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Trojan Nuclear Plant
License NPF-1
Docket 50-344

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Trojan Nuclear Plant Final Survey Report
for Spent Fuel Pool (SFP) Impacted Areas

The enclosure to this letter provides Portland General Electric Company's Final Survey Report for the Trojan Nuclear Plant SFP Impacted Areas. The report is presented in two volumes. The first volume is the main report documenting the results and conclusions of the final survey of the SFP Impacted Areas. The second volume is a supplement to the main report that provides scan measurement data and survey maps documenting where scan surveys were performed in each survey unit.

Data collection for the final survey of these areas began in August 2004 and was completed in November 2004. The report documents the results and conclusions of the survey, and was prepared in accordance with guidance and requirements contained in the following:

- Portland General Electric Topical Report PGE 1061, *Trojan Nuclear Plant Defueled Safety Analysis Report and License Termination Plan (PGE-1078)*,
- NUREG 1727, *NMSS Decommissioning Standard Review Plan*, Section 14.5 [Superceded by NUREG 1757 in September 2003],
- NUREG 1575, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, Section 8.6, and
- NUREG 1757, Volume 2, *Consolidated NMSS Decommissioning Guidance – Characterization, Survey, and Determination of Radiological Criteria*, Section 4.5

The attachment to this letter indicates where each of the requirements in the documents listed above is addressed.

NMSS01

The data collected during final survey demonstrate that each survey unit of SFP Impacted Areas meets the radiological criteria for unrestricted use specified in 10 CFR 20.1402. On that basis, Portland General Electric Company has concluded that each of these areas meets regulatory requirements for release to unrestricted use.

To support Portland General Electric Company's plans to have its Trojan Nuclear Plant license terminated in 2005 per 10 CFR 50.82(a)(11), it is requested that the Nuclear Regulatory Commission review this data package for acceptance of this portion of the site final radiological survey.

Should you have any questions concerning this matter, please contact Mr. Jerry D. Reid of my staff at (503) 556-6474.

Sincerely,

Stephen M. Quennoz
Vice President, Generation

Attachment
Enclosure

c: Director, NRC Region IV/DNMS
J. T. Buckley, NMSS/DWM/DCB (3 Copies)
R. J. Evans, NRC Region IV/DNMS/FCDB
D. Stewart-Smith, ODOE
A. Bless, ODOE
M. Dibblee, EFSC

Guidance/Requirement	Source	Where Addressed
... a final survey report will be prepared which summarizes the data and documents the conclusion that the TNP facility and site meet the 10 CFR 20.1402 release criteria and can be released for unrestricted use.	PGE 1061 – Trojan License Termination Plan – Section 4.1.3	Final Survey Report – Section 1.1, Section 5
... and in the final survey report. The final survey report is prepared which summarizes the data and states the conclusions.	PGE 1061 – Trojan License Termination Plan – Section 4.2.5.5	Final Survey Report – Section 1.1, Section 5
The report will provide a summary of the ALARA evaluations.	PGE 1061 – Trojan License Termination Plan – Section 4.7.3	Final Survey Report – Section 4.2.4, Table 4-1
The report will provide a summary of the survey data results.	PGE 1061 – Trojan License Termination Plan – Section 4.7.3	Final Survey Report –Section 3, Table 3-1, Table 3-2
The report will provide a summary of the overall conclusions.	PGE 1061 – Trojan License Termination Plan – Section 4.7.3	Final Survey Report –Section 5, Table 4-1
Information such as the number and type of measurements...will be included in the report.	PGE 1061 – Trojan License Termination Plan – Section 4.7.3	Final Survey Report – Section 3, Table 3-1, Appendix B
Information such as basic statistical quantities...will be included in the report.	PGE 1061 – Trojan License Termination Plan – Section 4.7.3	Final Survey Report – Appendix B
Information such as statistical test results...will be included in the report.	PGE 1061 – Trojan License Termination Plan – Section 4.7.3	Final Survey Report – Appendix B
The information should include: An overview of the results of the final status survey.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report –Section 3, Table 3-1

Guidance/Requirement	Source	Where Addressed
The information should include: A discussion of any changes that were made in the final status survey from what was proposed in the Decommissioning Plan or other prior submittals.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	N/A. Survey performed in accordance with PGE 1061 - Trojan License Termination Plan.
The information should include: A description of the method by which the number of samples was determined for each survey unit.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report –Section 2.3.2.2, Section 4.1.3.3
The information should include: A summary of the values used to determine the number of samples and a justification for these values.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	PGE 1061 - Trojan License Termination Plan – Section 4.4.3.1, Appendix 4-2
The information should include: The survey results for each survey unit including: The number of samples taken for each survey unit.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report – Appendix B
The information should include: The survey results for each survey unit including: A map or drawing of the survey unit showing the reference system and random start systematic sample locations for Class 1 and Class 2 survey units, and random locations shown for Class 3 survey units and reference areas.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report – Appendix B

Guidance/Requirement	Source	Where Addressed
The information should include: The survey results for each survey unit including: The measured sample concentrations.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report – Appendix B
The information should include: The survey results for each survey unit including: The statistical evaluation of the measured concentrations.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report – Appendix B
The information should include: The survey results for each survey unit including: Judgmental and miscellaneous sample data sets reported separately from those samples collected for performing the statistical evaluation.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report – Appendix B, Supplement
The information should include: The survey results for each survey unit including: A discussion of anomalous data including any areas of elevated direct radiation detected during scanning that exceeded the investigation level or measurement locations in excess of the $DCGL_w$.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report – Sections 2.4.2 and 2.4.3, Table 3-1, Table 3-2, Appendix B

Guidance/Requirement	Source	Where Addressed
The information should include: The survey results for each survey unit including: A statement that a given survey unit satisfied the $DCGL_w$ and the elevated measurement comparison if any sample points exceeded the $DCGL_w$.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report – Sections 4.2 and 5, Table 4-1
The information should include: A description of any changes in initial survey unit assumptions relative to the extent of residual radioactivity.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	Final Survey Report – N/A
The information should include: If a survey unit fails, a description of the investigation conducted to ascertain the reason for the failure and a discussion of the impact that the failure has on the conclusion that the facility is ready for final radiological surveys.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	N/A
The information should include: If a survey unit fails, a discussion of the impact that the reason for the failure has on other survey unit information.	NUREG 1727 – NMSS Decommissioning Standard Review Plan, Rev 0, Section 14.5	N/A
Documentation of the final status survey should provide a complete and unambiguous record of the radiological status of the survey unit relative to the established DCGLs.	NUREG 1575 MARSSIM – Section 8.6	Final Survey Report – Section 4.2, Table 4-1

Guidance/Requirement	Source	Where Addressed
Sufficient data and information should be provided to enable an independent evaluation of the results of the survey including repeating measurements at some future time.	NUREG 1575 MARSSIM – Section 8.6	Final Survey Report – Appendix B, Supplement
The document should describe the instrumentation or analytical methods used.	NUREG 1575 MARSSIM – Section 8.6	Final Survey Report – Section 2.2
The document should describe how the data were converted into DCGL units.	NUREG 1575 MARSSIM – Section 8.6	Final Survey Report – Section 2.4.4
The document should describe the process of comparing the results to the DCGLs.	NUREG 1575 MARSSIM – Section 8.6	Final Survey Report – Section 4.2
The document should describe the process of determining that the data quality objectives were met.	NUREG 1575 MARSSIM – Section 8.6	Final Survey Report – Section 4.1
The results of actions taken as a consequence of individual measurements or sample concentrations in excess of the investigation levels should be reported together with any additional data, remediation, or re-surveys performed to demonstrate that issues concerning potential areas of elevated activity were resolved.	NUREG 1575 MARSSIM – Section 8.6	Final Survey Report – Sections 2.4.2 and 2.4.3, Table 3-2, Appendix B

Guidance/Requirement	Source	Where Addressed
The results of the data evaluation using statistical methods to determine if release criteria were satisfied should be described.	NUREG 1575 MARSSIM – Section 8.6	Final Survey Report – Section 4.1.3
The information should include: An overview of the results of the FSS.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Section 3, Table 3-1
The information should include: A summary of the DCGLs for the facility (if DCGLs are used).	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Sections 1.3.2 and 4.2.2 (Appendix B also lists the DCGL for each survey unit.)
The information should include: A discussion of any changes that were made in the FSS from what was proposed in the DP or other prior submittals.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	N/A. Survey performed in accordance with PGE 1061 - Trojan License Termination Plan.
The information should include: A description of the method by which the number of samples was determined for each survey unit.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Section 2.3.2.2, Section 4.1.3.3
The information should include: A summary of the values used to determine the number of samples and a justification for these values.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	PGE 1061 – Trojan License Termination Plan – Section 4.4.3.1, Appendix 4-2
The information should include: The survey results for each survey unit including the following: The number of samples taken for each survey unit.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Appendix B

