	11/14/2002	11:07	1	1.99E+02	60	SCL	Unshielded	β		1.60E+02
30	STEELA15S	11/14/2002	11:08	1	2.16E+02	60	SCL	Shielded	β	2.16E+02	
31	STEELA15U	11/14/2002	11:09	1	2.15E+02	60	SCL	Unshielded	β		1.76E+02
32	STEELA16S	11/14/2002	11:10	1	1.88E+02	60	SCL	Shielded	β	1.88E+02	
33	STEELA16U	11/14/2002	11:11	1	2.05E+02	60	SCL	Unshielded	β		1.66E+02
34	STEELA17S	11/14/2002	11:13	1	2.12E+02	60	SCL	Shielded	β	2.12E+02	
35	STEELA17U	11/14/2002	11:14	1	2.11E+02	60	SCL	Unshielded	β		1.72E+02
36	STEELA18S	11/14/2002	11:15	1	2.00E+02	60	SCL	Shielded	β	2.00E+02	
37	STEELA18U	11/14/2002	11:16	1	1.93E+02	60	SCL	Unshielded	β		1.54E+02
38	STEELA19S	11/14/2002	11:17	1	1.84E+02	60	SCL	Shielded	β	1.84E+02	
39	STEELA19U	11/14/2002	11:18	1	2.09E+02	60	SCL	Unshielded	β		1.70E+02
40	STEELA20S	11/14/2002	11:19	1	1.94E+02	60	SCL	Shielded	β	1.94E+02	
41	STEELA20U	11/14/2002	11:20	1	2.30E+02	60	SCL	Unshielded	β		1.91E+02
42	STEELA21S	11/14/2002	11:22	1	2.10E+02	60	SCL	Shielded	β	2.10E+02	
43	STEELA21U	11/14/2002	11:23	1	1.93E+02	60	SCL	Unshielded	β		1.54E+02
44	STEELA22S	11/14/2002	11:24	1	2.05E+02	60	SCL	Shielded	β	2.05E+02	
45	STEELA22U	11/14/2002	11:25	1	1.91E+02	60	SCL	Unshielded	β		1.52E+02
46	STEELA23S	11/14/2002	11:26	1	1.77E+02	60	SCL	Shielded	β	1.77E+02	
47	STEELA23U	11/14/2002	11:27	1	1.98E+02	60	SCL	Unshielded	β		1.59E+02
48	STEELA24S	11/14/2002	11:28	1	1.88E+02	60	SCL	Shielded	β	1.88E+02	
49	STEELA24U	11/14/2002	11:30	1	2.44E+02	60	SCL	Unshielded	β		2.05E+02
50	STEELQC11S	11/14/2002	11:33	1	2.13E+02	60	SCL	Shielded	β	2.13E+02	
51	STEELQC11U	11/14/2002	11:34	1	2.10E+02	60	SCL	Unshielded	β		1.71E+02
52	STEELQC19S	11/14/2002	11:36	1	1.80E+02	60	SCL	Shielded	β	1.80E+02	
53	STEELQC19U	11/14/2002	11:37	1	1.99E+02	60	SCL	Unshielded	β		1.60E+02
58	STEELB1S	11/14/2002	13:09	1	2.25E+02	60	SCL	Shielded	β	2.25E+02	
59	STEELB1U	11/14/2002	13:10	1	1.94E+02	60	SCL	Unshielded	β		1.55E+02
60	STEELB2S	11/14/2002	13:12	1	1.78E+02	60	SCL	Shielded	β	1.78E+02	
61	STEELB2U	11/14/2002	13:13	1	2.50E+02	60	SCL	Unshielded	β		2.11E+02
62	STEELB3S	11/14/2002	13:14	1	2.03E+02	60	SCL	Shielded	β	2.03E+02	
63	STEELB3U	11/14/2002	13:15	1	2.11E+02	60	SCL	Unshielded	β		1.72E+02
64	STEELB4S	11/14/2002	13:17	1	2.03E+02	60	SCL	Shielded	β	2.03E+02	
65	STEELB4U	11/14/2002	13:18	1	1.78E+02	60	SCL	Unshielded	β		1.39E+02
66	STEELB5S	11/14/2002	13:19	1	2.32E+02	60	SCL	Shielded	β	2.32E+02	
67	STEELB5U	11/14/2002	13:20	1	2.08E+02	60	SCL	Unshielded	β		1.69E+02
68	STEELB6S	11/14/2002	13:22	1	2.22E+02	60	SCL	Shielded	β	2.22E+02	
69	STEELB6U	11/14/2002	13:23	1	2.22E+02	60	SCL	Unshielded	β		1.83E+02
70	STEELB7S	11/14/2002	13:24	1	2.21E+02	60	SCL	Shielded	β	2.21E+02	
71	STEELB7U	11/14/2002	13:25	1	2.18E+02	60	SCL	Unshielded	β		1.79E+02
72	STEELB8S	11/14/2002	13:26	1	2.18E+02	60	SCL	Shielded	β	2.18E+02	
73	STEELB8U	11/14/2002	13:28	1	2.15E+02	60	SCL	Unshielded	β		1.76E+02
74	STEELB9S	11/14/2002	13:29	1	1.90E+02	60	SCL	Shielded	β	1.90E+02	
75	STEELB9U	11/14/2002	13:30	1	2.17E+02	60	SCL	Unshielded	β		1.78E+02
76	STEELB10S	11/14/2002	13:41	1	2.45E+02	60	SCL	Shielded	β	2.45E+02	
77	STEELB10U	11/14/2002	13:42	1	2.32E+02	60	SCL	Unshielded	β		1.93E+02
78	STEELQCB5S	11/14/2002	13:44	1	1.81E+02	60	SCL	Shielded	β	1.81E+02	
79	STEELQCB5U	11/14/2002	13:45	1	2.13E+02	60	SCL	Unshielded	β		1.74E+02
80	Source Check	11/14/2002	13:53	1	1.75E+05	60	SCL	—	β		
								Minimum ⇒		1.55E+02	1.28E+02
								Maximum ⇒		2.45E+02	2.11E+02
								Mean ⇒		2.00E+02	1.72E+02
								Sigma ⇒		1.81E+01	1.77E+01

ATTACHMENT 7.2

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Gross Alpha/Beta Static Measurement MDC Calculation [redacted]

Use when Background Count Time = Sample Count Time

[redacted] [redacted] [redacted] [redacted] [redacted]

$L_C := 2.33 \cdot \sqrt{B}$ *Calculation of critical level (page 6-34 of MARSSIM)*

[redacted]

$\varepsilon_t = 0.146$

$L_C = 29.6$ *Critical level*

$L_C + B = 190.6$ *Any count above this value should be regarded as being greater than background (page 6-37 of MARSSIM).*

$C := \frac{1}{T \cdot \varepsilon_i \cdot \varepsilon_s} \cdot \frac{100}{A}$ *Calculation of constant "C" that includes probe area correction, source and instrument efficiencies and counting time (page 6-37 of MARSSIM).*

$MDC := C \cdot (3 + 4.65 \cdot \sqrt{B})$

[redacted] *Calculation of MDC. Results are in dpm/100 cm² (page 6-37 of MARSSIM).*

where:

L_C = critical level (counts)

B = number of background counts that are expected to occur while performing an actual measurement in time *T*

MDC = Minimum Detectable Concentration (dpm/100 square centimeters)

C = constant (see above)

ε_i = instrument efficiency

ε_s = source efficiency

A = instrument probe area (in square centimeters)

T = count time (in minutes)

ATTACHMENT 8 . 1

Beta Scan Measurement MDC Calculation

$p = 471$ $S = 5.67 \times 10^3$ $D = 161$ $d = 1.65$ $W_d = 48$ $S_r = 24$ $A = 100$

$A_s = 126$

$\frac{W_d}{S_r} = 2$ *Observation Interval (seconds)* $O_i := \frac{W_d}{S_r}$ *Observation Interval (seconds)*

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

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

$\varepsilon_t = 0.146$

$b_i = 5.4$ *Counts in observation Interval*

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

$C = 7.686$

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

$MDCR_i = 95.9$ *net counts per minute*

$MDCR_i + b = 256.908$ *gross counts per minute*

$\frac{MDCR_i}{O_i} = 48$ *net counts per minute in observation interval*

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

$MDC_{scan} = 737.154$ *dpm per 100 cm^2*

ATTACHMENT 8.2

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)

ATTACHMENT 8.3

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Exhibit 1
Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	CV2-23	Survey Unit Location	CV 774' TLG Ring
Date	3/17/03	Time	1405
Inspection Team Members	William Stoner / Raymond Shepherd		

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[a]	
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[a]	
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[b]	
11. Is lighting adequate to perform the FSS?		X[c]	
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[d]	

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:

a. Duct tape was found stuck to the TLG ring in several areas. Concrete debris was found on the underside and face of the ring. Notified the D&D Supervisor.

   A layer of rust covers the entire ring. Per D&D Engineering (Brosey), the rust will not affect the survey. No action required.

   Caulking covers the ring seams for PRI controls. Per D&D Engineering (Brosey), no action is necessary. Caulk was installed clean during installation of ring sections. Final Status Surveys were performed under caulk during ring installation.

   The wooden boxes that were installed to protect the ring for PRI need to be removed. Notified the D&D Supervisor

b. A moving scaffold is currently being used to access the TLG ring. Rad Con will need assistance with scaffold moves during surveying. No action is necessary.

c. Lighting is poor. Notified D&D Supervisor. He will add additional lighting.

d. A final inspection is necessary to close out deficiencies listed above. The final inspection will be documented on a new Survey Unit Inspection Check Sheet.

Survey Unit Inspector (print/sign)	W. Stoner/ [signature] R. Shepherd/ [signature]	Date	3/17/03
Survey Designer (print/sign)	R. Brosey [signature]	Date	3/18/03

Attachment 9 of 1

Attachment 9 of 1

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Exhibit 1
Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	CV1-23	Survey Unit Location	CV 774 TLG RING
Date	3/20/03	Time	1140
Inspection Team Members	R. Shepherd		

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: Scaffold positioned AT 'A' QUADRANT
All N/A Items performed on Initial Inspection Sheet

Survey Unit Inspector (print/sign)	R. Shepherd	Date	3/20/03
Survey Designer (print/sign)	W. Stowell / for S. Bagley per Telecon	Date	3/20/03

Attachment 1 of 2

Attachment 9 of 2

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EXHIBIT 3
Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION					
SMTA Number	SMTA - CV2-23 - 1	Survey Unit Number	CV2-23		
SMTA Location	CV 774' TLG Ring – Quadrant "A" – Beam Section 8				
Survey Unit Inspector	William Stoner / Raymond Shepherd	Date	3/17/03	Time	1515

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED					
Caliper Manufacturer	Not Listed	Caliper Model Number	Not Listed		
Caliper Serial Number	Not Listed	Calibration Due Date (as applicable)	N/A		
Rad Con Technician	W. Stoner /	Date	3/17/03	Time	1515
Survey Unit Inspector Approval	R. Shepherd /	Date	3/18/03		

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 - < 1 mm

Comments

15 measurements were taken at the location described below. All measurements were < 1 mm.

Additional Measurements Required

It is impossible to layout a 1 x 1 meter grid on the narrow ring. Therefore, obtain approximately 10 measurements within an approximately 6' section of beam face in quadrant "A" at beam section 8.

Attachment 1 of 3

Attachment 1 of 3

QAD A, 774' EI W-Beam Section

(all dimensions in inches)

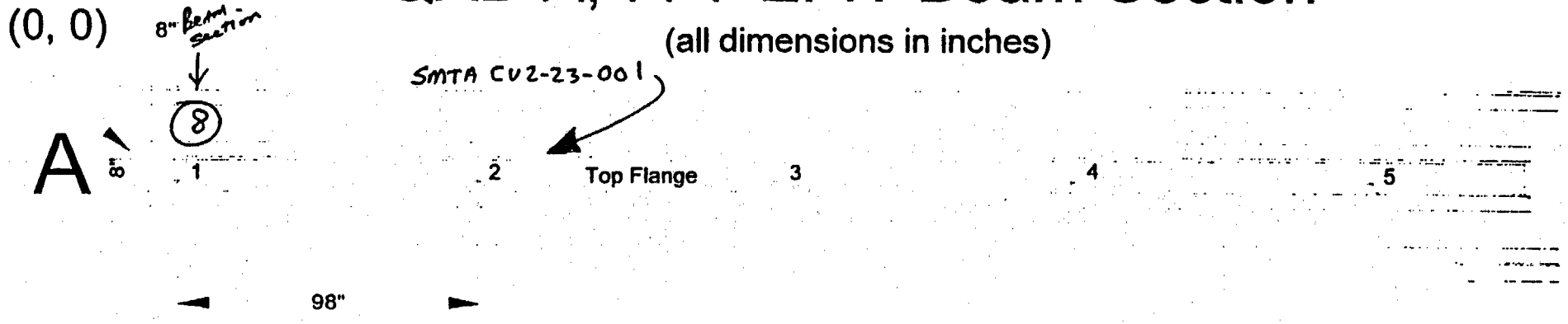

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Exhibit 1
Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	CV3-1	Survey Unit Location	CV Lower Shell - "C" Plates
Date	3/17/03	Time	1350
Inspection Team Members	William Stoner / Raymond Shepherd		

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[a]	
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[b]	
11. Is lighting adequate to perform the FSS?		X[c]	
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[d]	

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:

a. Blast grit was found in indentations and weld seams. Duct tape was found stuck to wall in several areas. Notified D&D Supervisor.

   Some rust was found on the steel plates throughout the survey unit. A thin layer of rust has collected on plates after cleaning. Per D&D Engineering (Brosey), the rust will not affect the survey. No action required.

b. A moving scaffold is currently being used to access the "C" plates. Rad Con will need assistance with scaffold moves during surveying. No action is necessary.

   Found several tabs that were previously welded to the CV to help support the 774' TLG ring. In some locations, the tabs stick out approximately 1 ½" making it difficult for detector access during surveying. Per D&D Engineering (Brosey), no action is necessary. Tabs were installed clean during installation of ring sections. Final Status Surveys were performed before tabs were installed.

c. Lighting is poor. Notified D&D Supervisor. He will add additional lighting.

d. A final inspection is necessary to close out deficiencies listed above. The final inspection will be documented on a new Survey Unit Inspection Check Sheet.

Survey Unit Inspector (print/sign)	W. Stoner/ [signature] R. Shepherd/ [signature]	Date	3/17/03
Survey Designer (print/sign)	[signature] B. Brosey	Date	3/18/03

Attachment 1 of 5

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Exhibit 1
Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	CV3-1	Survey Unit Location	Lower Shell "C" Plates
Date	3/20/03	Time	1155
Inspection Team Members	R. Shepherd		

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: All N/A Items were performed on Initial Inspection Sheet.