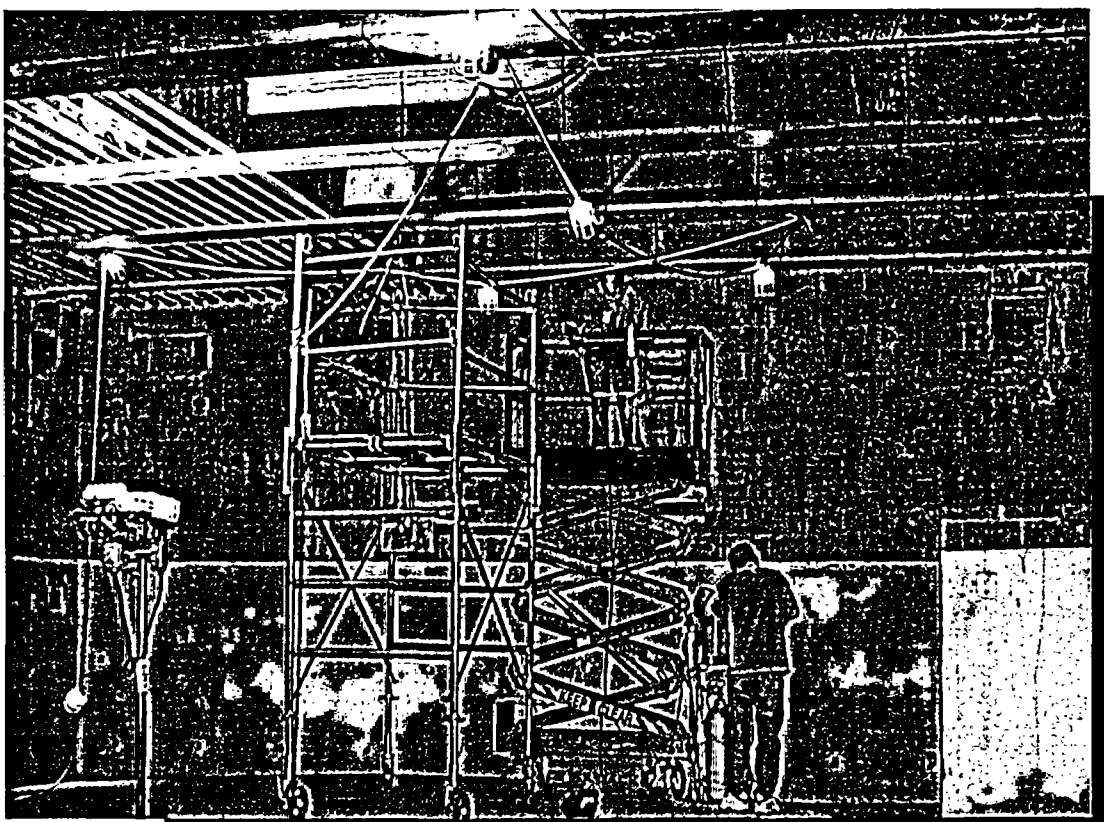
Guidance/Requirement	Source	Where Addressed
The information should include: The survey results for each survey unit including the following: a description of the survey unit, including (a) a map or drawing of the survey unit showing the reference system and random start systematic sample locations for Class 1 and Class 2 survey units, and random locations shown for Class 3 survey units and reference areas, (b) discussion of remedial actions and unique features, and (c) areas scanned for Class 2 and 3 survey units.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Sections 3.1 and 3.2, Appendix B, Supplement
The information should include: The survey results for each survey unit including the following: the measured sample concentrations, in units that are comparable to the DCGLs.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Appendix B
The information should include: The survey results for each survey unit including the following: the statistical evaluation of the measured concentrations.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Appendix B
The information should include: The survey results for each survey unit including the following: judgmental and miscellaneous sample data sets reported separately from those samples collected for performing the statistical evaluation.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Appendix B, Supplement

Guidance/Requirement	Source	Where Addressed
The information should include: The survey results for each survey unit including the following: a discussion of anomalous data including any areas of elevated direct radiation detected during scanning that exceeded the investigation level or any measurement locations in excess of $DCGL_W$.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Section 2.4.2, Table 3-2, Appendix B, Supplement
The information should include: The survey results for each survey unit including the following: a statement that a given survey unit satisfied the $DCGL_W$ and the elevated measurement comparison if any sample points exceeded the $DCGL_W$.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Section 4.2.2, Table 4-1
The information should include: A description of any changes in initial survey unit assumptions relative to the extent of residual radioactivity (e.g., material not accounted for during site characterization).	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – N/A
The information should include: A description of how ALARA practices were employed to achieve final activity levels.	NUREG 1757 Volume 2 Consolidated NMSS Decommissioning Guidance – Section 4.5	Final Survey Report – Section 4.2.4, Table 4-1

Trojan Nuclear Plant

Final Survey Report
Spent Fuel Pool Impacted Areas

Volume 1 of 2



Enclosure to VPN-076-2004
December 16, 2004

Final Survey Report

Spent Fuel Pool
Impacted Areas

Portland General Electric

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EXECUTIVE SUMMARY

This report presents the results and conclusions of the final survey conducted by Portland General Electric Company of the areas impacted by contaminated water from the spent fuel pool (SFP). These areas are primarily located in the Auxiliary and Fuel Buildings. They include the SFP, fuel transfer canal, cask load pit, and immediately adjacent floor and laydown areas around the SFP. Also included are areas that housed the SFP heat exchangers, cooling and purification pumps, and filter pits; and remaining components of the Discharge & Dilution Structure (D&DS) outfall chamber & pipe and the embedded SFP ventilation ducting 18" in diameter & larger. Contaminated equipment, components, and structural surfaces were removed or otherwise remediated as part of the decommissioning process. A final survey of the remaining structural and component surfaces was performed. Final survey data collection began in August 2004 and was completed in November 2004.

The final survey was performed in accordance with the final survey process described in PGE-1061, "Trojan Nuclear Plant Defueled Safety Analysis Report and License Termination Plan (PGE-1078)," referred to as the LTP. The SFP-impacted areas were divided into 15 survey units, encompassing approximately 2,800 square meters of surface area. All of the survey units were classified as Class 1 according to their potential for containing residual radioactivity above the derived concentration guideline level (DCGL). Survey data were collected from each survey unit according to data collection patterns and frequencies established for Class 1 survey units. Scan measurements were performed over 100 percent of the accessible surface area and a total of 1,194 static measurements were collected as final survey data. In addition, 597 supplemental removable surface radioactivity measurements were collected.

The final survey 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 final survey, Portland General Electric Company concludes the SFP-impacted areas meet the regulatory requirements for release to unrestricted use.

1. INTRODUCTION

1.1 PURPOSE AND SCOPE

This report presents the results and conclusions of the final survey of the areas impacted by contaminated water from the spent fuel pool (SFP). It provides the information required by 10 CFR 50.82(a)(11), which demonstrates that the SFP-impacted areas meet the radiological criteria for unrestricted use specified in 10 CFR 20.1402. This report also documents the final survey was performed in accordance with the final survey process described in PGE-1061, "Trojan Nuclear Plant Defueled Safety Analysis Report and License Termination Plan (PGE-1078)," hereinafter referred to as the LTP.

1.2 DESCRIPTION

The SFP-impacted areas are primarily located in the Auxiliary and Fuel Buildings. They include the SFP, fuel transfer canal, cask load pit, and immediately adjacent floor and laydown areas around the SFP. Also included are areas that housed the SFP heat exchangers, cooling and purification pumps, and filter pits; and remaining components of the Discharge & Dilution Structure (D&DS) outfall chamber & pipe and the embedded SFP ventilation ducting 18" in diameter & larger.

In their post-final survey configuration, the SFP-impacted areas exist as bare structure and pipe surfaces. Equipment and components, as well as heavily contaminated metal, concrete, and masonry surfaces were removed during decommissioning.

The SFP-impacted areas were prepared for final survey by a series of decommissioning activities, including radiological characterization, dismantlement and demolition, remediation, and turnover to final survey. A general description of these activities is given in Appendix A. Detailed decommissioning information as well as a brief radiological history is contained in the LTP, Section 3. Radiological characterization data were gathered and analyzed. The results guided decisions regarding the need for, extent of, and most effective means of remediation. Contaminated structures, equipment, and components were dismantled or demolished and removed for disposal. Remaining structure and pipe surfaces were remediated, as needed, and then systematically turned over for final survey. An assessment of the operation and radiological history established the initial classification of SFP-impacted areas.

1.3 SITE RELEASE CRITERIA

The site release criteria applied to the final survey correspond to the radiological criteria for unrestricted use given in 10 CFR 20.1402, which are:

1. Dose Criterion: 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

2. ALARA Criterion: The residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).

1.3.1 APPLICATION OF THE SITE RELEASE CRITERIA

Levels of residual radioactivity that correspond to the allowable radiation dose and ALARA levels of the site release criteria were derived by analysis of various scenarios and pathways (e.g., direct radiation, inhalation, ingestion) through which exposures could occur. These derived levels, referred to as Derived Concentration Guideline Levels (DCGLs), form the basis for the following four conditions which, when met, satisfy the site release criteria:

1. The average residual radioactivity above background is equal to or below the DCGL (where penetrating radiation from embedded piping is present, the average is compared to 0.8 x DCGL);

2. Individual measurements, representing small areas of residual radioactivity which exceed the DCGL, do not exceed the elevated measurement comparison DCGL;

3. Where one or more individual static measurements exceed the DCGL, the average residual radioactivity passes the Sign or Wilcoxon Rank Sum (WRS) statistical test; and

4. Remediation is performed where it is ALARA to reduce the levels of residual radioactivity to below the concentrations necessary to meet the DCGLs.

The manner in which these conditions were met is described in Section 4.2.

1.3.2 DERIVED CONCENTRATION GUIDELINE LEVELS

The residual radioactivity concentration levels on structure and pipe surfaces impacted by contaminated water from the SFP were compared to gross activity DCGLs of 7,500 dpm/100 cm^2 beta and 28 dpm/100 cm^2 alpha. The gross activity DCGLs were derived for surface residual radioactivity and developed using the methodology described in the LTP, Section 4.2.3, based on the radionuclide-specific screening DCGLs given in the LTP, Table 4-1.

1.3.2.1 SFP-Impacted Gross Activity DCGLs

The gross activity DCGLs of 7,500 dpm/100 cm^2 for beta and 28 dpm/100 cm^2 for alpha were developed primarily for application to remaining surfaces of the SFP and surfaces that were potentially contaminated with water from the SFP. Samples from five surfaces in or immediately adjacent to the SFP were collected prior to remediation. The samples conservatively represent the radionuclide distribution found on surfaces associated with the SFP. The sample locations were not biased towards any particular group of SFP systems, rooms, or elevations. Sample locations were randomly selected from a population of surfaces where fixed surface contamination was detected in or immediately adjacent to the SFP prior to remediation. The samples were sent to an offsite laboratory for analysis.

The laboratory results were used to calculate a gross activity DCGL value for each sample. The activity of transuranics detected in the samples collected from surfaces associated with the SFP represented a higher percentage of the total sample activity when compared to samples collected from any other area of the site. Using these samples to calculate total gross activity DCGLs resulted in DCGLs that were extremely small. These DCGLs were not useful because they were close to or less than the MDC of the final survey instrumentation. For this reason, alpha-emitting radionuclides were separated from the beta-emitting radionuclides detected in the samples and gross activity DCGLs were developed for both types of radiation.

Several radionuclides of interest were detected in each of the samples. The predominant beta-emitting radionuclides were ^{60}Co, ^{90}Sr, ^{137}Cs, and ^{241}Pu. The predominant alpha emitters were $^{239/240}Pu$ and ^{241}Am. There was some variability in relative radionuclide fractions and the resulting dose contributions when one sample was compared to another. Therefore, in order to be conservative, the gross activity DCGLs for surfaces associated with the SFP were established by averaging the gross activity DCGLs of the two samples with the most restrictive values.

The radionuclides, their relative distributions and dose contributions for the beta-emitting gross activity DCGL of 7,500 dpm/100 cm^2 and the alpha-emitting gross activity DCGL of 28 dpm/100 cm^2 are illustrated in the following tables.

SFP-Impacted Gross Activity DCGL Beta-Emitting Radionuclide Distribution

Radio-nuclide	Surface Screening DCGL (dpm/100 cm^2)	Activity Fraction		Activity Fraction/ DCGL[a]	Total DCGL Fraction[b]	DCGL Dose Contribution (mrem/yr)
		Sample #1	Sample #2			
^{3}H	1.2E+08	1.66E-02	2.78E-04	1.41E-10	<0.001	<0.1
^{55}Fe	4.5E+06	---	4.09E-01	9.09E-08	<0.001	<0.1
^{60}Co	7.1E+03	8.31E-03	3.16E-01	4.57E-05	0.173	4.3
^{63}Ni	1.8E+06	1.14E-02	1.03E-02	1.21E-08	<0.001	<0.1
^{90}Sr	8.7E+03	2.33E-01	9.15E-04	2.69E-05	0.102	2.6
^{137}Cs	2.8E+04	6.71E-01	1.81E-01	3.04E-05	0.115	2.9
^{241}Pu	8.8E+02	5.98E-02	8.22E-02	1.61E-04	0.610	15.3
Totals:	---	1.00E-00	1.00E-00	2.64E-04	1.000	25.0

Notes

[a] This value is calculated by dividing the summed activity fraction of samples #1 and #2 for the radionuclide by the screening DCGL value.

[a] This value is calculated by dividing the Activity Fraction/DCGL value for the radionuclide by the sum of the Activity Fraction/DCGL values for all the radionuclides.

SFP-Impacted Gross Activity DCGL Alpha-Emitting Radionuclide Distribution

Radio-nuclide	Surface Screening DCGL (dpm/100 cm^2)	Activity Fraction		Activity Fraction/ DCGL[a]	Total DCGL Fraction[b]	DCGL Dose Contribution (mrem/yr)
		Sample #1	Sample #2			
^{238}Pu	3.0E+01	6.79E-02	2.03E-02	2.94E-03	0.040	1.0
$^{239/240}$Pu	2.8E+01	4.74E-01	3.75E-02	1.83E-02	0.252	6.3
^{241}Am	2.7E+01	4.55E-01	9.07E-01	5.04E-02	0.694	17.4
$^{243/244}$Cm	3.9E+01	3.49E-03	3.53E-02	9.95E-04	0.013	0.3
Totals:	---	1.00E-00	1.00E-00	7.26E-02	1.000	25.0

Notes

[a] This value is calculated by dividing the summed activity fraction of samples #1 and #2 for the radionuclide by the screening DCGL value.

[b] This value is calculated by dividing the Activity Fraction/DCGL value for the radionuclide by the sum of the Activity Fraction/DCGL values for all the radionuclides.

1.3.2.2 Unity Rule Application

The SFP-impacted gross activity DCGLs for alpha- and beta-emitting radionuclides were simultaneously applied using the unity rule. The two types of measurements collected at each location were divided by their respective gross activity DCGL and summed to obtain the unity rule value.

2. FINAL SURVEY DESIGN

The final survey was designed and performed as described in the LTP, Section 4. The Data Quality Objectives (DQO) process was used to ensure that the final survey results were of sufficient quality to support the final decision. The SFP-impacted areas were divided into survey units of proper size, which were categorized and classified according to the type and potential of residual radioactivity. Instrumentation and survey methods, appropriate to the type of radiation being measured, were used to collect scan, static, and supplemental measurements. The measurements were collected in accordance with administrative and quality controls instituted to provide assurance of accurate results.

2.1 SURVEY UNITS

The SFP-impacted areas were divided into survey units based on the physical characteristics, the potential for elevated residual radioactivity, and the size of the area with similar potential for residual radioactivity.

2.1.1 CATEGORY

Survey units were assigned to one of the following two categories based on the physical characteristics and the type of residual radioactivity present:

- Structures with surface residual radioactivity where the SFP-impacted area gross activity DCGL was applied. This type included structural floor, wall, and ceiling surfaces. There were 13 survey units in this category

- Plant systems and other components with accessibility, dimensional, or operational survey design constraints that precluded their being categorized as a structure. This type included the embedded SFP ventilation ducting 18" in diameter and larger and the D&DS outfall chamber & pipe, which constituted the two survey units in this category.

2.1.2 CLASSIFICATION

Survey units were classified based on the potential for residual radioactivity. Areas with residual radioactivity that exceeded the DCGL prior to remediation were divided into 15 Class 1 survey units. There were no Class 2 or Class 3 survey units.

The classification process incorporated the working hypothesis that all areas had a potential for residual radioactivity above the DCGL. This initial assumption meant that a survey unit was initially considered Class 1 unless a basis for classification as Class 2 or Class 3 was identified. Characterization data, collected during the course of decommissioning and summarized in the following table, showed that the survey units were properly classified as Class 1.

Summary of Operational Survey Data

Survey ID Code[a]	Description	Operational Survey Results[b] (dpm/100 cm²)			Class		
		Coverage	Total	Removable	1	2	3
SFP and Adjacent Areas							
S04093F	FB Elev 93' Spent Fuel Pool - West Half	100%	≤ 1M[c]	<2,000	x		
S04093G	FB Elev 93' Fuel Transfer Canal	100%	≤ 65,000	<2,000	x		
S04093H	FB Elev 93' Cask Load Pit	100%	≤346,000	N/A[d]	x		
S04093J	FB Elev 93' Spent Fuel Pool - East Half	100%	≤110,000	<2,000	x		
S04093Q	FB Elev 93' Laydown Area - West Half	80%	≤ 16,000	<1,000	x		
S04093R	FB Elev 93' Laydown Area - East Half	80%	≤ 10,000	<1,000	x		
S04093T	FB Elev 93' Spent Fuel Pool SW Flr/Lwr Walls	30%	≤ 60,000	<1,000	x		
S04093V	FB Elev 93' Spent Fuel Pool S Center Flr Area	0%[e]	N/A	N/A	x		
S04093X	FB Elev 93' Spent Fuel Pool SE Floor Area	0%[e]	N/A	N/A	x		
Areas Housing SFP-Impacted Components							
S04061G	FB Elev 61' SFP Heat Exchanger Room	100%	≤300,000	<1,000	x		
S05045M	AB Elev 45' SFP Cooling/Purification Pmp Rms	100%	≤ 20,000	<16,000	x		
S05077N	AB Elev 77' Filter Pit "D"	100%	≤110,000	<1,000	x		
S05077P	AB Elev 77' Filter Pit "E"	100%	≤400,000	<1,000	x		
P62042A	D&DS Outfall Chamber & Pipe	100%	≤360,000	<8,000	x		
P62208A	Embedded SFP Ducting 18" Diameter & Larger	0%[e]	N/A	N/A	x		

Notes:
[a] See Section 2.1.4 for description of survey ID code nomenclature.
[b] Survey results reported to nearest 1,000 dpm/100 cm² and represent pre-remediation beta measurement values.
[c] Value is 1,000,000 dpm/100 cm².
[d] Survey data not available as part of survey unit release record.
[e] No surveys performed prior to remediation.

2.1.3 SURVEY UNIT SIZE

The SFP-impacted areas were divided into survey units ranging in size from 36 to 437 m², each with floor areas of 99 m² or less. The survey units were sized to ensure that survey data points were relatively uniformly distributed among areas of similar potential for residual radioactivity. Survey units were designed to have relatively simple shapes unless an unusual shape was appropriate for the operational history of the area. Where possible, existing building characteristics such as horizontal and vertical structural supports, walls, and rooms were used to define the boundaries of the survey units.

2.1.4 IDENTIFICATION NOMENCLATURE

Each survey unit was identified by a seven-digit identification code. The first digit represents the survey unit category. One of two category codes was used:

S – structure with surface residual radioactivity
P – plant system or component with surface residual radioactivity

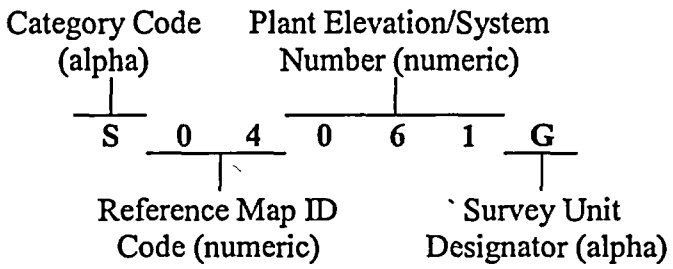
The next two digits represent the reference map identification code. Three codes were used, as shown below.

Reference Map Identification Codes

Number	Description
04	Fuel Building
05	Auxiliary Building
62	Plant System

The next three digits represent the plant elevation or plant system number. The last digit is an alpha sequential survey unit designator that was assigned in sequential order of the survey unit being created. The following figure illustrates the survey unit identification code for the 7th survey unit beginning at Elevation 61' of the Fuel Building.