Survey Unit Inspector (print/sign)	R. Shepherd	Date	3/20/03
Survey Designer (print/sign)	W. Stover / for B. Bagley per Telecon	Date	3/20/03

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EXHIBIT 3
Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION

SMTA Number	SMTA - CV3-1 - 1	Survey Unit Number	CV3-1
SMTA Location	CV Lower Shell – "C" Plates – Plate C9		

Survey Unit Inspector	William Stoner / Raymond Shepherd	Date	3/17/03	Time	1345

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED

Caliper Manufacturer	Not Listed	Caliper Model Number	Not Listed
Caliper Serial Number	Not Listed	Calibration Due Date (as applicable)	N/A

Rad Con Technician	W. Stoner /	Date	3/17/03	Time	1445
Survey Unit Inspector Approval	R. Shepherd /	Date	3/18/03		

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

Average Measurement - ≤ 1 mm

Comments

Measurements taken as requested:

SMTA - CV3-1 - 1A – Length and width ~130x40 mm. Depth 25 mm.

SMTA - CV3-1 - 1B – Length and width ~100x25 mm. Depth 13 mm.

SMTA - CV3-1 - 1C – Length and width ~100x25 mm. Depth 14 mm.

SMTA - CV3-1 - 1D – Length and width ~100x25 mm. Depth 17 mm.

Attachment 9 of 7

Attachment 9 of 7

Additional Measurements Required

Multiple indentations on "C" plates from concrete removal bit. The Survey Unit Inspector took preliminary measurements. Most indentations were <12.5 mm. Obtain additional measurements of indentations at the following marked locations within the survey unit:

SMTA - CV3-1 - 1A – Plate C5

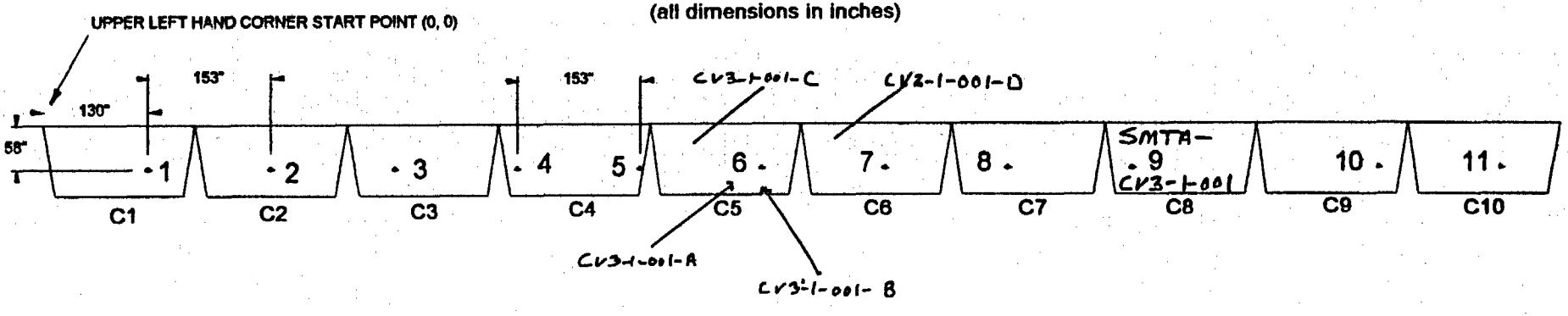
SMTA - CV3-1 - 1B – Plate C5

SMTA - CV3-1 - 1C – Plate C5

SMTA - CV3-1 - 1D – Plate C6

C - Plates

(all dimensions in inches)



SMTA-CV3-1-001
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Exhibit 1
Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	CV3-2	Survey Unit Location	CV INTERIOR BOWL 'B' PLATES
Date	3/17/03	Time	1500
Inspection Team Members	J DUSKIN, B BRASEY		

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

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:

3) ADDITIONAL HOUSE KEEPING TO BE DONE IN ADJACENT AREAS, (CV3-3 AND CV2-23). RESIDUAL DEBRIS TO BE REMOVED FROM THE FOLLOWING PLATES (B2, B5, B6, B7, B8, B10, B12, B15, B16, B17)

4) AC HOSE TO BE REMOVED

Survey Unit Inspector (print/sign)	J DUSKIN	Date	3/17/03
Survey Designer (print/sign)	B. BRASEY	Date	3/18/03

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E900-05-003

ORIGINAL

SAXTON NUCLEAR	Saxton Nuclear Experimental Corporation Facility Policy and Procedure Manual	Number E900-IMP-4520.06
Title Survey Unit Inspection in Support of FSS Design		Revision No. 0

EXHIBIT 1

Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	CV3-2	Survey Unit Location	CV Lower Bowl 'B' Plates
Date	3/20/03	Time	1205
Inspection Team Members	R. Shephard		

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: Retook photographs of B1-B1L. There is some minor Hot Drippage from overhead EQ opening controllable with Towel Wipes. I was Rinsing during Inspection
All N/A items performed on Initial Inspection Sheet

Survey Unit Inspector (print/sign)	R. Shephard	Date	3/20/03
Survey Designer (print/sign)	W. Stowe/ for B. Bradley per Telecon	Date	3/20/03

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SAXTON NUCLEAR	Saxton Nuclear Experimental Corporation Facility Policy and Procedure Manual	Number E900-03-003
		E900-IMP-4520.06
Title		Revision No.
Survey Unit Inspection In Support of FSS Design		0

EXHIBIT 3

Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION							
SMTA Number	SMTA - CV3-2-1			Survey Unit Number	CV3-2		
SMTA Location	CV INTERIOR - 'B' PLATES PLATE ~~A~~ B-13						
Survey Unit Inspector	JDUSKIN/JRLW		Date	3-17-03	Time	1430	
SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED							
Caliper Manufacturer	NOT INDICATED (EQUIVALENT TO MITUTOYO DIGIMATIC)			Caliper Model Number	NA		
Caliper Serial Number	NA			Calibration Due Date (as applicable)	NA		
Rad Con Technician	NA		Date	NA	Time	1530	
Survey Unit Inspector Approval	JDUSKIN/JRLW			Date	3/17/03		

SECTION 3 - MEASUREMENT RESULTS

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

1 0	7 0	13 0	19 C	25 ~~0~~ 3	31 0
2 C	8 0	14 0	20 C	26 0	32 0
3 0	9 0	15 0	21 0	27 8	33 3
4 0	10 0	16 0	22 0	28 0	34 7
5 0	11 0	17 0	23 0	29 5	35 0
6 ~~5~~ 5	12 0	18 8	24 C	30 0	36 0

Average Measurement 1.1 mm

Comments

ON PLATE B-13 THERE ABOUT 30 GOUGES 3" X 1/2", AVERAGE DEPTH OF ABOUT 5-6 MM THE RANGE WAS FROM 4 → 8 MM REPRESENTING ABOUT 45 in².
B-13 IS WORST CASE FOR GOUGES

Additional Measurements Required

PLATE B-4 1 GOUGE 19 MM DEEP (1" X 6") CV3-2-001A

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Attachment 9 of 11

B - Plates

UPPER LEFT HAND CORNER START POINT (0, 0)

(all dimensions in inches)

CV3-2-0014

SMTA CV3-2-1

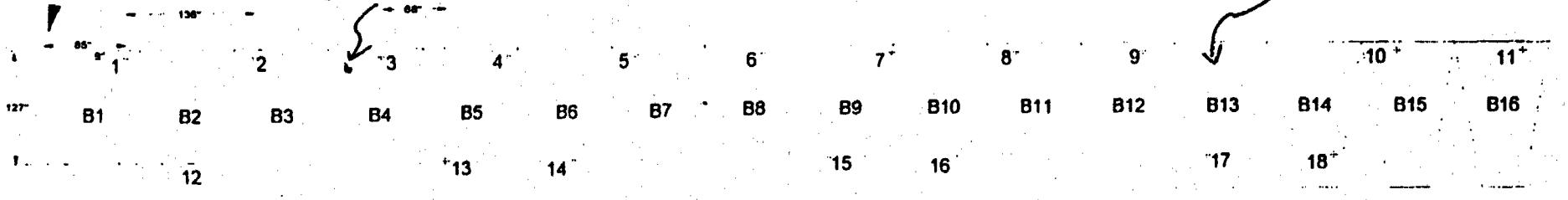

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Exhibit 1
Survey Unit Inspection Check Sheet

SECTION 1 - SURVEY UNIT INSPECTION DESCRIPTION

Survey Unit #	CV3-3	Survey Unit Location	CV INTERIOR 'A' PLATES
Date	3-17-03	Time	1348
Inspection Team Members	J. DUSKIN, B. BROSEY		

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

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:
RUST SPOT IN CENTER OF SURVEY UNIT FOUND TO BE ACCEPTABLE FOR SURVEY

Survey Unit Inspector (print/sign)	J DUSKIN / JDK	Date	3/17/03
Survey Designer (print/sign)	B. BROSEY	Date	3/18/03

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SAXTON NUCLEAR	Saxton Nuclear Experimental Corporation Facility Policy and Procedure Manual	Number E900-IMP-4520.06
Title: Survey Unit Inspection in Support of FSS Design		Revision No. 0

EXHIBIT 3

Surface Measurement Test Area (SMTA) Data Sheet

SECTION 1 - DESCRIPTION

SMTA Number	SMTA - CV3-3-1	Survey Unit Number	CV3-3		
SMTA Location	CV INTERIOR 'A' PLATES plate A +3'17-03 00				
Survey Unit Inspector	J DUSKIN, B BROSEY	Date	3-17-03	Time	1410

SECTION 2 - CALIPER INFORMATION & PERSONNEL INVOLVED

Caliper Manufacturer	NOT INDICATED (MITUTOYO DIGIMATIC EQUIVALENT)	Caliper Model Number	NA		
Caliper Serial Number	NA	Calibration Due Date (as applicable)	NA		
Rad Con Technician	NA	Date	NA	Time	1450
Survey Unit Inspector Approval	JDUSKIN / BBC	Date	3/17/03		

SECTION 3 - MEASUREMENT RESULTS

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

1: 0	7: 0	13: 0	19: 0	25: 0	31: 0
2: 0	8: 2	14: 0	20: 0	26: 0	32: 0
3: 0	9: 0	15: 0	21: 0	27: 0	33: 0
4: 0	10: 0	16: 0	22: 0	28: 0	34: 0
5: 0	11: 0	17: 0	23: 0	29: 0	35: 0
6: 0	12: 0	18: 0	24: 0	30: 5	36: 0

Average Measurement .19 mm

Comments

CV3-3-001A — Additional Measurements Required

19MM RECESS IN CENTER OF SURVEY UNIT HORIZONTAL LINE 7" IN DIAMETER

13 MM ELEVATED CIRCLE 1' IN DIAMETER. (C)

CLEANLINESS OF THIS REGION IS EQUIVALENT TO ADJACENT AREAS

CV3-3-001B — PIVOT ON A-1 PLATE 19 MM DEEP (1" X 6")

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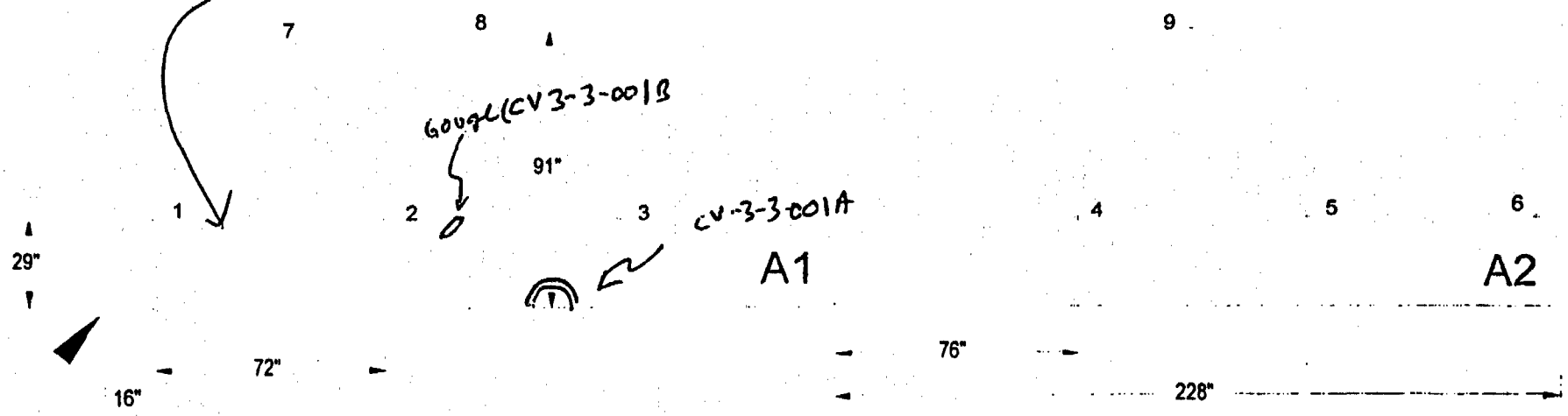
SMTA-CV3-3-1

A - Plates

(all dimensions in inches)



LOWER LEFT HAND CORNER START POINT (0, 0)

3/11/03
HAWKINS

EA00-03-03

Site Report

Site Summary

Site Name: SNEC CV Lower Head Survey

Planner(s): BHB

Contaminant Summary

NOTE: Surface soil DCGLw units are pCi/g.
Building surface DCGLw units are dpm/100 cm².

Contaminant	Type	DCGLw	Screening Value Used?	Area (m²)	Area Factor
Gross Activity	Building Surface	2,100	No	1	10.1
				4	3.4
				9	2
				16	1.5
				25	1.2
				36	1

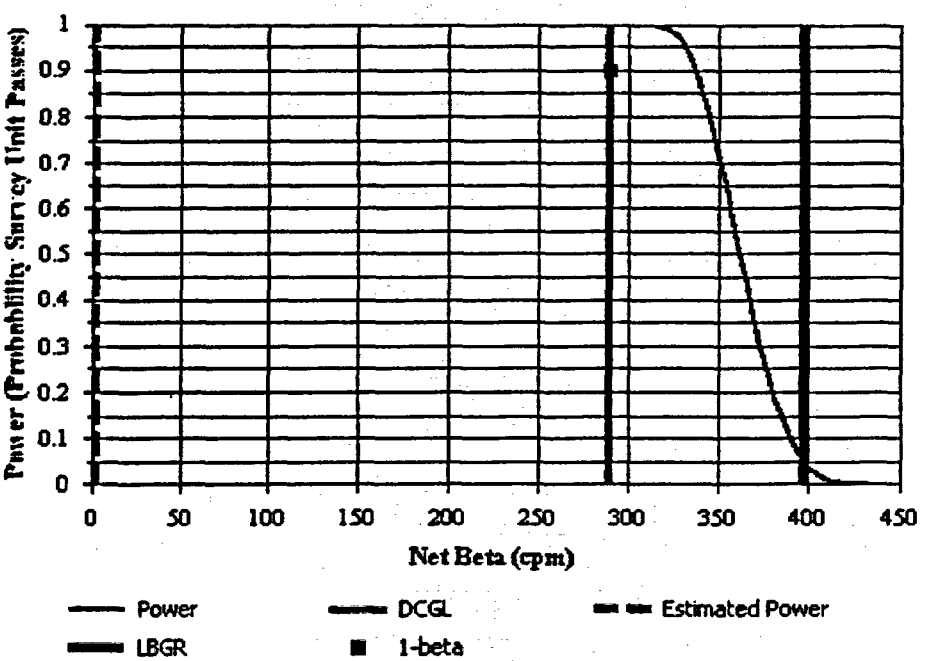
ATTACHMENT 10 - 1

Building Surface Survey Plan

Survey Plan Summary

Site:	SNEC CV Lower Head Survey		
Planner(s):	BHB		
Survey Unit Name:	Inner Steel Surface of SNEC CV, CV2-23		
Comments:	774' El, W-Beam Area		
Area (m²):	75	Classification:	1
Selected Test:	WRS	Estimated Sigma (cpm):	38.7
DCGL (cpm):	397	Sample Size (N/2):	8
LBGR (cpm):	290	Estimated Conc. (cpm):	3.1
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100	EMC Sample Size (N):	8

Prospective Power Curve



ATTACHMENT 10 - 2

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Building Surface Survey Plan

Contaminant Summary

Contaminant	DCGLw (dpm/100 cm²)
Gross Activity	2,100

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 2,100
Total Efficiency: 0.15
Gross Beta DCGLw (cpm): 397

ID	Type	Mode	Area (cm²)
1	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Gross Activity	187.87	1.0000	0.47	0.31	0.1460

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

Gross Survey Unit Mean (cpm): 175 ± 39 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Steel	37	171.9	17.7	338

ATTACHMENT 10.3

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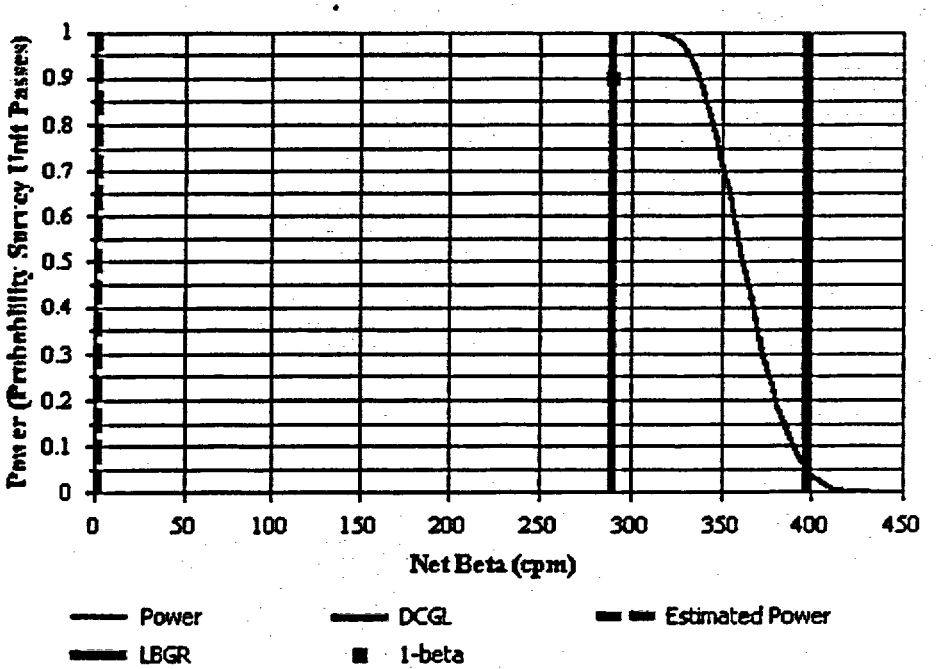
Building Surface Survey Plan

Survey Plan Summary

Site:	SNEC CV Lower Head Survey		
Planner(s):	BHB		
Survey Unit Name:	C-Plates in SNEC CV, CV3-1		
Comments:			
Area (m²):	105	Classification:	1
Selected Test:	WRS	Estimated Sigma (cpm):	38.7
DCGL (cpm):	397	Sample Size (N/2):	8
LBGR (cpm):	290	Estimated Conc. (cpm):	3.1
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100	EMC Sample Size (N):	8

Prospective Power Curve



ATTACHMENT 10.4

Building Surface Survey Plan

Contaminant Summary

Contaminant	DCGLw (dpm/100 cm²)
Gross Activity	2,100

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 2,100
Total Efficiency: 0.15
Gross Beta DCGLw (cpm): 397

ID	Type	Mode	Area (cm²)
1	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Gross Activity	187.87	1.0000	0.47	0.31	0.1460

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

Gross Survey Unit Mean (cpm): 175 ± 39 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Steel	37	171.9	17.7	338

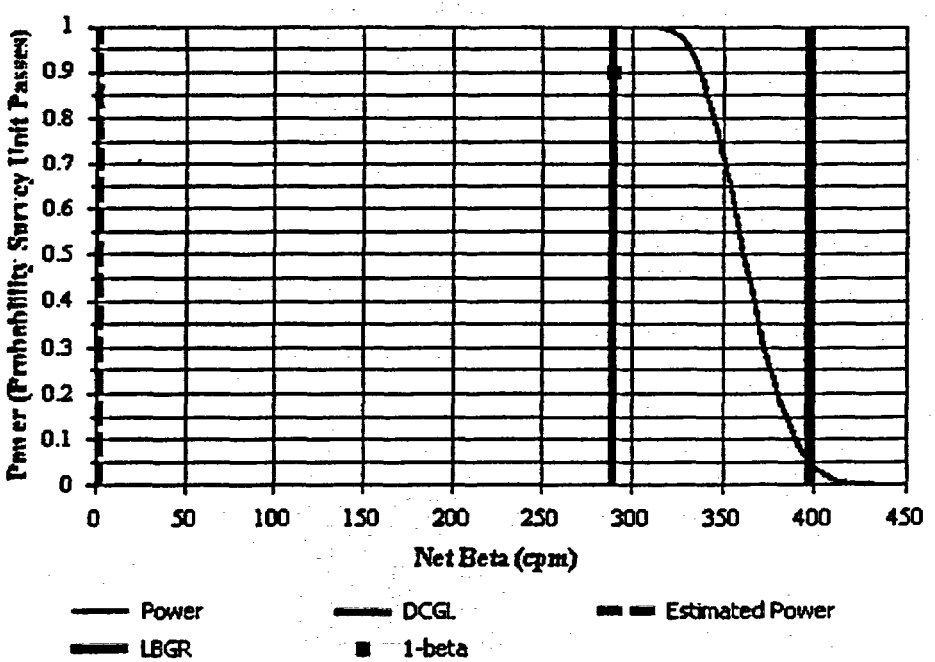
ATTACHMENT 10.5

Building Surface Survey Plan

Survey Plan Summary

Site:	SNEC CV Lower Head Survey		
Planner(s):	BHB		
Survey Unit Name:	B-Plates in SNEC CV, CV3-2		
Comments:			
Area (m^2):	124	Classification:	1
Selected Test:	WRS	Estimated Sigma (cpm):	38.7
DCGL (cpm):	397	Sample Size (N/2):	8
LBGR (cpm):	290	Estimated Conc. (cpm):	3.1
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100	EMC Sample Size (N):	8

Prospective Power Curve



Building Surface Survey Plan

Contaminant Summary

Contaminant	DCGLw (dpm/100 cm²)
Gross Activity	2,100

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 2,100
Total Efficiency: 0.15
Gross Beta DCGLw (cpm): 397

ID	Type	Mode	Area (cm²)
1	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Gross Activity	187.87	1.0000	0.47	0.31	0.1460

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

Gross Survey Unit Mean (cpm): 175 ± 39 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Steel	37	171.9	17.7	338

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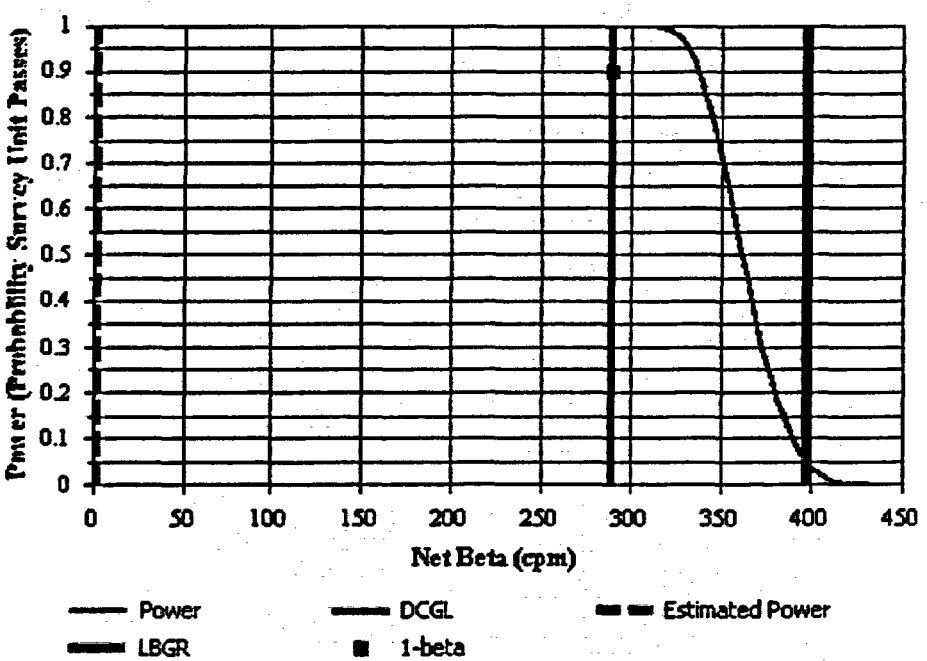
Building Surface Survey Plan

Survey Plan Summary

Site:	SNEC CV Lower Head Survey		
Planner(s):	BHB		
Survey Unit Name:	A-Plates in SNEC CV, CV3-3		
Comments:			
Area (m^2):	26	Classification:	1
Selected Test:	WRS	Estimated Sigma (cpm):	38.7
DCGL (cpm):	397	Sample Size (N/2):	8
LBGR (cpm):	290	Estimated Conc. (cpm):	3.1
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100	EMC Sample Size (N):	8

Prospective Power Curve



Building Surface Survey Plan

Contaminant Summary

Contaminant	DCGLw (dpm/100 cm²)
Gross Activity	2,100

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 2,100
Total Efficiency: 0.15
Gross Beta DCGLw (cpm): 397

ID	Type	Mode	Area (cm²)
1	GFPC	Beta	126

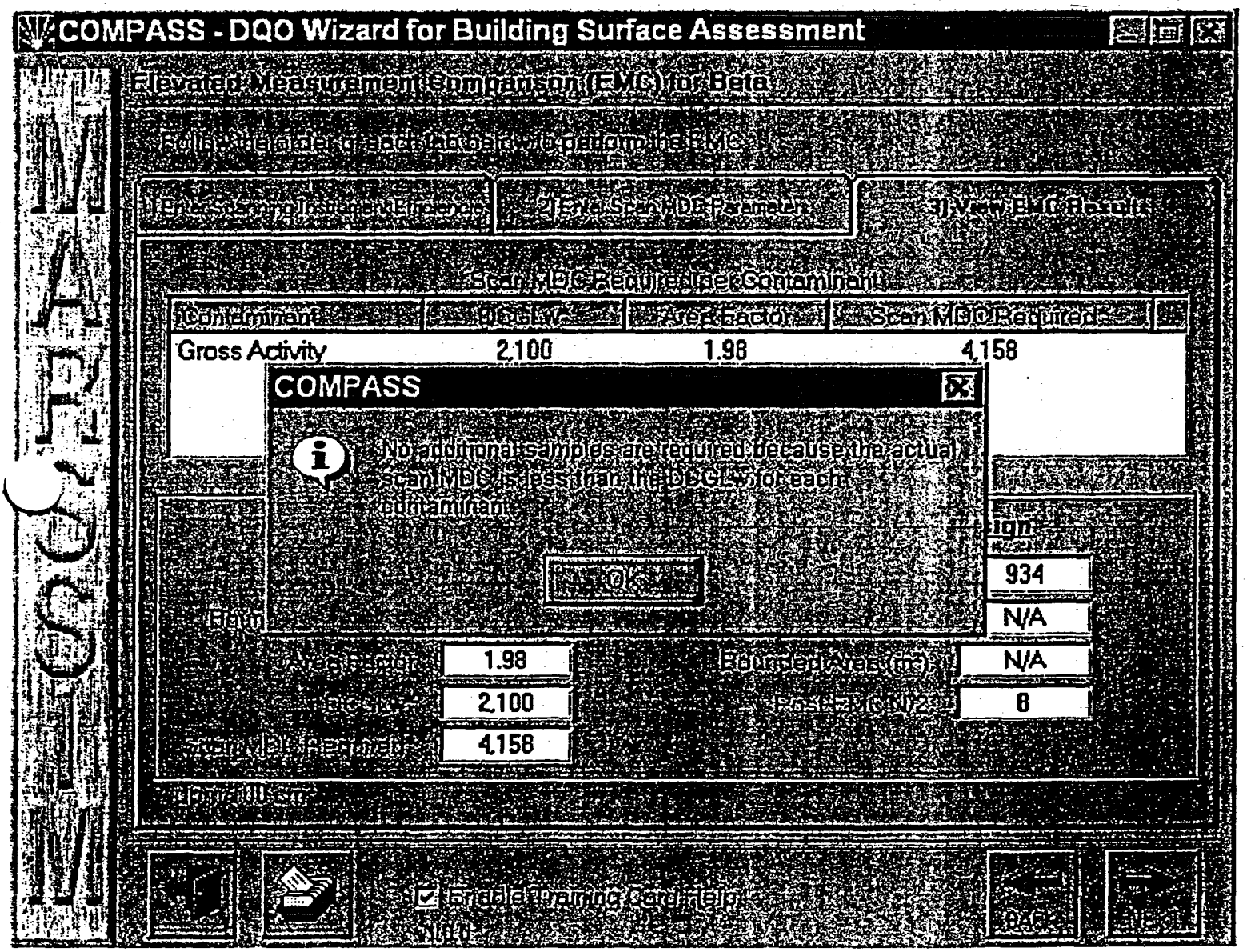
Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Gross Activity	187.87	1.0000	0.47	0.31	0.1460