Survey Unit Identification Nomenclature



2.1.5 BACKGROUND REFERENCE AREAS

The general practice for final survey was to compare the total concentration of radionuclides (residual radioactivity plus background) to the site release dose criterion. The advantage of ignoring a small background concentration is that a background reference area is not needed. However, since the alpha background concentration was known to exceed the alpha gross activity DCGL, the data sets for the SFP-impacted areas required a background reference area for applying the statistical test.

Surveys were conducted of three background reference areas to determine background levels for comparison with the conditions determined in SFP-impacted area survey units. The selected background reference areas have similar physical, material, and radiological characteristics as the survey units that were evaluated. In one case, the survey unit itself served as the background reference area (survey unit P62208A – see Section 3.3.1). The background reference areas are identified using the same seven-digit identification code as survey units, with the exception that the first digit is a "B" instead of an "S" or "P".

2.2 INSTRUMENTATION

Portable and laboratory instrumentation capable of detecting the radiation types and energies of interest were selected, calibrated, and maintained for final survey data collection. Commercially available radiation detection and measurement instrumentation was selected based on reliable operation, detection sensitivity, operating characteristics, and expected performance in the field.

Radioactive sources used for calibration purposes are traceable to the National Institute of Standards and Technology (NIST).

2.2.1 PORTABLE INSTRUMENTATION

Scan and static surface radioactivity measurements were performed using the Ludlum Model 2350-1 data logging survey meter with one of two types of Ludlum detectors: gas-flow proportional (GFP) or Geiger-Mueller (G-M). Table 2-1 gives the model number and a description of the detectors used.

2.2.1.1 Calibration and Maintenance

Survey instruments were calibrated for the radiation types and energies of interest. Radionuclide mixture ratios and varying energies were accounted for during calibration by using a calibration source with a conservative average energy as compared to the weighted average energy of the radionuclide mixture. The following table provides typical information on calibration sources used.

Typical Portable Instrumentation Calibration Sources

Source Description	Radiation of Interest	Source Geometry	Radio-nuclide	Source Activity	2π Surface Emission Rate
Acrylic-backed, w/0.9 mg/cm^2 mylar cover	beta	10 x 15 cm plate	^{99}Tc	23,000 dpm	6,800 β/min/100 cm^2
Stainless steel-backed electroplated Tc metal	beta	4.1 cm dia. disk	^{99}Tc	20,000 dpm	12,000 β/min
Stainless steel-backed electrodeposited oxide	alpha	10 x 15 cm plate	^{239}Pu	28,000 dpm	10,000 α/min/100 cm^2
Stainless steel-backed electrodeposited oxide	alpha	4.1 cm dia. disk	^{239}Pu	20,000 dpm	10,000 α/min

A total efficiency was established for each detector. The total efficiency is the product of the instrument efficiency and the source (or surface) efficiency for a specified survey geometry or measurement technique. The instrument efficiency, i.e., the ratio between the net count rate of the instrument and the 2π surface emission rate of a radiation source, was determined by counting the source with the detector in a fixed position from the source (reproducible geometry). A jig was used to create the reproducible geometry and a source to detector distance of 1 cm was normally used. A value of 0.5 was used for the beta source efficiency for smooth surfaces; a value of 0.3 for concrete scabbled surfaces. For alpha detection, a value of 0.25 was used for the source efficiency. These values were established based on energies of the expected radionuclide distribution and on surface geometry considerations. The source efficiency for particle emission is the ratio between the number of radiation particles emerging from the measurement surface of the area being surveyed (the source) and the total number of radiation particles being released within that source per unit time.

2.2.1.2 Instrument Response

Instrument response was checked before and after instrument use each day. A check source was used that emitted the same type of radiation (i.e., beta or alpha) as the radiation being measured and that gave a similar instrument response (see the preceding table). The response check was performed using a specified source-detector alignment that could easily be repeated. If the instrument failed its response check, it was not used until the problem was resolved. Measurements made between the last acceptable response check and the failed check were evaluated and, if appropriate, discarded.

2.2.1.3 Minimum Detectable Concentration

A minimum detectable concentration (MDC) was determined for each instrument and scan and static measurement method that were used for survey data collection. Instruments used for beta scan measurements were capable of detecting radiation to an MDC of less than 50% of the DCGL at a scan rate of 5 cm/sec. The exception to this was the Model 44-9 pancake G-M detector, which typically could not achieve a scan MDC of less than the DCGL. Where this detector was used, the survey design prescribed compensatory measures that included using a lower scan rate (i.e., 3 cm/sec), limiting the size of the survey unit area, and/or increasing the number of static measurements. Instruments used for beta static measurements were capable of detecting radiation to an MDC of less than 50% of the DCGL with a count time of one minute.

An MDC was determined but not applied for alpha static measurements due to the low background response of alpha emitters. A study was performed to determine the impact of count time on the static MDC. Count times of 1, 2, 5, 10, 15, and 30 minutes were selected. The results, given in the table below, show that a count time of 30 minutes or more is required to detect alpha radiation to an MDC of less than 50% of the DCGL, which is not practical for final survey data collection.

Count Time vs. MDC Time for Alpha Static Measurements

Count Time (min)	Background = 1 cpm		Background = 2 cpm	
	Counts	MDC	Counts	MDC
1	1	101	2	127
2	2	63	4	81
5	5	35	10	47
10	10	23	20	31
15	15	19	30	25
30	30	13	60	17

Operational experience with the Ludlum Model 43-68 detector shows it experiences an instrument background count rate of 0-2 cpm. Since instrument and material background counts are not subtracted, any acquired counts are considered alpha counts and a two-minute count time is sufficient to detect alpha-emitting residual radioactivity, regardless of the above MDC calculations. Therefore, a count time of two minutes was selected.

2.2.2 LABORATORY INSTRUMENTATION

On-site laboratory instruments were used to perform gas proportional counting of removable surface radioactivity samples (smears). Removable surface radioactivity measurements were performed using the Tennelec Model LB5100 GFP alpha/beta counting system described in the table below.

Tennelec Model LB5100

Parameter	Specification		
Detector Type	GFP		
Measurement Type	Removable surface radioactivity		
Detector Description	57 mm dia. detector with 80 μg/cm^2 mylar window		
Radiation Detected	alpha	beta	beta
Count Time (min)	5	5	2
Background (counts)	1 to 7	29 to 128	46
Efficiency (cnts/dis)	0.222	0.336	0.337
MDC (dpm/100 cm^2)	7 to 14	29 to 33	51

2.2.2.1 Calibration and Maintenance

The Tennelec Model LB5100 was calibrated for the radiation types and energies of interest by counting a radionuclide standard and comparing the results with the actual concentration on the certificate of calibration provided by the manufacturer of the radionuclide standard. The following table provides typical information on the radionuclide standards used.

Typical Laboratory Instrumentation Calibration Sources

Source Material	Radiation of Interest	Source Geometry	Source Density	Radionuclides of Interest	Source Activity
Stainless steel-backed metal	Beta	5.1 cm dia. disk	N/A	^{137}Cs	130,000 dpm
Stainless steel-backed metal	Beta	5.1 cm dia. disk	N/A	^{137}Cs	30,000 dpm
Stainless steel-backed metal	Alpha	5.1 cm dia. disk	N/A	^{241}Am	190,000 dpm
Stainless steel-backed metal	Alpha	5.1 cm dia. disk	N/A	^{241}Am	47,000 dpm

2.2.2.2 Daily Quality Control Standardization

Quality Control (QC) standardization was performed on the Tennelec Model 5100 prior to use each day. A QC standard was used that emitted the same type of radiation in the same type of counting geometry as the radiation being measured. Count results were graphed and reviewed for trends in detector performance. No count results fell outside the acceptable QC band and no negative trends were identified in instrument performance.

2.2.2.3 Minimum Detectable Concentration

The Tennelec Model 5100 was capable of detecting radiations of interest to less than 1% of the beta-emitting DCGLs with a two-minute count time, and less than 50% of the alpha-emitting DCGL with a five-minute count time.

2.3 SURVEY METHODS

Survey methods, as described in the following sections, were applied to collect scan and static measurements of surface residual radioactivity, and removable surface radioactivity measurements.

2.3.1 SCAN MEASUREMENTS

Scan measurements were performed to locate radiation anomalies that might indicate elevated areas of residual radioactivity that require further investigation. The level of scan coverage was proportional to the potential for finding elevated areas of residual radioactivity based on the history of the survey unit.

2.3.1.1 Scan Coverage

Beta scan measurements were performed over 100% of the accessible surface area. Alpha scan measurements were not performed.

2.3.1.2 Surface Residual Radioactivity

Structure and component surfaces were scanned for beta-emitting radionuclides. Typically, the detector was held less than 2 cm from the surface and moved at 5 cm/sec over a selected area at the survey location. Once the selected area was scanned, the latched value was electronically entered into the data logger memory. As a matter of practice, the instrument ratemeter alarm was usually set at approximately 0.8 times DCGL. The audible alarm would alert the surveyor that radiation levels are approaching the DCGL. The surveyor would respond by identifying the size of the area exceeding the alarm setpoint, mark the location in the field, and then attempt to capture the maximum radiation level within the elevated area. An investigation and/or remediation was performed where the maximum radiation level exceeded the investigation level.

Normally, the Ludlum Model 43-68 GFP detector with the data logger in ratemeter latching mode was used. For areas with size or geometry constraints, the Ludlum Model 43-116-1 GFP detector or the Ludlum Model 44-9 pancake G-M detector was used.

Surfaces were not scanned for alpha-emitting radionuclides since characterization data have consistently shown that alpha-emitting radionuclides are found in the presence of beta-emitting radionuclides. As a practical matter, alpha scan measurements must be collected as a series of short-duration alpha static measurements since the background response is near zero. This was not practical for final survey data collection.

2.3.2 STATIC MEASUREMENTS

Static measurements were collected at a frequency and at representative locations throughout the survey unit such that a statistically sound conclusion regarding the radiological condition of the survey unit could be developed.

2.3.2.1 Surface Residual Radioactivity

Static measurements to detect beta- or alpha-emitting surface residual radioactivity were collected using the Ludlum Model 43-68 GFP detector with the data logger in scaler mode. For each discrete measurement, the detector was placed on or near the surface to be measured, a one-minute (beta) or two-minute (alpha) count was taken, and the value was electronically entered into the data logger memory.