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

Gross Survey Unit Mean (cpm): 175 ± 39 (1-sigma)
Count Time (min): 1

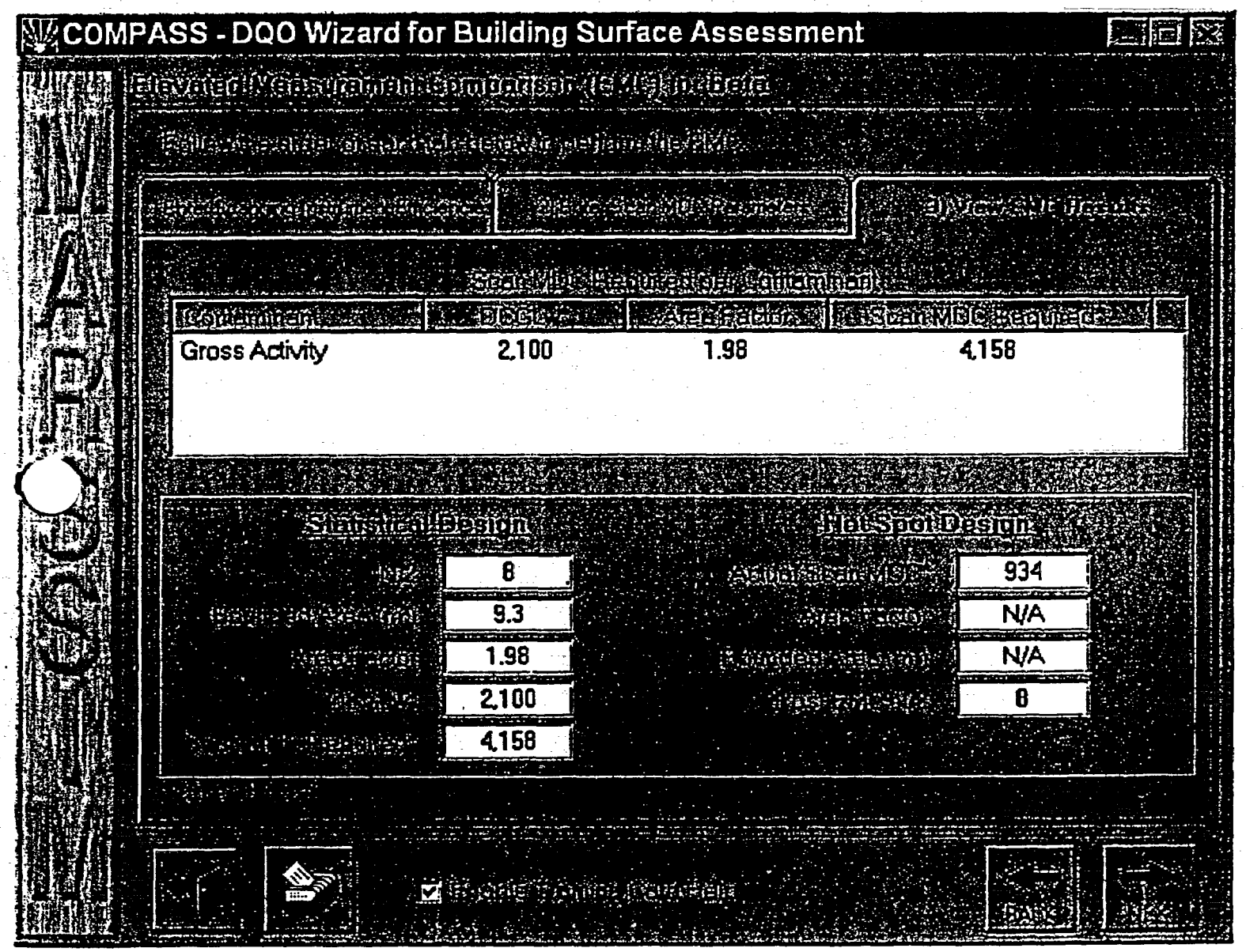
Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Steel	37	171.9	17.7	338

E900-03-003


COMPASS - DQO Wizard for Building Surface Assessment
Elevated Measurement Comparison (EMC) for Beta
Scan MDC Required per Contaminant
Contaminant
DCGLw
Area Factor
Scan MDC Required
Gross Activity
2,100
1.98
4,158
COMPASS
No additional samples are required because the actual Scan MDC is less than the DCGLw for each contaminant.
OK
934
N/A
1.98
2,100
4,158
N/A
8
Enable Training Card Help

70 & 70

E900-03-003



GPU NUCLEAR

CALCULATION COVER SHEET

Subject:	Calculation No.	Revision Number
Interior CV Weld Ring Areas @ 774 ft. El - Survey Plan	6900-02-024	0

DESCRIPTION OF REVISION

	Signature	Date
Originator	B. Brosey/ B. Brosey	9/26/02
Reviewer	J.P. Donnachie/ J.P. Donnachie	9/26/02
Additional Reviewer		
Additional Reviewer		
Additional Reviewer		
Management Approval	Paynter	9/26/02

GPU NUCLEAR

Calculation Sheet

Subject	Calc. No.	Rev. No.	Sheet No.
Interior CV Weld Ring Areas @ 774 ft El - Survey Plan	6900-02-024	0	1 of 38

Originator	Date	Reviewed by	Date
Barry H. Brosey B. Brosey	September 26, 2002	J. P. Donnachie J. Donnachie	9/26/02

1.0 PROBLEM STATEMENT

1.1 The purpose of this calculation is to provide a survey plan for the 774 ft El weld area associated with one stiffener support ring located along the interior surface of the SNEC CV.

1.2 This plan incorporates the use of the Compass computer program (**Reference 3.2**), and the VSP computer program (**Reference 3.3**). Additionally, instrument information and preliminary survey data have been used to produce this survey plan.

1.3 This plan makes use of conservative assumptions and a radionuclide mix that is conservatively chosen, in the absence of more definitive information.

2.0 SUMMARY OF RESULTS

2.1 The results of this planning calculation are presented in the attachments. The key elements for this survey plan are:

- Scan Speed is initially set at 2.2 cm/second (1 detector width per 4 seconds).
- The effective DCGLw for this measurement plan is taken to be **2100 dpm/100 cm^2**.
- The investigation level for the scanning phase of this work is ~250 cpm above background. Areas should be marked when at or above this level. An open and closed window measurement should then be made at these elevated locations as a part of the scan process (for a fixed time period (1 min.)). At least one re-cleaning and re-measurement cycle should follow.
- A shielded measurement may be used as a reasonable estimate of background in the survey area.
- A net fixed point measurement result of about 580 cpm yields ~2100 dpm/100 cm^2 (the DCGLw) for a 1 minute count time.
- Prior to survey, the surface should be clean, dry and free of materials that can interfere with the measurement process. It takes only about 0.005 inches of material of density 1 g/cc to cut the source detection efficiency by ½. Rust typically has a much higher density than 1 g/cc and therefore it takes very little rust scale to inhibit beta radiation. A thorough cleaning and inspection must be performed prior to performing this survey work. Contact the RSO for guidance.
- Photos should be taken before and after the cleaning process.
- A scrape or smear survey of the area(s) to be surveyed should be performed prior to cleaning the surface to verify the radionuclide concentration mix. Smears should be sent to an off-site laboratory for analysis.
- The WRS statistical testing procedure will be used when the data are to be analyzed. No analysis is necessary if all static measurements are below the assigned DCGLw (580 net cpm per 100 cm^2 or 2100 dpm/100 cm^2).

- The output from the Compass program indicates that the following static measurement points will be necessary per ring area to satisfy this survey plan. That is, each ring area measuring ~10" in height by ~471" in length will have the following number of fixed survey points placed randomly. These locations are marked on the attached maps.

  1. QUADRANT A = 9 Points
  2. QUADRANT B = 9 Points
  3. QUADRANT C = 9 Points
  4. QUADRANT D = 9 Points

- The typical scanning MDC for this survey will be ~425 dpm/100 cm^2. Since this value is < 2100 dpm/100 cm^2 (DCGLw), there is no Elevated Measurement Concentration (EMC) areas (see **Attachments 1-1 to 1-3**). These surveys do not result in the release of any activated component of the steel shell.

- All quadrants shall be laid out IAW the areas specified in the previous ring survey plan (see **Reference 3.14**).

3.0 REFERENCES

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

3.2 Compass, a computer code designed to support MARSSIM survey planning activities, Version 1.0.0, Oak Ridge Institute for Science and Education, Oak Ridge Associated Universities, 2000/2001. Compass has been reviewed and is approved by the US NRC.

3.3 Visual Sample Plan, "VSP", Pacific Northwest National Laboratories computer software, PNL Statistics Group, Version 1.1, used to design statistical survey plans with a basis in the DQO process. For purposes of this plan, this program is used to locate random measurement points.

3.4 GPU Nuclear Calculation No. 6900-02-011, "CV Stiffener Region Radionuclide Mix – Pre-Survey", 3/12/02.

3.5 International Standard, ISO 7503-1, First Edition, 1988-08-01, Evaluation of Surface Contamination – Part 1: Beta-emitters (maximum beta energy greater than 0.15 MeV) and alpha-emitters.

3.6 ASTM E 1893 – 97, Standard Guide for Selection and Use of Portable Radiological Survey Instruments for Performing In Situ Radiological Assessments in Support of Decommissioning. American Society for Testing and Materials.

3.7 SNEC License Termination Plan Draft (LTP), Revision 1, 2002.

3.8 Unit-2 CWPH Pump-bay Report, 1997, "Post Dismantlement Radiological and Environmental Survey of the Three Mile Island Unit-2 Circulating Water Pump House Pump-bay", GPU Nuclear Corporation, Report No. 990-2548.

3.9 NUREG- 1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Rev 1, August 2000.

3.10 GPU Nuclear Calculation No. 6900-02-013, Revision 1, 3/29/02, "Exterior CV Weld Area Survey Plan.

3.11 RESRAD-BUILD 3.1, "A Computer Program for Analyzing the Radiological Doses Resulting from the Remediation and Occupancy of Buildings Contaminated with Radioactive Materials", Environmental Assessment Division of Argonne National Laboratories, UD-DOE, ANL/EAD/LD-3.

3.12 GPU Nuclear Calculation No. 6900-02-017, "Interior CV Weld Ring Areas – Survey Plan", 6/13/02.

3.13 GPU Nuclear Calculation No. 6900-02-019, "Interior CV Weld Ring Areas @ 792.5 ft. El – Survey Plan", 6/24/02.

3.14 GPU Nuclear Calculation No. 6900-02-020, "Interior CV Weld Ring Areas @ 787 ft. El – Survey Plan", 8/1/02.

3.15 GPU Nuclear Calculation No. 6900-02-022, "Interior CV Weld Ring Areas @ 782 ft. El – Survey Plan", 8/21/02.

3.16 GPU Nuclear Calculation No. 6900-02-023, "Interior CV Weld Ring Areas @ 777 ft. El – Survey Plan", 8/21/02.

4.0 ASSUMPTIONS AND BASIC DATA

4.1 It is assumed that the detection efficiency for this survey work will be at least that given on **Attachment 2-1** for Tc-99. The instrument vendor uses Tc-99 to calibrate all Ludlum 2350/43-68 Gas Flow Proportional Counter (GFPC) systems. The current vendor calibration report does not include values for ε_i or ε_s. For purposes of this plan the reported value is assumed to be ε_t (see **Reference 3.9**).

4.2 For purposes of this plan, an instrument efficiency of 22.5% for Tc-99 was used. This efficiency is for an energy (Tc-99) that is equivalent to that provided by Co-60. However, the majority of the activity in the assumed radionuclide mix is from Cs-137 (~87%). Sr-90 is also assumed present in the mix. Cs-137 and Sr-90 both have average energies above Tc-99, and therefore the results of this measurement will be an over-estimate of the residual activities present on the surface of the CV steel. Samples of surface materials will be taken as part of this survey plan.

When these results are analyzed residual surface activities for these CV areas will be re-calculated.

4.3 No credit for back-scatter of beta particles from the steel surface is taken in this plan. An estimate of back-scatter for the most probable end-point energy present in the radionuclide mix suggests that this value may be as much as 1.2 (end-point energy of around 200 keV) (see **Reference 3.6 & 3.12**).

4.4 For purposes of this survey plan, a conservative mix of radionuclides has been assumed. The materials are as described in **Reference 3.4**. However, the originally recommended limit of 1000 dpm/100 cm^2 (provided in **Reference 3.4**) is extremely conservative. Therefore, the release limit will be adjusted IAW smear samples taken from the steel shell in both the Storage Well/Reactor Cavity and the Primary compartment of the CV. This should be more representative of the type of contamination present on the CV steel in these areas until a more complete sample set has been assayed. The selected samples (see **Reference 3.13**) are :

- Sample No. SXSMHAP8 – HAP-8 Smears, 18" Wall Area in the Storage Well, and
- Sample No. SXSMHAP37 – HAP-37 Smears, 18" Wall Area in the Primary Compartment.

Both of these sample materials provide similar effective limits, but for purposes of this plan the more conservative mix provided by sample No. SXSMHAP8 has been used.

4.5 The resulting mix from sample No. SXSMHAP8 was entered into the spreadsheet titled, "Effective DCGL Calculator for Cs-137 (dpm/100 cm^2)". The pending DCGL values for surface activity (SNEC LTP – **Reference 3.7**) is then used to calculate an effective gross activity limit of ~10611 dpm/100 cm^2. This limit would be appropriate if all areas in the CV contained the same mix. However, since a representative sampling of all regions in the CV is currently unavailable, it is prudent to reduce this limit by some safety factor for current field work. The resulting gross count rate will then be assumed (for planning purposes) to be the result of Cs-137 activity on the surface of the CV steel. This is a conservative assumption.

4.6 The actual limit set for this survey work will be 20% of the above gross activity value or 0.2 x 10611 dpm/100 cm^2 = ***~2100 dpm/100 cm^2***.

NOTE: SNEC sample analysis results for a sample taken in the area of the 792' El support ring survey, indicated that a gross survey unit limit of ~3700 dpm/100 cm^2 would be the maximum limit for that support ring location (SNEC Sample No. SXSD3055).

4.7 No additional surface attenuating media is assumed present on the CV steel surface, i.e., the surface of the CV steel is assumed to be clean, dry, free of tar, rusty scale, paint and concrete dust. Contact the SNEC RSO before performing this survey work if there is any question regarding the interpretation of this requirement.

4.8 Dimensions of the area to be surveyed have been defined by SNEC site engineer D. Chokshi and SNEC contractor TLG. The survey area dimensions were then input to a CAD program to complete the survey plan. This ring area is 10" in height and encompasses the entire CV circumference of 157 feet. Because of the varying difficulty in applying physical measurement points within a long narrow band, the ring is divided into four quadrants (A, B, C, & D). Each quadrant represents a survey unit.

4.9 Steel background GFPC measurements were assembled from **Reference 3.8** (see **Attachment 3-1 to 3-3**). These values were input to the Compass program as representative background steel values. These values represent a conservative assumption for initial planning purposes. A more appropriate background set will be used in the assessment phase.