2.3.2.2 Number of Measurements

To simplify the final survey process and to ensure conservatism without an associated unreasonable expenditure of resources, a minimum number of 30 static measurements per survey unit were collected. This number of measurements provided a sample population of sufficient size to assure statistical confidence in the conclusions drawn from the survey data (see Section 4.1.3.3).

2.3.2.3 Measurement Locations

Measurement locations were selected using a random-start systematic spacing method based on a reference coordinate system appropriate for the survey unit. Scale drawings, maps, or photographs of the survey unit were prepared, along with an overlay of the reference coordinate system. A random number generator provided the coordinates of the starting point. Subsequent measurement locations were distributed around the starting point in a systematic pattern across the survey unit area. In most cases, this led to more than the minimum number of 30 static measurements being collected.

Measurement locations that did not fall within the survey unit area or that could not be surveyed due to health and safety considerations were replaced with other measurement locations determined using the random selection process.

2.3.3 SUPPLEMENTAL MEASUREMENTS

Supplemental measurements to detect removable beta- or alpha-emitting surface residual radioactivity were collected at static measurement locations. These measurements (i.e., smears) were collected to verify removable surface radioactivity was no more than 10% of the gross activity DCGL (beta) or the MDC (alpha). Smears were counted onsite using the Tennelec Model LB5100.

2.3.4 MEASUREMENT LOCATION IDENTIFICATION

Measurement locations were clearly identified and documented to ensure they could be relocated if necessary. Actual measurement locations were permanently marked on survey maps and, where feasible, in the field. A unique number identifies each measurement location. The number convention, described in Section 2.4.4, allows survey data to be referenced to specific measurement locations identified on the photographs, drawings, or maps of the survey unit.

Physical gridding was used where practical and useful. It provided a mechanism for referencing scan measurements to a specific location. Permanent marker was used to mark the physical grid layout. The basic grid pattern used was a one-meter square grid.

2.4 SURVEY PERFORMANCE

2.4.1 SAMPLE HANDLING

Smear samples collected for laboratory analysis were tracked. When sample custody was transferred (e.g., when samples were sent to the lab for analysis), a sample tracking record accompanied the sample for tracking purposes. The sample tracking (or chain of custody) record documented the custody of samples from the point of collection until final results were obtained.

2.4.2 IN-PROCESS REMEDIATION

Scan measurements in the SFP, fuel transfer canal, and cask load pit located numerous radiation anomalies that indicated potential areas of elevated beta residual radioactivity. Hundreds of small areas ranging from 15 cm^2 to 0.23 m^2 in size were found with elevated residual radioactivity levels up to 760,000 dpm/100 cm^2 beta. These areas were marked, remediated, and rescanned. The original scan measurement data for the remediated areas were replaced by scan measurements collected post-remediation. Approximately 380 m^2 (30% of total surface area) was remediated and re-scanned.

Normally, the evaluation of areas of elevated residual radioactivity is documented in a data investigation. However, the large number of areas and the inability to effectively determine, in a timely manner, if elevated alpha radioactivity would also be present in areas of elevated beta radioactivity, prompted the management decision to immediately remediate all areas identified as potentially elevated by initial beta scan measurements. This negated the need for performing an alpha investigation survey and for completing a data investigation for the large number of areas.

2.4.3 DATA INVESTIGATION

Locations, identified by scan or static measurements, with residual radioactivity that exceeded the DCGL were marked and investigated. Beta scan measurements were performed over 100 percent of the area being investigated. Beta and/or alpha static measurements in the form of scalar or integrated counts were performed at locations with the highest concentration of residual radioactivity.

Two standard operating practices were found to cause significant overestimates in the level of beta residual radioactivity at locations identified for investigation. These practices are: (1) using gross cpm instead of net cpm to convert to dpm, and (2) converting the area of elevated residual radioactivity to 100 cm^2 when the measured area is much smaller than that. For example, assuming an instrument background of 35 cpm and a total efficiency of 0.1, area with a "true" level of residual radioactivity of 5,000 dpm distributed over 15 cm^2 (the active area of a pancake G-M detector) yields a converted value of over 35,000 dpm/100 cm^2. The investigation level is 7,500 dpm/100 cm^2 beta. To avoid such significant overestimates, instrument background was subtracted from beta measurements exceeding the investigation level and an area correction was applied to elevated areas less than 100 cm^2 in size.

A similar standard operating practice was found to cause significant overestimates in the level of alpha residual radioactivity at locations identified for investigation. Instrument and material background counts are not subtracted from alpha static measurements and any acquired counts are considered alpha counts. Instrument and material background counts average 2 to 3 cpm which, assuming a total efficiency of 0.06, yields 33 to 50 dpm/100 cm^2. Approximately 75% of the alpha static measurements (446 of 597) exceeded the investigation level of 28 dpm/100 cm^2 alpha. Nevertheless, the practice of not subtracting instrument and material background from alpha static measurements was deemed to be conservative and the investigations were performed.

The results of the data investigations are summarized in Table 3-2. The details of the investigations are included in survey unit summary reports (see Appendix B). Depending on the results of the investigation, the identified areas within the survey unit were remediated and/or resurveyed.

2.4.4 DATA RECORDING

Measurement data were corrected for instrument efficiency, source efficiency, detector area, and measurement size as applicable, and recorded in units appropriate for comparison to the DCGL. The recording units were dpm/100 cm^2. Measured numerical values were recorded and included values below the MDC. Instrument and material backgrounds were generally not subtracted from residual radioactivity measurements gathered using portable instrumentation (see exception in Section 2.4.3). Instrument background was subtracted from measurements analyzed using laboratory instrumentation.

Measurement results stored as final survey data constitute the final survey of record and are included in the data set for each survey unit. The data were used for calculations to determine compliance with the site release dose criterion. The affected data were stored as characterization data where a survey unit was remediated and/or reclassified during final survey.

2.4.5 DATA MANAGEMENT

The Survey Data Management System (SDMS) was used to store and process survey data. The SDMS is an electronic database that contains the final survey data and constitutes the quality record. Administrative controls for maintaining data integrity were incorporated into the

software design. SDMS applications were tested as part of two separate tests: factory acceptance testing performed by the vendor and site acceptance testing performed by the Final Survey organization. A test plan and procedure were developed and documented for each functional module. Documented test results include the acceptance test objectives, test results, test discrepancies, and corrective actions taken to resolve the discrepancies.

Raw survey data captured in the Ludlum Model 2350-1 data logger were downloaded, electronically converted to recording units, and uploaded to the SDMS. Other data, such as laboratory data, were manually entered into the SDMS for analysis.

For electronic storage and retrieval purposes, each survey measurement is identified by a unique 15-digit code. The first seven digits are the survey unit Identification (ID) code (see Section 2.1.4). The last eight digits are the measurement ID code. The first two digits of the measurement ID code identify the type of measurement, as shown in the following table, and the last six digits are the unique measurement location ID.

Measurement Type Codes

Type Code	Type Description
01	Static surface beta
02	Static surface alpha
04	Removable beta smears
05	Removable alpha smears
08	Surface scanning beta

Records of survey data include the surveyor identification, measurement type, measurement location, measurement instrumentation used, measurement results, and time and date measurement was taken.

2.4.6 QUALITY CONTROL MEASUREMENTS

Quality Control (QC) measurements were performed to identify, assess, and monitor measurement error and uncertainty attributable to measurement methods or analytical procedures used in the survey data collection process. A discussion of the QC measurements performed and their results are found in the final survey reports for the Auxiliary and Fuel Building interiors.

2.4.7 PROCEDURES

Final survey activities were implemented and controlled using approved plant procedures. A list of those procedures is given in Table 2-2.

2.4.8 TECHNICAL BASIS DOCUMENTS

Calculations and memoranda were prepared to document methods that were used, how the methods were derived, underlying assumptions for decisions that were made, the basis for deviations, and other information that warranted documentation. The technical basis documents

developed to support/conduct the final survey of the SFP-impacted areas are listed in the following table.

Calculations

Number	Title
FSC 2003-03	Site Specific Scabbled Concrete Source Efficiency Factor
FSC 2004-01	Gross Activity DCGLs for Surfaces Associated with the SFP
FSC 2004-03	Remediation Levels for the SFP-Related Gross Activity DCGLs
FSC 2004-04	Area Factors for the SFP-Related Gross Activity DCGLs

Memoranda

Number	Title
FS-018-03	Beta Surface Scans With a Pancake GM Survey Instrument
FS-002-04	Application of Elevated Measurement Comparison
FS-004-04	Fuel Building Beta Surface Scans
FS-009-04	Surveying Difficult to Access Areas
FS-010-04	Fuel/Auxiliary Building Alpha MDC
FS-016-04	Beta Surface Scans & Prompt Remediation for Survey Unit S04093F
FS-017-04	Beta Surface Scans & Prompt Remediation for Survey Unit S04093J
FS-018-04	Beta Surface Scans & Prompt Remediation for Survey Unit S04093G
FS-019-04	Beta Surface Scans & Prompt Remediation for Survey Unit S04093H

2.4.9 CONTROL OF VENDOR SUPPLIED SERVICES

Quality-related services, shown in the following table, were procured from qualified vendors whose internal Quality Assurance (QA) program was subject to approval in accordance with the Trojan QA Program.

Vendor Supplied Services

Vendor	Service
Ludlum Measurements, Inc.	Instrument repair and calibration services
Isotope Products Laboratories	NIST-traceable calibration and check sources
Thermo Nutech	Characterization sample analysis
Duke Engineering	Characterization/final survey sample analysis
SAIC	Characterization sample analysis
Analytics, Inc.	Environmental cross-check sample analysis

2.4.10 TRAINING

Final survey data collection and technical support staff members were initially trained and qualified in procedures performed by them, and received annual refresher training thereafter. Surveyors completed scan and static survey practical training on a semi-annual basis. The following table lists the lesson modules developed and used to provide the training.