4.10 A static open and closed window GFPC measurement set was performed on the surface of CV in the four survey units – post decontamination. That data set was used to determine an estimate for the mean and sigma of each survey unit (see **Attachment 5-1 to 5-2**). These values were then input to the Compass program as representative steel count rates in the survey areas (see statistical breakdown on **Attachments 6-1 to 6-8**).

4.11 For purposes of this plan, each area of ~ 3.04 m^2 is assumed to be one (1) survey unit, and a MARSSIM (**Reference 3.9**), Class 1 survey area.

4.12 The survey diagram was imported into the VSP program (**Reference 3.3**). The assigned static measurement points are randomly selected and placed on the survey map along with their coordinates. Random start systematic spacing was not used for this survey plan because of the long narrow shape of these decontaminated survey units and their location which is in the middle of a contaminated zone.

4.13 The survey plot in VSP was then imported to a CAD program and the survey points were located and listed. The (0, 0) starting point is the lower left hand corner of each survey unit.

4.14 The Area Factors for this survey plan were selected from the most conservative AF values from **Reference 3.7** (Co-60). However, the scan MDC value calculated for this work is less than the DCGLw value, and therefore the AF feature is not used.

4.15 The detector should be in contact with the CV steel for both the scan and static measurements. Open and closed window readings are performed using a ¼" piece of Lucite (or equivalent), to cover the face of the probe when making a closed window reading.

4.16 Static measurements are to be performed using the open and closed window technique. A one minute count time is necessary for all static measurements.

4.17 Survey point location maps are shown in **Attachment 9-1** through **9-2**.

4.18 Survey coordinates are listed for each quadrant in **Attachment 10-1**.

5.0 CALCULATIONS

5.1 All calculations are performed internal to the computer codes listed in Section 3.0.

6.0 LIST OF ATTACHMENTS

6.1 Attachments 1-1 to 1-3, "Beta Scan Measurement MDC Calculation Sheets" (for a 111 & 200 cpm background levels).

6.2 Attachments 2-1, GFPC Detector Source Check Log Sheet from the SNEC Facility – S/N for 43-68B Probe – 092512, & instrument 2350-1 S/N of 126196.

6.3 Attachment 3-1 to 3-3, Off-site background values for GFPC type instrument.

6.4 Attachments 4-1 to 4-2, Pre-decontamination survey results for all four quadrants. Both open and closed measurements are included.

6.5 Attachments 5-1 to 5-2, Post-decontamination survey results for all four quadrants. Both open and closed window measurements are included.

6.6 Attachments 6-1 to 6-8, Statistics for post-remediation survey results of 774' El ring areas (QAD A to D).

6.7 Attachments 7-1 to 7-2, Area factor values from LTP (**Reference 3.7**) and Compass area factor printout for Co-60 (7-2).

6.8 Attachments 8-1 to 8-8, Compass program output.

6.9 Attachments 9-1 to 9-2, Static measurement point location maps per quadrant based on VSP output.

6.10 Attachment 10-1, Coordinates for all four (4) quadrants for static measurement points as determined by the VSP computer program.

B. Bunny 6900-02-029

Beta Scan Measurement MDC Calculation

$\varepsilon_i = 0.5$ $\quad S_r = 5$ $\quad b = 7.4$ $\quad d = 1.65$ $\quad W_d = 20$ $\quad \varepsilon_s = 0.45$ $\quad \varepsilon_i = 0.5$

$A = 100$

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

$\varepsilon_t = \varepsilon_i \cdot \varepsilon_s$

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

$\varepsilon_t = 0.225$

$b_i = 7.4$ *Counts in observation Interval*

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

$C = 6.285$

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

$MDCR_i = 56.3$ *net counts per minute*

$MDCR_i + b = 167.31$ *gross counts per minute*

$\frac{MDCR_i}{O_i} = 14.1$ *net counts per minute in observation interval*

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

$MDC_{scan} = 353.931$ *dpm per 100 cm^2*

ATTACHMENT 1 . 1

B. Brunson 6900-02-02

Beta Scan Measurement MDC Calculation

$\varepsilon_i = 0$ $\varepsilon_s = 0.45$ $b = 200$ $d = 0.5$ $W_d = 8$ $S_r = 2$ $p = 156$

$A = 100$

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

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

$\varepsilon_t := \varepsilon_i \varepsilon_s$

$\varepsilon_t = 0.225$

$b_i = 13.3$ *Counts in observation Interval*

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

$C = 6.285$

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

$MDCR_i = 75.6$ *net counts per minute*

$MDCR_i + b = 275.586$ *gross counts per minute*

$\frac{MDCR_i}{O_i} = 18.9$ *net counts per minute in observation interval*

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

$MDC_{scan} = 475.086$ *dpm per 100 cm^2*

ATTACHMENT 1.2

9 & 38
B. Bruno
6900-02-024

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)

ATTACHMENT 1.3

B. Brown 10 of 38

6900-02-024

SAXTON NUCLEAR	Saxton Nuclear Experimental Corporation Facility Policy and Procedure Manual	Number E900-OPS-4524.42
Title SNEC Rad Con Instrument Operations Manual		Revision 2

EXHIBIT 5

ORIGINAL

Counter Scaler Source Check Log

Instrument Type Ludlum 2350-1 Serial Number 126196

Cal. Due Date 1/24/03 Detector / Serial Number 43-68 092512

Source Type / Serial Number Cs 137 5024

Voltage Setting 1850 Efficiency 22.5%

Acceptance Criteria ~~(± 2 or ± 3 Sigma Range~~ ± 1026 in CPM) 162346 to 198423

DATE/TIME	BKG COUNT TIME (MIN)	BKG CPM	SOURCE COUNT TIME (MIN)	GROSS SOURCE CPM	NCPM	TECHNICIAN (PRINT/SIGN)	PASS	FAIL	
9-5-02 0800	30	241	1	180,959	180,718	R Lafayette	✓		RS
9-6-02 0850	30	232	1	178,896	178,619	Brownsberger/Bob	✓		RS
9-6-02 1760	–	232	1	181,877	181,645	R Lafayette	✓		①
9.9.02 0900	30	206	1	180,511	180,305	R Lafayette	✓		RS
9.9.02 1830	–	206	1	180,992	180,786	R Lafayette	✓		①
9.10.02 1000	30	252	1	180,259	180,007	R Lafayette	✓		RS
9.10.02 1515	–	252	1	183,734	143,482	R Lafayette	✓		①
9.24.02 0730	30	254	1	179,096	178,842	R Lafayette	✓		RS
9.24.02 1240	–	254	1	176,862	176,608	R Lafayette	✓		①
9.25.02 0730	30	248	1	179,026	178,778	R Lafayette	✓		
9.25.02 1450	–	248	1	179,832	179584	R LAFAYETTE RJ Bolland	✓		①

Final Review (GRCS) _____ Date _____

① 2nd Source Check

ATTACHMENT 2.1

B. Brown
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6900-02-024

CWPH Backgrounds Only.dmd Thursday, September 26, 2002 12:44:48 AM

	CWPH OW BKGNDS	Lowest 50% of BKGNDS
1	132	111
2	146	111
3	126	113
4	148	119
5	123	121
6	187	123
7	182	123
8	182	126
9	132	126
10	167	127
11	199	132
12	143	132
13	159	134
14	111	135
15	134	138
16	119	141
17	141	141
18	149	142
19	123	143
20	151	146
21	111	146
22	148	148
23	113	148
24	135	148
25	127	149
26	154	151
27	138	151
28	207	151
29	163	153
30	154	154
31	213	154
32	157	156
33	178	157
34	141	157
35	210	159
36	161	161
37	121	162
38	216	163
39	153	166
40	166	166
41	334	167
42	226	167
43	197	169
44	142	169
45	167	177
46	151	178
47	199	179
48	162	182
49	191	182
50	151	182

ATTACHMENT 3.1

B. Brown
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6906-02-024

CWPH Backgrounds Only.dmd Thursday, September 26, 2002 12:44:48 AM

	CWPH OW BKGNDS	Lowest 50% of BKGNDS
51	205	182
52	156	184
53	214	187
54	148	187
55	206	191
56	126	197
57	299	197
58	254	197
59	271	
60	350	
61	418	
62	272	
63	200	
64	326	
65	254	
66	182	
67	197	
68	197	
69	207	
70	182	
71	205	
72	203	
73	256	
74	169	
75	256	
76	388	
77	531	
78	212	
79	373	
80	367	
81	387	
82	210	
83	311	
84	177	
85	238	
86	407	
87	169	
88	268	
89	381	
90	187	
91	201	
92	146	
93	213	
94	222	
95	157	
96	337	
97	242	
98	235	
99	250	
100	184	

ATTACHMENT 3 - 2

B. Brown
13 & 38

6900-02-024

CWPH Backgrounds Only.dmd Thursday, September 26, 2002 12:44:48 AM

	CWPH OW BKGNDS	Lowest 50% of BKGNDS
101	220	
102	179	
103	255	
104	305	
105	233	
106	237	
107	166	
108	250	
109	223	
110	299	
111	266	

ATTACHMENT 3.3

B. Brown 14 & 38

6900-02-029

PRE-CLEANING SURVEY DATA

37122N21	126196	RLM6220								
	Location	Date	Time			Count Time	Mode			
0	BACKGROUND	9/24/2002	7:53	1	7.62E+03	1800	SCL	0		
1	SOURCE CK	9/24/2002	8:15	1	1.79E+05	60	SCL	0	Shielded	Unshielded
2	CV2-19 1S	9/24/2002	10:58	1	1.79E+02	60	SCL	0	1.79E+02	
3	CV2-19 1U	9/24/2002	10:59	1	2.12E+02	60	SCL	0		2.12E+02
* → 4	CV2-19 2S	9/24/2002	11:00	1	1.62E+02	60	SCL	0	1.62E+02	
5	CV2-19 2U	9/24/2002	11:01	1	2.09E+02	60	SCL	0		2.09E+02
6	CV2-19 3S	9/24/2002	11:02	1	1.93E+02	60	SCL	0	1.93E+02	
7	CV2-19 3U	9/24/2002	11:03	1	2.20E+02	60	SCL	0		2.20E+02
8	CV2-19 4S	9/24/2002	11:05	1	2.08E+02	60	SCL	0	2.08E+02	
9	CV2-19 4U	9/24/2002	11:06	1	3.67E+02	60	SCL	0		3.67E+02
10	CV2-19 5S	9/24/2002	11:07	1	1.67E+02	60	SCL	0	1.67E+02	
11	CV2-19 5U	9/24/2002	11:08	1	2.26E+02	60	SCL	0		2.26E+02
12	CV2-19 6S	9/24/2002	11:09	1	1.74E+02	60	SCL	0	1.74E+02	
13	CV2-19 6U	9/24/2002	11:10	1	2.17E+02	60	SCL	0		2.17E+02
14	CV2-19 7S	9/24/2002	11:12	1	1.55E+02	60	SCL	0	1.55E+02	
15	CV2-19 7U	9/24/2002	11:13	1	1.94E+02	60	SCL	0		1.94E+02
16	CV2-19 8S	9/24/2002	11:14	1	2.02E+02	60	SCL	0	2.02E+02	
17	CV2-19 8U	9/24/2002	11:15	1	2.04E+02	60	SCL	0		2.04E+02
18	CV2-19 9S	9/24/2002	11:16	1	1.73E+02	60	SCL	0	1.73E+02	
19	CV2-19 9U	9/24/2002	11:17	1	1.69E+02	60	SCL	0		1.69E+02
20	CV2-19 10S	9/24/2002	11:19	1	1.68E+02	60	SCL	0	1.68E+02	
21	CV2-19 10U	9/24/2002	11:20	1	1.89E+02	60	SCL	0		1.89E+02
22	CU2-20 1S	9/24/2002	11:23	1	1.67E+02	60	SCL	0	1.67E+02	
23	CU2-20 1U	9/24/2002	11:25	1	2.70E+02	60	SCL	0		2.70E+02
24	CU2-20 2S	9/24/2002	11:26	1	1.66E+02	60	SCL	0	1.66E+02	
25	CU2-20 2U	9/24/2002	11:27	1	2.55E+02	60	SCL	0		2.55E+02
26	CU2-20 3S	9/24/2002	11:28	1	1.87E+02	60	SCL	0	1.87E+02	
27	CU2-20 3U	9/24/2002	11:29	1	2.92E+02	60	SCL	0		2.92E+02
28	CU2-20 4S	9/24/2002	11:31	1	1.84E+02	60	SCL	0	1.84E+02	
29	CU2-20 4U	9/24/2002	11:32	1	2.75E+02	60	SCL	0		2.75E+02
30	CU2-20 5S	9/24/2002	11:33	1	1.61E+02	60	SCL	0	1.61E+02	
31	CU2-20 5U	9/24/2002	11:34	1	2.30E+02	60	SCL	0		2.30E+02
32	CU2-20 6S	9/24/2002	11:36	1	1.84E+02	60	SCL	0	1.84E+02	
33	CU2-20 6U	9/24/2002	11:37	1	1.93E+02	60	SCL	0		1.93E+02
34	CU2-20 7S	9/24/2002	11:38	1	1.58E+02	60	SCL	0	1.58E+02	
35	CU2-20 7U	9/24/2002	11:39	1	1.86E+02	60	SCL	0		1.86E+02
36	CU2-20 8S	9/24/2002	11:40	1	1.78E+02	60	SCL	0	1.78E+02	
37	CU2-20 8U	9/24/2002	11:42	1	1.88E+02	60	SCL	0		1.88E+02
38	CU2-20 9S	9/24/2002	11:43	1	1.77E+02	60	SCL	0	1.77E+02	
39	CU2-20 9U	9/24/2002	11:44	1	1.66E+02	60	SCL	0		1.66E+02
40	CU2-20 10S	9/24/2002	11:46	1	1.60E+02	60	SCL	0	1.60E+02	
41	CU2-20 10U	9/24/2002	11:47	1	1.97E+02	60	SCL	0		1.97E+02
42	CV2-21 5SQ	9/24/2002	11:50	1	1.57E+02	60	SCL	0	Min	Min
43	CV2-21 5UQ	9/24/2002	11:51	1	2.20E+02	60	SCL	0	1.55E+02	1.66E+02
44	CV2-22 2SQ	9/24/2002	11:52	1	1.92E+02	60	SCL	0	Max	Max
45	CV2-22 2UQ	9/24/2002	11:54	1	3.04E+02	60	SCL	0	2.08E+02	3.67E+02
46	2ND SC CK	9/24/2002	12:43	1	1.77E+05	60	SCL	0		

LOGGED DATA DUMP COMPLETED.

* confirmed no shielded measurement 9/26/02 BWB

ATTACHMENT 4.1

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PRE-CLEANING SURVEY DATA

37122N28	80500	RJR9291							
	Location	Date	Time		Counts	Count Time	Mode		
0	BACKGROUND	9/24/2002	7:48	1	6.96E+03	1800	SCL	0	
1	SOURCE CK	9/24/2002	8:03	1	1.78E+05	60	SCL	0	Shielded	Unshielded
2	CV2-21 1S	9/24/2002	10:55	1	1.59E+02	60	SCL	0	1.59E+02	
3	CV2-21 1U	9/24/2002	10:56	1	2.05E+02	60	SCL	0		2.05E+02
4	CV2-21 2S	9/24/2002	10:58	1	1.81E+02	60	SCL	0	1.81E+02	
5	CV2-21 2U	9/24/2002	10:59	1	2.21E+02	60	SCL	0		2.21E+02
6	CV2-21 3S	9/24/2002	11:00	1	1.75E+02	60	SCL	0	1.75E+02	
7	CV2-21 3U	9/24/2002	11:01	1	2.14E+02	60	SCL	0		2.14E+02
8	CV2-21 4S	9/24/2002	11:02	1	1.51E+02	60	SCL	0	1.51E+02	
9	CV2-21 4U	9/24/2002	11:03	1	2.52E+02	60	SCL	0		2.52E+02
10	CV2-21 5S	9/24/2002	11:05	1	1.69E+02	60	SCL	0	1.69E+02	
11	CV2-21 5U	9/24/2002	11:06	1	2.29E+02	60	SCL	0		2.29E+02
12	CV2-21 6S	9/24/2002	11:07	1	1.82E+02	60	SCL	0	1.82E+02	
13	CV2-21 6U	9/24/2002	11:08	1	1.88E+02	60	SCL	0		1.88E+02
14	CV2-21 7S	9/24/2002	11:09	1	1.73E+02	60	SCL	0	1.73E+02	
15	CV2-21 7U	9/24/2002	11:10	1	2.44E+02	60	SCL	0		2.44E+02
16	CV2-21 8S	9/24/2002	11:11	1	1.84E+02	60	SCL	0	1.84E+02	
17	CV2-21 8U	9/24/2002	11:12	1	2.08E+02	60	SCL	0		2.08E+02
18	CV2-21 9S	9/24/2002	11:13	1	1.75E+02	60	SCL	0	1.75E+02	
19	CV2-21 9U	9/24/2002	11:14	1	2.68E+02	60	SCL	0		2.68E+02
20	CV2-21 10S	9/24/2002	11:15	1	1.87E+02	60	SCL	0	1.87E+02	
21	CV2-21 10U	9/24/2002	11:17	1	2.59E+02	60	SCL	0		2.59E+02
22	CV2-22 1S	9/24/2002	11:20	1	1.83E+02	60	SCL	0	1.83E+02	
23	CV2-22 1U	9/24/2002	11:21	1	2.40E+02	60	SCL	0		2.40E+02
24	CV2-22 2S	9/24/2002	11:22	1	2.07E+02	60	SCL	0	2.07E+02	
25	CV2-22 2U	9/24/2002	11:23	1	3.09E+02	60	SCL	0		3.09E+02
26	CV2-22 3S	9/24/2002	11:24	1	1.70E+02	60	SCL	0	1.70E+02	
27	CV2-22 3U	9/24/2002	11:25	1	2.29E+02	60	SCL	0		2.29E+02
28	CV2-22 4S	9/24/2002	11:27	1	1.63E+02	60	SCL	0	1.63E+02	
29	CV2-22 4U	9/24/2002	11:28	1	1.85E+02	60	SCL	0		1.85E+02
30	CV2-22 5S	9/24/2002	11:29	1	1.53E+02	60	SCL	0	1.53E+02	
31	CV2-22 5U	9/24/2002	11:30	1	2.05E+02	60	SCL	0		2.05E+02
32	CV2-22 6S	9/24/2002	11:31	1	1.45E+02	60	SCL	0	1.45E+02	
33	CV2-22 6U	9/24/2002	11:32	1	2.33E+02	60	SCL	0		2.33E+02
34	CV2-22 7S	9/24/2002	11:33	1	1.73E+02	60	SCL	0	1.73E+02	
35	CV2-22 7U	9/24/2002	11:34	1	2.35E+02	60	SCL	0		2.35E+02
36	CV2-22 8S	9/24/2002	11:35	1	1.79E+02	60	SCL	0	1.79E+02	
37	CV2-22 8U	9/24/2002	11:36	1	2.37E+02	60	SCL	0		2.37E+02
38	CV2-22 9S	9/24/2002	11:37	1	1.68E+02	60	SCL	0	1.68E+02	
39	CV2-22 9U	9/24/2002	11:39	1	2.24E+02	60	SCL	0		2.24E+02
40	CV2-22 10S	9/24/2002	11:40	1	1.59E+02	60	SCL	0	1.59E+02	
41	CV2-22 10U	9/24/2002	11:41	1	2.27E+02	60	SCL	0		2.27E+02
42	CV2-19 5SQ	9/24/2002	11:48	1	1.71E+02	60	SCL	0	Min	Min
43	CV2-19 5UQ	9/24/2002	11:49	1	2.16E+02	60	SCL	0	1.45E+02	1.85E+02
44	CV2-20 5SQ	9/24/2002	11:52	1	1.96E+02	60	SCL	0	Max	Max
45	CV2-20 5UQ	9/24/2002	11:53	1	1.99E+02	60	SCL	0	2.07E+02	3.09E+02
46	2ND SC CK	9/24/2002	12:39	1	1.79E+05	60	SCL	0		

LOGGED DATA DUMP COMPLETED.

ATTACHMENT 4.2

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POST CLEANING SURVEY DATA

37122N28	RLM6220	120583							
	Location	Date	Time			Count Time	Mode		
0	BACKGROUND	9/25/2002	7:33	1	6137.001	1800	SCL		
1	SOURCE CK	9/25/2002	7:46	1	1.51E+05	60	SCL	Shielded	Unshielded
2	CV2-19 1S	9/25/2002	13:18	1	1.58E+02	60	SCL	1.58E+02	
3	CV2-19 1U	9/25/2002	13:20	1	1.44E+02	60	SCL		1.44E+02
4	CV2-19 2S	9/25/2002	13:21	1	1.46E+02	60	SCL	1.46E+02	
5	CV2-19 2U	9/25/2002	13:26	1	1.26E+02	60	SCL		1.26E+02
6	CV2-19 3S	9/25/2002	13:25	1	1.42E+02	60	SCL	1.42E+02	
7	CV2-19 3U	9/25/2002	13:26	1	1.62E+02	60	SCL		1.62E+02
8	CV2-19 4S	9/25/2002	13:27	1	1.49E+02	60	SCL	1.49E+02	
9	CV2-19 4U	9/25/2002	13:28	1	1.58E+02	60	SCL		1.58E+02
10	CV2-19 5S	9/25/2002	13:29	1	1.59E+02	60	SCL	1.59E+02	
11	CV2-19 5U	9/25/2002	13:30	1	1.59E+02	60	SCL		1.59E+02
12	CV2-19 5S	9/25/2002	13:32	1	1.44E+02	60	SCL	1.44E+02	
13	CV2-19 6S	9/25/2002	13:34	1	1.50E+02	60	SCL	1.50E+02	
14	CV2-19 6U	9/25/2002	13:35	1	1.60E+02	60	SCL		1.60E+02
15	CV2-19 7S	9/25/2002	13:36	1	1.42E+02	60	SCL	1.42E+02	
16	CV2-19 7U	9/25/2002	13:37	1	1.57E+02	60	SCL		1.57E+02
17	CV2-19 8S	9/25/2002	13:38	1	1.25E+02	60	SCL	1.25E+02	
18	CV2-19 8U	9/25/2002	13:39	1	1.49E+02	60	SCL		1.49E+02
19	CV2-19 9S	9/25/2002	13:40	1	1.48E+02	60	SCL	1.48E+02	
20	CV2-19 9U	9/25/2002	13:41	1	1.52E+02	60	SCL		1.52E+02
21	CV2-19 10S	9/25/2002	13:42	1	1.11E+02	60	SCL	1.11E+02	
22	CV2-19 10U	9/25/2002	13:43	1	1.42E+02	60	SCL		1.42E+02
23	CV2-20 1S	9/25/2002	13:45	1	1.38E+02	60	SCL	1.38E+02	
24	CV2-20 1U	9/25/2002	13:46	1	1.41E+02	60	SCL		1.41E+02
25	CV2-20 2S	9/25/2002	13:47	1	1.66E+02	60	SCL	1.66E+02	
26	CV2-20 2U	9/25/2002	13:48	1	1.56E+02	60	SCL		1.56E+02
27	CV2-20 3S	9/25/2002	13:49	1	1.62E+02	60	SCL	1.62E+02	
28	CV2-20 3U	9/25/2002	13:50	1	1.67E+02	60	SCL		1.67E+02
29	CV2-20 4S	9/25/2002	13:51	1	1.50E+02	60	SCL	1.50E+02	
30	CV2-20 4U	9/25/2002	13:52	1	1.58E+02	60	SCL		1.58E+02
31	CV2-20 5S	9/25/2002	13:53	1	1.55E+02	60	SCL	1.55E+02	
32	CV2-20 5U	9/25/2002	13:55	1	1.38E+02	60	SCL		1.38E+02
33	CV2-20 6S	9/25/2002	13:56	1	1.64E+02	60	SCL	1.64E+02	
34	CV2-20 6U	9/25/2002	13:57	1	1.89E+02	60	SCL		1.89E+02
35	CV2-20 7S	9/25/2002	13:58	1	1.40E+02	60	SCL	1.40E+02	
36	CV2-20 7U	9/25/2002	13:59	1	1.68E+02	60	SCL		1.68E+02
37	CV2-20 8S	9/25/2002	14:00	1	1.44E+02	60	SCL	1.44E+02	
38	CV2-20 8U	9/25/2002	14:01	1	1.57E+02	60	SCL		1.57E+02
39	CV2-20 9S	9/25/2002	14:02	1	1.48E+02	60	SCL	1.48E+02	
40	CV2-20 9U	9/25/2002	14:03	1	1.68E+02	60	SCL		1.68E+02
41	CV2-20 10S	9/25/2002	14:04	1	1.48E+02	60	SCL	1.48E+02	
42	CV2-20 10U	9/25/2002	14:06	1	1.49E+02	60	SCL		1.49E+02
43	CV2-21 1SQ	9/25/2002	14:07	1	1.45E+02	60	SCL	Min	Min
44	CV2-21 1UQ	9/25/2002	14:08	1	1.58E+02	60	SCL	1.11E+02	1.26E+02
45	CV2-22 5SQ	9/25/2002	14:17	1	1.58E+02	60	SCL	Max	Max
46	CV2-22 5UQ	9/25/2002	14:18	1	1.38E+02	60	SCL	1.66E+02	1.89E+02
47	2ND SC CK	9/25/2002	14:59	1	1.49E+05	60	SCL		

LOGGED DATA DUMP COMPLETED.

ATTACHMENT 5.1

6900-02-024 B. Brun 17 of 38

POST CLEANING SURVEY DATA

37122N21	RJR9291	126196							
	Location	Date	Time			Count Time	Mode		
0	BACKROUND	9/25/2002	7:39	1	7.45E+03	1800	SCL		
1	SOURCE CK	9/25/2002	7:58	1	1.79E+05	60	SCL	Shielded	Unshielded
2	CV2-21 1S	9/25/2002	13:23	1	1.75E+02	60	SCL	1.75E+02	
3	CV2-21 1U	9/25/2002	13:24	1	1.93E+02	60	SCL		1.93E+02
4	CV2-21 2S	9/25/2002	13:26	1	1.45E+02	60	SCL	1.45E+02	
5	CV2-21 2U	9/25/2002	13:27	1	1.73E+02	60	SCL		1.73E+02
6	CV2-21 3S	9/25/2002	13:28	1	1.54E+02	60	SCL	1.54E+02	
7	CV2-21 3U	9/25/2002	13:29	1	1.77E+02	60	SCL		1.77E+02
8	CV2-21 4S	9/25/2002	13:30	1	1.73E+02	60	SCL	1.73E+02	
9	CV2-21 4U	9/25/2002	13:31	1	1.73E+02	60	SCL		1.73E+02
10	CV2-21 5S	9/25/2002	13:33	1	1.76E+02	60	SCL	1.76E+02	
11	CV2-21 5U	9/25/2002	13:34	1	1.80E+02	60	SCL		1.80E+02
12	CV2-21 6S	9/25/2002	13:35	1	1.75E+02	60	SCL	1.75E+02	
13	CV2-21 6U	9/25/2002	13:36	1	1.61E+02	60	SCL		1.61E+02
14	CV2-21 7S	9/25/2002	13:37	1	1.75E+02	60	SCL	1.75E+02	
15	CV2-21 7U	9/25/2002	13:38	1	1.77E+02	60	SCL		1.77E+02
16	CV2-21 8S	9/25/2002	13:39	1	1.80E+02	60	SCL	1.80E+02	
17	CV2-21 8U	9/25/2002	13:40	1	2.02E+02	60	SCL		2.02E+02
18	CV2-21 9S	9/25/2002	13:42	1	1.74E+02	60	SCL	1.74E+02	
19	CV2-21 9U	9/25/2002	13:43	1	1.67E+02	60	SCL		1.67E+02
20	CV2-21 10S	9/25/2002	13:44	1	1.76E+02	60	SCL	1.76E+02	
21	CV2-21 10U	9/25/2002	13:45	1	2.03E+02	60	SCL		2.03E+02
22	CV2-22 1S	9/25/2002	13:56	1	1.78E+02	60	SCL	1.78E+02	
23	CV2-22 1U	9/25/2002	13:57	1	1.68E+02	60	SCL		1.68E+02
24	CV2-22 2S	9/25/2002	13:58	1	2.04E+02	60	SCL	2.04E+02	
25	CV2-22 2U	9/25/2002	13:59	1	1.88E+02	60	SCL		1.88E+02
26	CV2-22 3S	9/25/2002	14:00	1	1.80E+02	60	SCL	1.80E+02	
27	CV2-22 3U	9/25/2002	14:02	1	1.73E+02	60	SCL		-1.73E+02
28	CV2-22 4S	9/25/2002	14:03	1	1.95E+02	60	SCL	1.95E+02	
29	CV2-22 4U	9/25/2002	14:04	1	1.65E+02	60	SCL		1.65E+02
30	CV2-22 5S	9/25/2002	14:05	1	1.98E+02	60	SCL	1.98E+02	
31	CV2-22 5U	9/25/2002	14:06	1	1.58E+02	60	SCL		1.58E+02
32	CV2-22 6S	9/25/2002	14:07	1	1.68E+02	60	SCL	1.68E+02	
33	CV2-22 6U	9/25/2002	14:08	1	1.73E+02	60	SCL		1.73E+02
34	CV2-22 7S	9/25/2002	14:09	1	1.76E+02	60	SCL	1.76E+02	
35	CV2-22 7U	9/25/2002	14:10	1	1.70E+02	60	SCL		1.70E+02
36	CV2-22 8S	9/25/2002	14:12	1	1.74E+02	60	SCL	1.74E+02	
37	CV2-22 8U	9/25/2002	14:13	1	1.94E+02	60	SCL		1.94E+02
38	CV2-22 9S	9/25/2002	14:14	1	1.70E+02	60	SCL	1.70E+02	
39	CV2-22 9U	9/25/2002	14:15	1	1.92E+02	60	SCL		1.92E+02
40	CV2-22 10S	9/25/2002	14:16	1	1.52E+02	60	SCL	1.52E+02	
41	CV2-22 10U	9/25/2002	14:17	1	1.75E+02	60	SCL		1.75E+02
42	CV2-19 5SQ	9/25/2002	14:22	1	1.62E+02	60	SCL	Min	Min
43	CV2-19 5UQ	9/25/2002	14:23	1	1.67E+02	60	SCL	1.45E+02	1.58E+02
44	CV2-20 5SQ	9/25/2002	14:25	1	2.04E+02	60	SCL	Max	Max
45	CV2-20 5UQ	9/25/2002	14:27	1	1.82E+02	60	SCL	2.04E+02	2.03E+02
46	2ND SC CK	9/25/2002	14:56	1	1.80E+05	60	SCL		
LOGGED DATA DUMP COMPLETED.									