Final Survey Training Program

Module	Title
FS-S-11-LP	Final Survey Plan Overview
FS-S-22-LP	Survey Unit Design
FS-S-33-LP	Survey Instruments/Data Collection
FS-S-55-LP	Scan and Static Survey Practical
FS-S-66-LP	Survey Data Processing
FS-S-77-LP	SDMS Overview
FS-S-88-LP	Annual Refresher Training

Table 2-1

Portable Instrumentation Radiation Detectors

Ludlum Detector Model	43-68	43-68(S)[a]	43-68(A)[b]	43-116-1	44-9
Detector Type	GFP				G-M
Radiation of Interest	beta		alpha	beta	
Measurement Type	scan, static		static	scan, static	
Detector Area	126 cm^2			54 cm^2	15 cm^2
Window Thickness	0.8 mg/cm^2				1.7 mg/cm^2
Window Material	mylar				mica
Background (cpm)[b,c]	190 to 290		2	96 to 120	30 to 40
Instrument Efficiency (cnts/dis)[c]	0.38 to 0.45		0.23 to 0.25	0.39 to 0.41	0.14 to 0.17
Source Efficiency (cnts/dis)	0.50	0.30	0.25	0.50	
Total Efficiency (cnts/dis)[c]	0.19 to 0.22	0.11 to 0.13	0.06	0.20 to 0.21	0.07 to 0.09
Count Time (min)	1		2	1	
Static MDC (dpm/100 cm^2)[c]	300 to 340	510 to 580	N/A	500 to 550	2,800 to 3,300
Scan MDC (dpm/100 cm^2)[c,d]	710 to 800[e]	1,200 to 1,400[e]	N/A	740[f] to 2,400[g]	8,200[h] to 10,780[i]

Notes

[a] (S) denotes detector used with concrete scabbled surface source efficiency.
[b] (A) denotes detector configured for use in alpha detection mode.
[b] Background count time is 1 minute.
[c] A range of values is given where multiple detectors were used; values rounded to two significant figures.
[d] Scan MDC assumes 5 cm/sec scan rate, unless otherwise noted.
[e] Assumes a 8.8 cm detector width for an equivalent count time of 0.03 min.
[f] Assumes a 2.5 cm detector width for an equivalent count time of 0.008 min.
[g] Assumes a 21.5 cm detector length for an equivalent count time of 0.07 min.
[h] Assumes a 4.4 cm detector width for an equivalent count time of 0.015 min.
[i] Assumes a 4.4 cm detector width and a 3 cm/sec scan rate for an equivalent count time of 0.024 min.

Table 2-2

Final Survey Procedures

Number	Title
TPP 14-24	Transfer of Turnover Units
TPP 16-1	Material/Service Procurement and Control Process *(for purchasing final survey materials and services)*
TPP 18-4	Trojan Nuclear Plant Quality Assurance Records Management Program *(for final survey quality records processing)*
TPP 18-9	Trojan Calculations *(for creating technical basis documents)*
TPP 18-10	Control of Quality-Related Computer Programs *(for SDMS revision validations)*
TPP 20-40	Control of Areas Surveyed for Final Site Release
TPP 22-1	Trojan Training Program *(for documenting final survey staff training)*
RP 95	Ludlum M2350-1 Data Logger Calibration Procedure *(for data logger electronic calibrations/checks only)*
RP 159	Conduct of Portable/Semi-Portable Radiation Protection Instrument Program *(for instrument tagging and calibration sticker)*
RP 450	Final Survey Administrative and Quality Controls
RP 451	Final Survey Unit Design
RP 452	Final Survey Data Collection
RP 453	Final Survey Data Processing
RP 454	Final Survey Background Reference Areas
RP 455	Final Survey Quality Control Measurements
RP 456	Control & Operation of Data Logger Survey Instruments
RP 457	Development and Application of Derived Concentration Guideline Levels
RP 458	Final Survey Remediation Levels and ALARA Evaluations
RP 459	Final Survey Instruments Calibration Program
RP 460	Final Survey Data Management
RP 461	Groundwater Sample Collection
RG 20-10	SDMS Applications Instructions
CL 161	LB5100 Planchet Counting System Calibration Procedure
LI 162	LB5100 Planchet Counting System Operation

3. FINAL SURVEY RESULTS

Final survey scan, static, and supplemental data were collected from the SFP-impacted areas. Data collection began in August 2004 and was completed in November 2004. Scan measurements were performed over 100 percent of the surface area (2,793 m^2) and a total of 1,194 static measurements were collected as final survey data. Table 3-1 summarizes the final survey results. In addition, 597 supplemental removable surface radioactivity measurements (or smears) were collected, with beta results less than 1,000 dpm/100 cm^2 and alpha results less than MDC. Twenty-seven data investigations were performed of 522 areas identified by scan or static measurements with elevated beta or alpha residual radioactivity. The 522 areas represent a total of less than 8 m^2 of surface area with residual radioactivity above the DCGL. The results of the data investigations are summarized in Table 3-2. A detailed summary of final survey data for each survey unit is given in the survey unit summary reports in Appendix B. Scan measurement data are provided in the Supplement. Measurement results given in the following sections are direct surface beta measurements, unless otherwise noted, and are reported to two significant figures or to the nearest single-digit whole integer.

3.1 SPENT FUEL POOL AND ADJACENT AREAS

The SFP, fuel transfer canal, cask load pit, and immediately adjacent floor and laydown areas comprise nine Class 1 survey units. The surface area of each survey unit ranged from 113 to 437 m^2. Beta scan measurements were performed over 100% of the surface area (2,034 m^2), with results ranging from 770 to 12,000 dpm/100 cm^2. Static measurements were collected from 30 to 80 locations in each survey unit. Beta static measurement results ranged from 770 to 5,700 dpm/100 cm^2, with average measured values ranging from 1,500 to 2,100 dpm/100 cm^2. Alpha static measurement results ranged from 0 to 120 dpm/100 cm^2, with average measured values ranging from 28 to 53 dpm/100 cm^2.

Scan and static measurements identified 409 areas with elevated residual radioactivity in the nine survey units. Data investigations revealed less than 5 m^2 of surface area with residual radioactivity above the DCGL, and radioactivity levels up to 150,000 dpm/100 cm^2 beta and 330 dpm/100 cm^2 alpha. Areas in eight survey units were remediated. The elevated measurement comparison (EMC) was applied to areas in those and other survey units with residual radioactivity remaining above the DCGL.

3.2 AREAS HOUSING SFP-IMPACTED COMPONENTS

Areas that housed the SFP heat exchangers, cooling and purification pumps, and filter pits; and remaining components of the Discharge & Dilution Structure (D&DS) outfall chamber & pipe and the embedded SFP ventilation ducting 18" in diameter & larger comprise six Class 1 survey units. The surface area of each survey unit ranged from 36 to 209 m^2. Beta scan measurements were performed over 100% of the surface area (759 m^2), with results ranging from 600 to 8,900 dpm/100 cm^2. Static measurements were collected from 30 to 36 locations in each survey unit. Beta static measurement results ranged from 400 to 6,800 dpm/100 cm^2, with average measured values ranging from 920 to 1,700 dpm/100 cm^2. Alpha static measurement results

ranged from 0 to 110 dpm/100 cm^2, with average measured values ranging from 23 to 46 dpm/100 cm^2.

Scan and static measurements identified 113 areas with elevated residual radioactivity in the six survey units. Data investigations revealed less than 3 m^2 of surface area with residual radioactivity above the DCGL, and radioactivity levels up to 11,000 dpm/100 cm^2 beta and 110 dpm/100 cm^2 alpha. Areas in one survey unit were remediated. The EMC was applied to areas in that and other survey units with residual radioactivity remaining above the DCGL.

3.3 BACKGROUND REFERENCE AREAS

Data set populations of beta and alpha static measurements were collected from three background reference areas. Four additional background reference areas were created using data subsets from one of the original background reference areas. A complete data set for each background reference area is found in the survey unit summary report of the survey unit to which it was compared (see Appendix B).

3.3.1 ORIGINAL BACKGROUND REFERENCE AREAS

Data were collected from two background reference areas for concrete – one from the Turbine Building basement and the other from the outside south wall of the fuel transfer canal in the Fuel Building. These areas had concrete of the same age and composition as that found in the survey units. Data were collected from a third background reference area for metal pipe. All three background reference areas are impacted areas. However, their purpose and design (i.e., not exposed to transuranic contamination) permitted them to be used. The background reference areas are described in the following sections. The results are summarized below.

Summary of Background Reference Area Results

Area ID Code	Material Composition	Static Measurements (dpm/100 cm^2)								
		Size of Population	Beta				Alpha			
			Low Value	Mean	High Value	Std Dev	Low Value	Mean	High Value	Std Dev
B02027B	concrete	30	N/A	N/A	N/A	N/A	7	34	96	20
B04045Y	concrete	80	770	930	1,400	100	6	46	260	31
B04208A	metal	36	340	570	740	66	0	16	37	10

3.3.1.1 Turbine Building Elev. 27' Neutralizing Tank Room (B02027B)

The background reference area consisted of the Turbine Building Elev. 27' Neutralizing Tank Room and the concrete pit on the north side of Main Condenser "C". The area was used as a concrete background reference area for alpha static measurements, which were collected on concrete wall and floor surfaces at random locations. Alpha static measurement results ranged from 7 to 96 dpm/100 cm^2, with an average measured value of 34 dpm/100 cm^2 and a standard deviation of 20 dpm/100 cm^2.

3.3.1.2 Outside South Wall of Fuel Transfer Canal (B04045Y)

The background reference area consisted of the outside wall of the Fuel Transfer Canal and the floor of the Elev. 45' wall gap. The area was used as a concrete background reference area for beta and alpha static measurements, which were collected on concrete wall and floor surfaces at random locations. Beta and alpha static measurements were collected at each of 80 measurement locations. Beta static measurement results ranged from 770 to 1,400 dpm/100 cm^2, with an average measured value of 930 dpm/100 cm^2 and a standard deviation of 100 dpm/100 cm^2. Alpha static measurement results ranged from 6 to 110 dpm/100 cm^2, with a single outlier of 260 dpm/100 cm^2. The outlier was not discarded. The average measured value was 46 dpm/100 cm^2, with a standard deviation of 31 dpm/100 cm^2.