ATTACHMENT 5.2

B. Brun
10 & 38
6900-02-024

StatMost for Windows Thursday, September 26, 2002 12:31:16 AM

********** Statistics Report **********

Post-A-Shielded

Sample size (N)	11
Num missings	0
Minimum	111.0000
Maximum	159.0000
Std deviation	13.9675
Variance	195.0909
Mean	143.0909
Geometric mean	142.4152
Quadratic mean	143.7093
Harmonic mean	141.6786
Sum	1574.0000
Absolute Sum	1574.0000
Median	146.0000
Percentiles:	
10	113.8000
25	142.0000
50	146.0000
75	150.0000
90	158.8000
Quartiles:	
First quartile:	142.0000
Second quartile:	146.0000
Third quartile:	150.0000
95.00% Confidence Interval:	
lower limit	133.7074
upper limit	152.4744

********** The End **********

ATTACHMENT 6-1

B. Brun
19 & 38
6900-02-024

StatMost for Windows Thursday, September 26, 2002 12:31:43 AM

********** Statistics Report **********

Post-A-Unshielded

Sample size (N)	10
Num missings	0
Minimum	126.0000
Maximum	162.0000
Std deviation	11.0574
Variance	122.2667
Mean	150.6000
Geometric mean	150.2132
Quadratic mean	150.9649
Harmonic mean	149.8039
Sum	1506.0000
Absolute Sum	1506.0000
Median	154.0000
Percentiles:	
10	140.4000
25	144.5000
50	154.0000
75	158.5000
90	160.2000
Quartiles:	
First quartile:	144.5000
Second quartile:	154.0000
Third quartile:	158.5000
95.00% Confidence Interval:	
lower limit	142.6900
upper limit	158.5100

********** The End **********

ATTACHMENT 6.2

B. Bonn
20 & 38
6900-02-024

StatMost for Windows Thursday, September 26, 2002 12:32:07 AM

********** Statistics Report **********

	Post-B-Shielded
Sample size (N)	10
Num missings	0
Minimum	138.0000
Maximum	166.0000
Std deviation	9.9247
Variance	98.5000
Mean	151.5000
Geometric mean	151.2092
Quadratic mean	151.7923
Harmonic mean	150.9207
Sum	1515.0000
Absolute Sum	1515.0000
Median	149.0000
Percentiles:	
10	139.8000
25	145.0000
50	149.0000
75	160.2500
90	164.2000
Quartiles:	
First quartile:	145.0000
Second quartile:	149.0000
Third quartile:	160.2500
95.00% Confidence Interval:	
lower limit	144.4003
upper limit	158.5997

********** The End **********

ATTACHMENT 6.3

B. Brown
21 of 38
6100-02-024

StatMost for Windows Thursday, September 26, 2002 12:32:22 AM

********** Statistics Report **********

Post-B-Unshielded

Sample size (N)	10
Num missings	0
Minimum	138.0000
Maximum	189.0000
Std deviation	14.9254
Variance	222.7667
Mean	159.1000
Geometric mean	158.4807
Quadratic mean	159.7288
Harmonic mean	157.8717
Sum	1591.0000
Absolute Sum	1591.0000
Median	157.5000
Percentiles:	
10	140.7000
25	150.7500
50	157.5000
75	167.7500
90	170.1000
Quartiles:	
First quartile:	150.7500
Second quartile:	157.5000
Third quartile:	167.7500
95.00% Confidence Interval:	
lower limit	148.4230
upper limit	169.7770

********** The End **********

ATTACHMENT 6.4

B. Brown
22 of 38
6900-02-024

StatMost for Windows Thursday, September 26, 2002 12:32:38 AM

********** Statistics Report **********

Post-C-Shielded

Sample size (N)	10
Num missings	0
Minimum	145.0000
Maximum	180.0000
Std deviation	11.3142
Variance	128.0111
Mean	170.3000
Geometric mean	169.9376
Quadratic mean	170.6379
Harmonic mean	169.5502
Sum	1703.0000
Absolute Sum	1703.0000
Median	175.0000
Percentiles:	
10	153.1000
25	173.2500
50	175.0000
75	175.7500
90	176.4000
Quartiles:	
First quartile:	173.2500
Second quartile:	175.0000
Third quartile:	175.7500
95.00% Confidence Interval:	
lower limit	162.2063
upper limit	178.3937

********** The End **********

ATTACHMENT 6.5

B. Bm
23 & 38
6900-02-024

StatMost for Windows Thursday, September 26, 2002 12:32:52 AM

********** Statistics Report **********

Post-C-Unshielded

Sample size (N)	10
Num missings	0
Minimum	161.0000
Maximum	203.0000
Std deviation	14.2377
Variance	202.7111
Mean	180.6000
Geometric mean	180.1050
Quadratic mean	181.1044
Harmonic mean	179.6208
Sum	1806.0000
Absolute Sum	1806.0000
Median	177.0000
Percentiles:	
10	166.4000
25	173.0000
50	177.0000
75	189.7500
90	202.1000
Quartiles:	
First quartile:	173.0000
Second quartile:	177.0000
Third quartile:	189.7500
95.00% Confidence Interval:	
lower limit	170.4150
upper limit	190.7850

********** The End **********

ATTACHMENT 6.6

B. Brown
24 & 38
6900-02-024

StatMost for Windows Thursday, September 26, 2002 12:33:09 AM

********** Statistics Report **********

Post-D-Shielded

Sample size (N)	10
Num missings	0
Minimum	152.0000
Maximum	204.0000
Std deviation	15.6578
Variance	245.1667
Mean	179.5000
Geometric mean	178.8828
Quadratic mean	180.1136
Harmonic mean	178.2632
Sum	1795.0000
Absolute Sum	1795.0000
Median	177.0000
Percentiles:	
10	166.4000
25	171.0000
50	177.0000
75	191.2500
90	198.6000
Quartiles:	
First quartile:	171.0000
Second quartile:	177.0000
Third quartile:	191.2500
95.00% Confidence Interval:	
lower limit	168.2991
upper limit	190.7009

********** The End **********

ATTACHMENT 6.7

B. Brown
25 of 38
6900-02-024

StatMost for Windows Thursday, September 26, 2002 12:41:48 AM

********** Statistics Report **********

Post-D-Unshielded

Sample size (N)	10
Num missings	0
Minimum	158.0000
Maximum	194.0000
Std deviation	11.9555
Variance	142.9333
Mean	175.6000
Geometric mean	175.2383
Quadratic mean	175.9659
Harmonic mean	174.8816
Sum	1756.0000
Absolute Sum	1756.0000
Median	173.0000
Percentiles:	
10	164.3000
25	168.5000
50	173.0000
75	184.7500
90	192.2000
Quartiles:	
First quartile:	168.5000
Second quartile:	173.0000
Third quartile:	184.7500
95.00% Confidence Interval:	
lower limit	167.0476
upper limit	184.1524

********** The End **********

ATTACHMENT 6.8

B. Brum
26 of 38
4900-02-024

Table 5-15A
Area Factors For Structural Surfaces
(Based on NRC Screening Values - see Table 5-1)

Nuclide	36 m^2	25 m^2	16 m^2	9 m^2	4 m^2	1 m^2
Am-241	1	1.5	2.3	4.1	9.2	36.2
C-14	1	1.4	2.2	4.0	8.9	35.9
Co-60	1	1.2	1.5	2.0	3.4	10.1
Cs-137	1	1.2	1.5	2.2	3.7	11.2
Eu-152	1	1.2	1.5	2.1	3.5	10.7
H-3	1	1.4	2.2	4.0	8.9	35.8
Ni-63	1	1.4	2.2	4.0	9.0	35.3
Pu-238	1	1.4	2.3	4.0	9.1	36.9
Pu-239	1	1.4	2.2	4.0	9.0	35.4
Pu-241	1	1.4	2.2	4.0	9.0	34.8
Sr-90	1	1.4	2.2	1.5	8.8	34.7

NOTE: DCGL is in dpm/100 cm^2

ATTACHMENT 7.1

B. Burns
27 of 38
6900-02-024

Site Report

Site Summary

Site Name: 774 ft El CV Ring Areas

Planner(s): BHB

Contaminant Summary

NOTE: Surface soil DCGLw units are pCi/g.
Building surface DCGLw units are dpm/100 cm².

Contaminant	Type	DCGLw	Screening Value Used?	Area (m²)	Area Factor
Cs-137	Building Surface	2,100	No	0.1	10.1
				0.5	10.1
				1	10.1

.3 N 3
9/26/02

ATTACHMENT 7.2

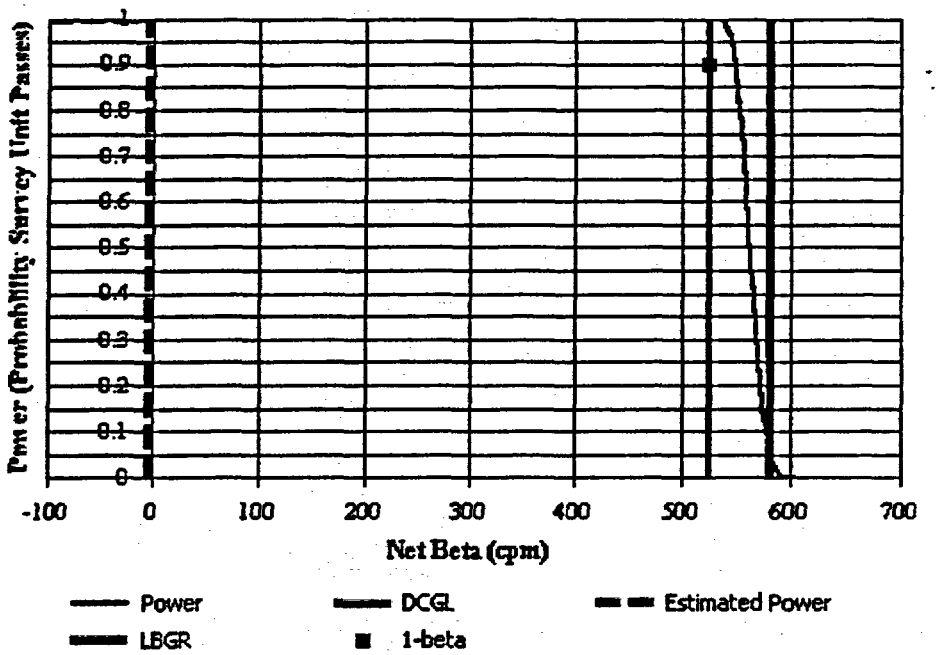
B. Brunson
28 & 38
6900-02-024

Building Surface Survey Plan

Survey Plan Summary

Site:	774 ft El CV Ring Areas		
Planner(s):	BHB		
Survey Unit Name:	774 ft El of SNEC CV - Internal Surface QAD A		
Comments:			
Area (m^2):	3	Classification:	1
Selected Test:	WRS	Estimated Sigma (cpm):	23.3
DCGL (cpm):	582	Sample Size (N/2):	9
LBGR (cpm):	525	Estimated Conc. (cpm):	-3.8
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100	EMC Sample Size (N):	9

Prospective Power Curve



ATTACHMENT 8 - 1

B. Brun 29 & 38
6900-02-024

Building Surface Survey Plan

Contaminant Summary

Contaminant	DCGLw (dpm/100 cm²)
Cs-137	2,100

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 2,100
Total Efficiency: 0.22
Gross Beta DCGLw (cpm): 582

ID	Type	Mode	Area (cm²)
16	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Cs-137	187.87	1.0000	0.90	0.25	0.2250

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

Gross Survey Unit Mean (cpm): 151 ± 11 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Steel	58	154.4	23.3	219

ATTACHMENT 8.2

B. Burns 30 & 38

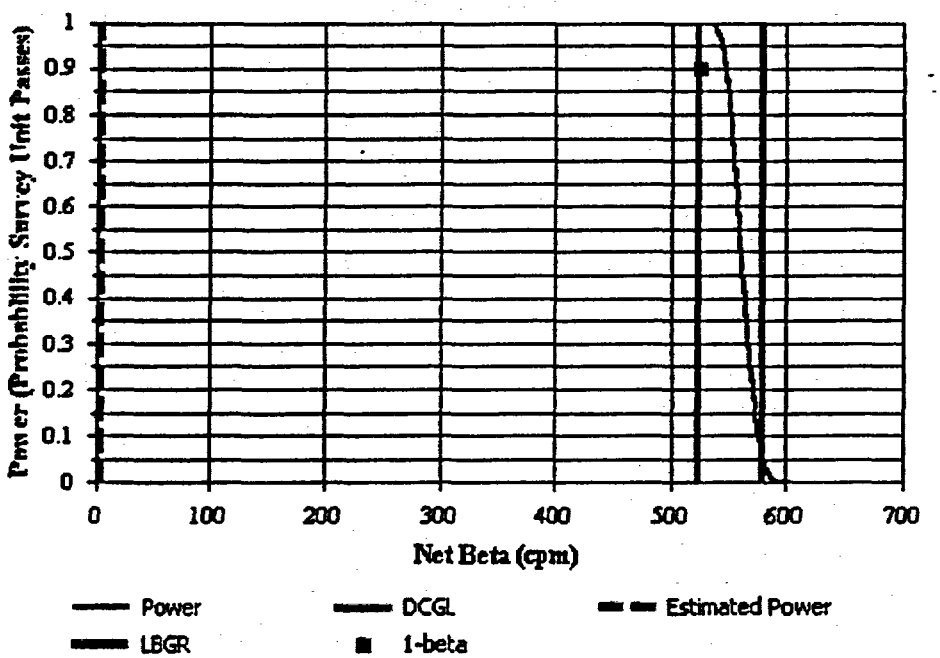
6900-02-024

Building Surface Survey Plan

Survey Plan Summary

Site:	774 ft El CV Ring Areas		
Planner(s):	BHB		
Survey Unit Name:	774 ft El of SNEC CV - Internal Surface QAD B		
Comments:			
Area (m^2):	3	Classification:	1
Selected Test:	WRS	Estimated Sigma (cpm):	23.3
DCGL (cpm):	582	Sample Size (N/2):	9
LBGR (cpm):	525	Estimated Conc. (cpm):	4.7
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100	EMC Sample Size (N):	9