3.3.1.3 Embedded SFP Ventilation Ducting (B04208A)

The survey unit P62208A served as its own background reference area for beta and alpha static measurements. Various diameters of clean stainless steel pipe were inserted into the embedded SFP ventilation ducting 18" in diameter and larger. Beta and alpha static measurements were collected on the bottom of a clean section of stainless steel pipe at each of the 36 locations where static measurements were taken for survey unit P62208A. Beta static measurement results ranged from 340 to 740 dpm/100 cm^2, with an average measured value of 570 dpm/100 cm^2 and a standard deviation of 66 dpm/100 cm^2. Alpha static measurement results ranged from 0 to 37 dpm/100 cm^2, with an average measured value of 16 dpm/100 cm^2 and a standard deviation of 10 dpm/100 cm^2.

3.3.2 BACKGROUND REFERENCE AREAS CREATED USING DATA SUBSETS

As a general rule, the number of measurements in the background reference area should be the same or close to the number of measurements in the survey unit to which it is compared using the WRS statistical test. To achieve this parity in the number of measurements, the relatively large 80-measurement background reference area B04045Y was used to create background reference areas with smaller sample populations. Where a background reference area of *n* measurements was needed, it was simply created by taking the first *n* measurements from the data set population of B04045Y. The background reference areas created from B04045Y are shown in the table below.

Background Reference Areas Created Using B04045Y Data Subsets

Area ID Code	Size of Population	Static Measurements (dpm/100 cm^2)							
		Beta				Alpha			
		Low Value	Mean	High Value	Std Dev	Low Value	Mean	High Value	Std Dev
B02027B[a]	30	770	920	1,100	77	N/A	N/A	N/A	N/A
B04045N	31	770	920	1,100	75	6	42	74	19
B04045X	51	770	950	1,400	120	6	44	74	17
B04045Z	36	770	920	1,100	76	6	42	74	18

Note
[a] A data set for beta measurements was created and added to the original background reference area data set.

Table 3-1

Summary of Final Survey Results

Survey ID Code[a]	Description	Survey Area (m^2)		Beta Scan Measurements ($dpm/100\ cm^2$)			Static Measurements ($dpm/100\ cm^2$)						
								Beta[d]			Alpha[d,e]		
		Floor[b]	Total[c]	Coverage (%)	Low Value[d]	High Value[d]	No.[f]	Low Value	Mean	High Value	Low Value	Mean	High Value
SFP and Adjacent Areas													
S04093F	FB Elev 93' Spent Fuel Pool - West Half	56	283	100	1,400	10,000[e]	51	1,400	2,000	4,300	13	51	120
S04093G	FB Elev 93' Fuel Transfer Canal	24	437	100	1,700	7,900[e]	80	1,600	2,000	2,700	7	53	110
S04093H	FB Elev 93' Cask Load Pit	15	206	100	1,800	7,000	36	1,700	2,000	2,700	20	45	73
S04093J	FB Elev 93' Spent Fuel Pool - East Half	57	314	100	1,700	7,100	57	1,600	1,900	2,900	13	46	99
S04093Q	FB Elev 93' Laydown Area - West Half	99	121	100	1,100	12,000[e]	30	1,500	1,900	2,500	0	32	62
S04093R	FB Elev 93' Laydown Area - East Half	90	158	100	920	6,400	30	1,100	1,900	5,700	13	46	86
S04093T	FB Elev 93' Spent Fuel Pool SW Floor/Lwr Walls	95	282	100	880	11,000[e]	50	1,100	2,100	4,400	13	49	110
S04093V	FB Elev 93' Spent Fuel Pool S Center Floor Area	88	113	100	770	7,100	34	930	1,800	2,300	0	36	79
S04093X	FB Elev 93' Spent Fuel Pool SE Floor Area	67	120	100	800	12,000[e]	34	770	1,500	2,100	0	28	68
Areas Housing SFP-Impacted Components													
S04061G	FB Elev 61' SFP Heat Exchanger Room	21	155	100	760	7,500	36	950	1,500	2,400	7	23	53
S05045M	AB Elev 45' SFP Cooling/Purification Pump Rms	34	131	100	600	6,800	30	400	1,100	2,700	0	23	68
S05077N	AB Elev 77' Filter Pit "D"	3	36	100	870	7,400	31	450	1,200	2,400	7	29	79
S05077P	AB Elev 77' Filter Pit "E"	3	36	100	950	7,200	32	660	1,500	2,800	13	46	110
P62042A	D&DS Outfall Chamber & Pipe	11	209	100	600	8,900[e]	36	420	1,700	6,800	0	46	99
P62208A	Embedded SFP Ducting 18" Diameter & Larger	N/A	192	100	680	4,800	30	520	920	2,100	0	26	74

Notes:

[a] See Section 2.1.4 for description of survey ID code nomenclature.

[b] Includes floor surface area only.

[c] Includes floor and other surfaces in survey unit.

[d] Survey results reported to two significant figures or to the nearest single-digit whole integer.

[e] Data investigation performed and EMC applied.

[f] Number collected of each type of radiation measurement; multiply value by two for total number of static measurements collected in survey unit.

Table 3-2

Summary of Data Investigation Results and Actions Taken

Survey Unit	Class	Identified Locations	Area > DCGL (m^2)	Action(s) Taken	Maximum Value (dpm/100 cm^2)[a]	
					Before	After
Beta Scan Measurements[b]						
S04093F[c]	1	4	0.05	apply EMC	10,000[d]	10,000[d]
S04093G[c]	1	1	0.02	" "	7,900[d]	7,900[d]
S04093Q	1	10	0.06	remediate/apply EMC	23,000[d]	12,000
S04093R	1	9	0.18	remediate	42,000[d]	6,400
S04093T	1	19	0.32	remediate/apply EMC	56,000[d]	11,000
S04093V	1	6	0.05	remediate	34,000[d]	7,100
S04093X	1	9	0.08	remediate/apply EMC	150,000[d]	12,000
S04061G	1	5	N/A	none	9,800[d]	7,500
S05045M	1	1	N/A	"	7,800[d]	6,800
S05077N	1	2	"	"	8,600[d]	7,400
S05077P	1	3	"	"	9,600[d]	7,200
P62042A	1	7	1.35	apply EMC	11,000[d]	8,900
Alpha Static Measurements						
S04093F	1	43	0.6	apply EMC	120	120
S04093G	1	68	0.9	remediate/apply EMC	330	110
S04093H	1	30	0.4	apply EMC	73	73
S04093J	1	46	0.6	remediate/apply EMC	160	99
S04093Q	1	62	0.25	apply EMC	62	62
S04093R	1	23	0.3	remediate/apply EMC	170	86
S04093T	1	41	0.53	apply EMC	110	110
S04093V	1	23	0.3	" "	79	79
S04093X	1	15	0.2	" "	68	68
S04061G	1	11	0.14	" "	53	53
S05045M	1	7	0.1	" "	68	68
S05077N	1	12	0.2	" "	79	79
S05077P	1	31	0.4	" "	110	110
P62042A	1	23	0.3	remediate/apply EMC	290	99
P62208A	1	11	0.14	apply EMC	74	74

Notes:
[a] Values rounded to two significant figures.
[b] Actions taken included correcting results by subtracting instrument background and applying an area correction for areas smaller than 100 cm^2, unless otherwise noted.
[c] Data investigation performed as part of in-process remediation (see discussion in Section 2.4.2); identified locations are areas of elevated residual radioactivity which remain after remediation of hundreds of small areas.
[d] Uncorrected value (i.e., instrument background not subtracted and area correction not applied).

4. DATA ASSESSMENT

Final survey data were reviewed to ensure that they were of a sufficient type, quantity, and quality such that conclusions could be drawn with confidence regarding the radiological condition of the survey unit. Conclusions were drawn and documented in a separate release record prepared for each survey unit. A summary of the release record for each survey unit is given in Appendix B.

4.1 DATA VERIFICATION AND VALIDATION

Data were reviewed to verify Data Quality Objectives (DQOs) established in the final survey design were met. Graphical representations and statistical comparisons of the data were made which provided both qualitative and quantitative information about the data. An assessment was performed to verify the data supported the underlying assumptions necessary for the statistical tests, if applicable.

4.1.1 DATA QUALITY

The final survey data were verified authentic, appropriately documented, and technically defensible. Specifically, the following conclusions were made:

1. The instruments used to collect the data were capable of detecting the radiation of interest at or below the investigation level except as noted in Section 2.2.1.3.

2. The calibration of the instruments used to collect the data was current and radioactive sources used for calibration were NIST traceable.

3. Instrument response was checked before and, where required, after data collection each day.

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

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

6. Special measurement methods used to collect the data were applied as warranted by survey conditions.

7. The custody of samples collected for laboratory analysis was tracked from the point of collection until final results were obtained.

8. The final survey data set consists of qualified measurement results that are representative of the current facility status and randomly collected as prescribed by the survey design.

4.1.2 GRAPHICAL DATA REVIEW

Survey data were graphed to identify patterns, relationships, or potential anomalies in the data that might go unnoticed using purely numerical methods. A frequency plot was used to examine the general shape of the data distribution.

4.1.3 BASIC STATISTICAL COMPARISONS

Statistical quantities (range, median, and standard deviation) were calculated separately for the beta and alpha final survey data sets for each final survey unit. The calculated quantities were compared to the test values shown in the following table.

Basic Statistical Comparisons

Statistical Quantity	Test Value	Failure Response
Range (R)	$R \leq 5\sigma$	Examine data for outliers
Median ($\tilde{u}$)	$\lvert (\tilde{u} - \text{mean}) / \sigma \rvert \leq 0.5$	Examine data for outliers and anomalies
Standard Deviation (σ)	$\sigma \leq 0.2 \times \text{DCGL}$	Determine if more measurements are necessary

Where the statistical quantity failed the comparison, the data set and/or survey design assumptions were examined.