Prospective Power Curve



ATTACHMENT 8.3

B. Brun 31 & 38
6900-02-024

Building Surface Survey Plan

Contaminant Summary

Contaminant	DCGLw (dpm/100 cm²)
Cs-137	2,100

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 2,100
Total Efficiency: 0.22
Gross Beta DCGLw (cpm): 582

ID	Type	Mode	Area (cm²)
16	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Cs-137	187.87	1.0000	0.90	0.25	0.2250

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

Gross Survey Unit Mean (cpm): 159 ± 15 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Steel	58	154.4	23.3	219

ATTACHMENT 8.4

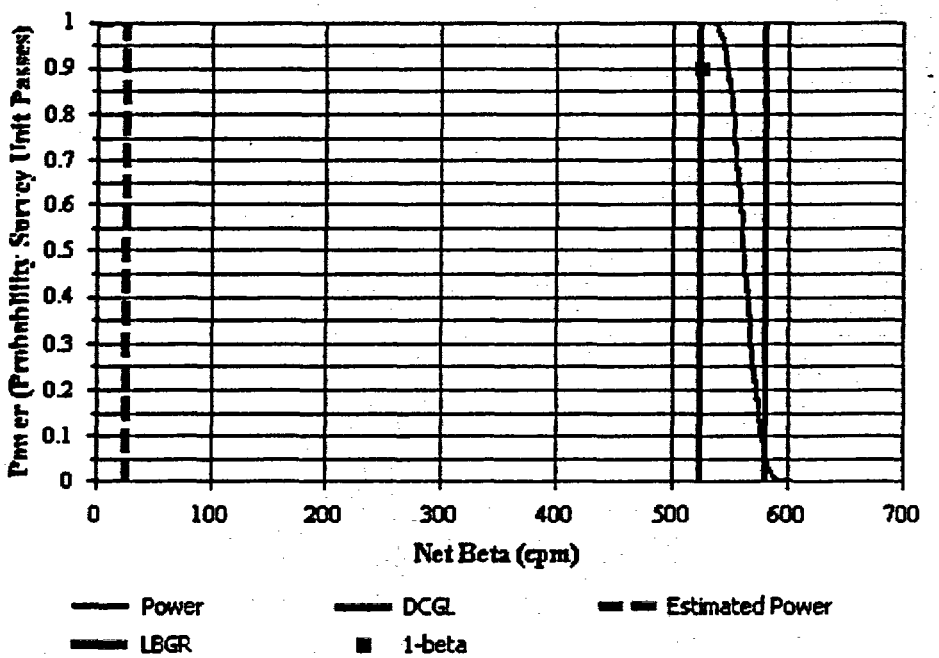
B. Burns 32 of 38
6900-02-024

Building Surface Survey Plan

Survey Plan Summary

Site:	774 ft El CV Ring Areas		
Planner(s):	BHB		
Survey Unit Name:	774 ft El of SNEC Cv - Internal Surface QAD C		
Comments:			
Area (m²):	3	Classification:	1
Selected Test:	WRS	Estimated Sigma (cpm):	23.3
DCGL (cpm):	582	Sample Size (N/2):	9
LBGR (cpm):	525	Estimated Conc. (cpm):	26.2
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100	EMC Sample Size (N):	9

Prospective Power Curve



ATTACHMENT 8.5

B. Bunn 6/58
33 & 6906-02-024

Building Surface Survey Plan

Contaminant Summary

Contaminant	DCGLw (dpm/100 cm²)
Cs-137	2,100

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 2,100
Total Efficiency: 0.22
Gross Beta DCGLw (cpm): 582

ID	Type	Mode	Area (cm²)
16	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Cs-137	187.87	1.0000	0.90	0.25	0.2250

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

Gross Survey Unit Mean (cpm): 161 ± 14 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Steel	58	154.4	23.3	219

ATTACHMENT 8.6

B. Bm 34 & 38

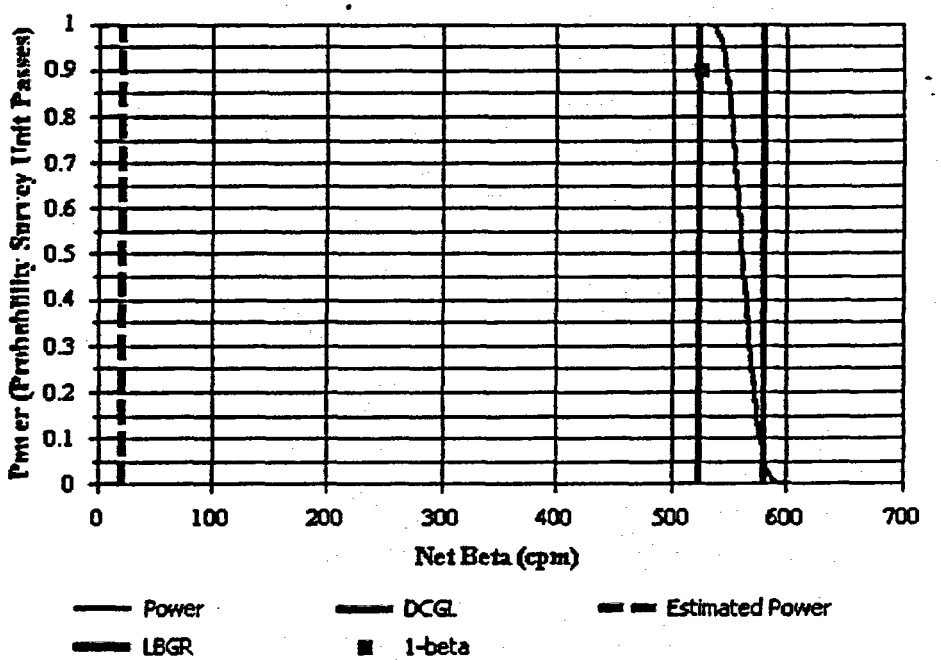
6900-02-029

Building Surface Survey Plan

Survey Plan Summary

Site:	774 ft El CV Ring Areas		
Planner(s):	BHB		
Survey Unit Name:	774 ft El of SNEC CV - Internal Surface QAD D		
Comments:			
Area (m²):	3	Classification:	1
Selected Test:	WRS	Estimated Sigma (cpm):	23.3
DCGL (cpm):	582	Sample Size (N/2):	9
LBGR (cpm):	525	Estimated Conc. (cpm):	21.2
Alpha:	0.050	Estimated Power:	1.00
Beta:	0.100	EMC Sample Size (N):	9

Prospective Power Curve



ATTACHMENT 8.7

B. B 35 & 38

6900-02-024

Building Surface Survey Plan

Contaminant Summary

Contaminant	DCGLw (dpm/100 cm²)
Cs-137	2,100

Beta Instrumentation Summary

Gross Beta DCGLw (dpm/100 cm²): 2,100
Total Efficiency: 0.22
Gross Beta DCGLw (cpm): 582

ID	Type	Mode	Area (cm²)
16	GFPC	Beta	126

Contaminant	Energy[1]	Fraction[2]	Inst. Eff.	Surf. Eff.	Total Eff.
Cs-137	187.87	1.0000	0.90	0.25	0.2250

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

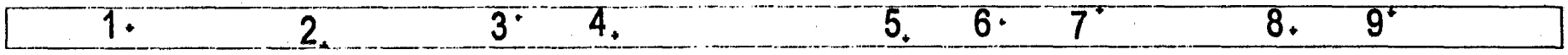
Gross Survey Unit Mean (cpm): 176 ± 12 (1-sigma)
Count Time (min): 1

Material	Number of BKG Counts	Average (cpm)	Standard Deviation (cpm)	MDC (dpm/100 cm²)
Steel	58	154.4	23.3	219

ATTACHMENT 8.8

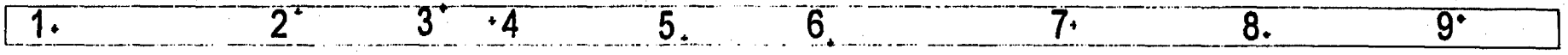
774' El CV Ring Survey Area - QAD A

~3 square Meters (~471 by 10 in)



774' El CV Ring Survey Area - QAD B

~3 square Meters (~471 by 10 in)

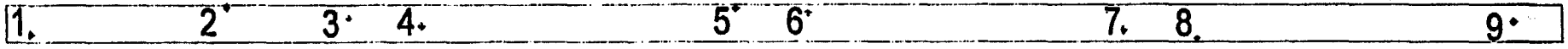


ATTACHMENT 9.1

B. Brunz
26 of 38
6996-02-024

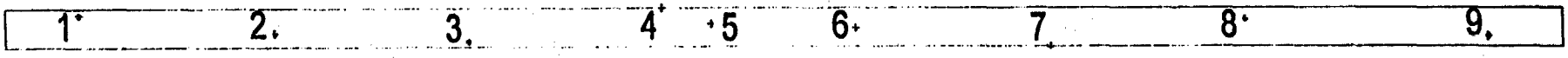
774' El CV Ring Survey Area - QAD C

~3 square Meters (~471 by 10 in)



774' El CV Ring Survey Area - QAD D

~3 square Meters (~471 by 10 in)



ATTACHMENT 9.2

B. Bemis 4-58
QAD-02-04

STATIC SURVEY POINT COORDINATES - QAD A

Survey Point No.	Inches X - Coordinate	Inches Y - Coordinate	Feet X - Coordinate	Inches X - Coordinate	Fractional Inches X - Coordinate	Feet Y - Coordinate	Inches Y - Coordinate	Fractional Inches Y - Coordinate	[illegible] X Coordinate	[illegible] Y Coordinate
1	36.85	5.08	3	0.0	27/32	0	5.0	5/64	[illegible]	[illegible]
2	95.82	0.63	7	11	13/16	0	0	5/8	[illegible]	[illegible]
3	154.79	7.31	12	10	25/32	0	7	19/64	[illegible]	[illegible]
4	184.28	2.86	15	4	17/64	0	2	55/64	[illegible]	[illegible]
5	272.73	1.74	22	8	23/32	0	1	47/64	[illegible]	[illegible]
6	302.22	6.19	25	2	7/32	0	6	3/16	[illegible]	[illegible]
7	331.70	9.16	27	7	11/16	0	9	5/32	[illegible]	[illegible]
8	390.67	3.97	32	6	21/32	0	3	31/32	[illegible]	[illegible]
9	420.15	8.42	35	0	9/64	0	8	13/32	[illegible]	[illegible]

STATIC SURVEY POINT COORDINATES - QAD B

Survey Point No.	Inches X - Coordinate	Inches Y - Coordinate	Feet X - Coordinate	Inches X - Coordinate	Fractional Inches X - Coordinate	Feet Y - Coordinate	Inches Y - Coordinate	Fractional Inches Y - Coordinate	[illegible] X Coordinate	[illegible] Y Coordinate
1	14.74	4.09	1	2	47/64	0	4	5/64	[illegible]	[illegible]
2	88.45	8.54	7	4	7/16	0	8	17/32	[illegible]	[illegible]
3	132.68	9.28	11	0	43/64	0	9	17/64	[illegible]	[illegible]
4	147.42	6.32	12	3	13/32	0	6	5/16	[illegible]	[illegible]
5	206.39	1.87	17	2	3/8	0	1	55/64	[illegible]	[illegible]
6	250.62	0.75	20	10	39/64	0	0	3/4	[illegible]	[illegible]
7	324.33	5.20	27	0	21/64	0	5	3/16	[illegible]	[illegible]
8	383.30	2.98	31	11	19/64	0	2	31/32	[illegible]	[illegible]
9	442.27	7.43	36	10	17/64	0	7	27/64	[illegible]	[illegible]

STATIC SURVEY POINT COORDINATES - QAD C

Survey Point No.	Inches X - Coordinate	Inches Y - Coordinate	Feet X - Coordinate	Inches X - Coordinate	Fractional Inches X - Coordinate	Feet Y - Coordinate	Inches Y - Coordinate	Fractional Inches Y - Coordinate	[illegible] X Coordinate	[illegible] Y Coordinate
1	7.37	2.11	0	7	23/64	0	2	7/64	[illegible]	[illegible]
2	66.34	9.53	5	6	21/64	0	9	33/64	[illegible]	[illegible]
3	103.19	6.56	8	7	3/16	0	6	35/64	[illegible]	[illegible]
4	125.31	4.34	10	5	19/64	0	4	21/64	[illegible]	[illegible]
5	221.13	8.79	18	5	1/8	0	8	25/32	[illegible]	[illegible]
6	243.25	7.68	20	3	1/4	0	7	43/64	[illegible]	[illegible]
7	339.07	3.23	28	3	1/16	0	3	7/32	[illegible]	[illegible]
8	361.19	1.00	30	1	3/16	0	1	0	[illegible]	[illegible]
9	457.01	5.45	38	1	0	0	5	7/16	[illegible]	[illegible]

STATIC SURVEY POINT COORDINATES - QAD D

Survey Point No.	Inches X - Coordinate	Inches Y - Coordinate	Feet X - Coordinate	Inches X - Coordinate	Fractional Inches X - Coordinate	Feet Y - Coordinate	Inches Y - Coordinate	Fractional Inches Y - Coordinate	[illegible] X Coordinate	[illegible] Y Coordinate
1	22.11	8.05	1	10	7/64	0	8	3/64	[illegible]	[illegible]
2	81.08	3.60	6	9	5/64	0	3	19/32	[illegible]	[illegible]
3	140.05	1.37	11	8	3/64	0	1	23/64	[illegible]	[illegible]
4	199.02	9.78	16	7	1/64	0	9	49/64	[illegible]	[illegible]
5	213.76	5.82	17	9	3/4	0	5	13/16	[illegible]	[illegible]
6	257.99	4.71	21	5	63/64	0	4	45/64	[illegible]	[illegible]
7	316.96	0.26	26	4	61/64	0	0	1/4	[illegible]	[illegible]
8	375.93	6.94	31	3	59/64	0	6	15/16	[illegible]	[illegible]
9	449.64	2.48	37	5	5/8	0	2	15/32	[illegible]	[illegible]

ATTACHMENT 10. 1

B. Brown 38 of 38 9-20-24