4.1.3.1 Range Test

Where the range was greater than 5 standard deviations, the data were examined for outliers. Outliers usually represented true extreme values of a distribution, such as areas of elevated residual radioactivity, and indicated more variability in the population than was expected. There were three range test failures; however, no data were discarded. The failures were generally caused by a very tight distribution and a single outlier with elevated results relative to the rest of the data set.

Range Test Failures[a]

Survey Unit	Calculated Value	Acceptance Criterion	Reason for Failure		
			Number of Outliers	High/Low Value (dpm/100 cm^2)[b]	Balance of Data (dpm/100 cm^2)[b]
S04093F	2,910	≤ 2,225	2	3,900[c]	<2,300
S04093G	1,185	≤ 1,177	N/A	2,700	<2,700[d]
S04093R	4,614	≤ 4,119	1	5,700	<2,600

Notes:
[a] Test failures are for beta measurement data sets.
[b] Values rounded to two significant figures.
[c] Value shown is average of both outliers.
[d] Small standard deviation due to tight data set population distribution.

4.1.3.2 Median Test

Failure of the median test indicates large differences between the mean and the median and is an indication of the skewness in the data, warranting an examination of the data for outliers or anomalies. There were no failures of the median test.

4.1.3.3 Standard Deviation Test

Where the value of the calculated standard deviation was larger than that estimated in the survey design (the initial design value was 0.2 x DCGL), an insufficient number of measurements may have been taken and additional measurements may have been necessary. None of the beta measurement data sets failed the standard deviation test. However, due to the low alpha gross activity DCGL value relative to background, every alpha measurement data set failed the standard deviation test. The standard deviation test consequently cannot be used as indicator of whether an insufficient number of measurements may have been taken. Instead, the results of the statistical test provide this answer directly (see Section 4.2.3).

4.2 SATISFACTION OF THE SITE RELEASE CRITERIA

Four conditions were established that, when met, satisfy the site release criteria (see Section 1.3.1). These conditions were applied using the unity rule and a background reference area for each survey unit, as shown below. The results are shown in Table 4-1.

Survey Units and Corresponding Background Reference Areas

Survey Unit	Number of Measurements	Unity Rule Mean	Background Reference Area	Number of Measurements	Unity Rule Mean
S04093F	51	2.103	B04045X	51	1.689
S04093G	80	2.138	B04045Y	80	1.765
S04093H	36	1.860	B04045Z	36	1.619
S04093J	57	1.892	B04045X	51	1.689
S04093Q	30	1.384	B02027B	30	1.344
S04093R	30	1.904	B02027B	30	1.344
S04093T	50	2.020	B04045X	50	1.685
S04093V	34	1.533	B02027B	30	1.344
S04093X	34	1.207	B02027B	30	1.344
S04061G	36	1.022	B02027B	30	1.344
S05045M	30	0.973	B02027B	30	1.344
S05077N	31	1.192	B04045N	31	1.630
S05077P	32	1.827	B04045N	31	1.630
P62042A	36	1.871	B04045Z	36	1.617
P62208A	30	1.033	B04208B	30	0.645

4.2.1 CONDITION #1 - MEAN TEST

Condition #1 requires that the average residual radioactivity above background be less than or equal to the DCGL. For unity rule application, the DCGL is 1.0. Where a background reference area is used, the difference between the average residual radioactivity of the final survey data set and the average of the background reference area must be less than or equal to the DCGL. Where penetrating radiation from embedded piping is present, as in the SFP-impacted areas, the average is compared to 0.8 x DCGL instead of to the DCGL (see LTP, Section 4.6.3.3).

To determine if Condition #1 was met, the mean of the background reference area was subtracted from the mean of the final survey unit data set and the difference compared to 0.8 x DCGL. In all cases, the difference between the average residual radioactivity of the final survey data set and the average of the background reference area was less than 0.7 x DCGL. Therefore, each survey unit satisfies Condition #1.

4.2.2 CONDITION #2 - ELEVATED MEASUREMENT COMPARISON

Condition #2 requires that individual measurements, representing small areas of residual radioactivity that exceed the DCGL, do not exceed the EMC DCGL. To determine if Condition #2 was met, the individual beta and alpha static measurements that exceeded the DCGL were summed and compared to the EMC DCGL. In all cases, the individual measurements were less than 0.9 x EMC DCGL. Therefore, each survey unit satisfies Condition #2.

The EMC DCGL was developed using the methodology and the area factors provided in the LTP, Appendix 4-1. The radionuclide-specific area factors given in the LTP could not be used directly to develop the EMC DCGL since the gross activity DCGL was derived based on a radionuclide distribution and not on a single radionuclide. Instead, a weighting method was applied using the radionuclide distribution and the relative activity fractions used to derive the gross activity DCGL. The radionuclides of interest were those used in the derivation of the gross activity DCGL. Area factors for use with the gross activity DCGL were calculated for areas of elevated residual radioactivity of 1 m^2, 4 m^2, and 9 m^2 in size. The area factors were 5.0, 1.2, and 1.0, respectively. As applied, areas smaller in size than 1 m^2 were generally assumed to be 1 m^2 and the 1 m^2 value of 5.0 was used, resulting in an EMC DCGL of 38,000 dpm/100 cm^2 beta and 140 dpm/100 cm^2 alpha (5.0 x DCGL). One survey unit (P62042A) had areas of elevated residual radioactivity totaling 1.7 m^2 in size. In this case, an interpolated value of 4.1 was applied as the area factor.

4.2.3 CONDITION #3 – STATISTICAL TEST

Condition #3 requires that where one or more static measurements exceed the DCGL, the average residual radioactivity passes the Sign or WRS statistical test. To determine if Condition #3 was met, the WRS test was applied to the final survey data sets, all of which had one or more static measurements above the DCGL. In all cases, the average residual radioactivity passed the WRS statistical test (i.e. the W_r value is greater than the calculated critical value). Therefore, each survey unit satisfies Condition #3.

The Sign statistical test was not used since the alpha background concentration was known to exceed the alpha gross activity DCGL and to ignore them would affect the outcome of the statistical test. Instead, the two-sample WRS statistical test was used.

The statistical test (Sign or WRS) is based on the hypothesis that the level of residual radioactivity in the survey unit exceeds the DCGL. There must be sufficient survey data with levels of residual radioactivity at or below the DCGL to reject this statistical hypothesis and to conclude the survey unit meets the site release dose criterion. When the results of the statistical test do reject this hypothesis, the power of the statistical test (i.e., whether a sufficient number of measurements was collected) becomes a somewhat moot question. The data provided statistically significant evidence that the level of residual radioactivity in the survey unit does not exceed the site release dose criterion. The decision that the survey unit is acceptable for unrestricted release can be made with sufficient confidence and without further analysis.

4.2.4 CONDITION #4 - ALARA EVALUATION

Condition #4 requires that remediation be performed where it is ALARA to reduce the levels of residual radioactivity to below the concentrations necessary to meet the DCGLs. The levels of residual radioactivity were considered ALARA once remediation actions, considered to be cost effective, were taken. To determine if Condition #4 was met, an ALARA evaluation was performed for every Class 1 survey unit. In all cases, the ALARA evaluation verified that remediation was performed where it was ALARA to do so. Therefore, each survey unit satisfies Condition #4.

The ALARA evaluation ensured that: (1) residual radioactivity had been reduced to levels that are as low as reasonably achievable, and (2) efforts to remove residual radioactivity were commensurate with the level of risk the residual radioactivity poses. The ALARA evaluation examined various remediation actions to determine which actions, if any, have a net benefit in further reducing the levels of residual radioactivity. The evaluation compared residual radioactivity levels to calculated remediation levels (see Appendix A) for possible remediation actions. The remediation action was taken where the level of residual radioactivity exceeded the remediation level. Conversely, if the concentration was less than the remediation level, the level of residual radioactivity was documented as ALARA and the remediation action was not performed.

Table 4-1

Satisfaction of Conditions for Site Release

Survey ID Code	Description	Condition #1 Mean Test		Condition #2 EMC			Condition #3 WRS Test		Condition #4 ALARA		Conclusion: Satisfies Release Criteria?
		Mean	Diff	Area (m^2)	Max Value	% of EMC	W_r Value	Critical Value	Rad Levels ALARA?	Remediated to ALARA?	
SFP and Adjacent Areas											
S04093F	FB Elev 93' Spent Fuel Pool - West Half	2.103	0.414	0.6	4.25	85	3,295	2,872	N	Y	Y
S04093G	FB Elev 93' Fuel Transfer Canal	2.138	0.373	0.9	3.79	76	7,736	6,922	N	Y	Y
S04093H	FB Elev 93' Cask Load Pit	1.860	0.241	0.4	2.61	52	1,729	1,460	N	Y	Y
S04093J	FB Elev 93' Spent Fuel Pool - East Half	1.892	0.203	0.6	3.54	71	3,688	3,047	N	Y	Y
S04093Q	FB Elev 93' Laydown Area - West Half	1.384	0.040	0.3	2.21	44	1,256	1,026	N	Y	Y
S04093R	FB Elev 93' Laydown Area - East Half	1.904	0.560	0.5	3.07	61	1,031	1,026	N	Y	Y
S04093T	FB Elev 93' Spent Fuel Pool SW Floor/Lower Walls	2.020	0.335	0.9	3.79	76	3,173	2,764	N	Y	Y
S04093V	FB Elev 93' Spent Fuel Pool S Center Floor Area	1.533	0.189	0.4	2.82	56	1,263	1,097	N	Y	Y
S04093X	FB Elev 93' Spent Fuel Pool SE Floor Area	1.207	0.137	0.3	2.43	49	1,388	1,097	N	Y	Y
Areas Housing SFP-Impacted Components											
S04061G	FB Elev 61' SFP Heat Exchanger Room	1.022	0.322	0.1	1.89	38	1,502	1,020	N	Y	Y
S05045M	AB Elev 45' SFP Cooling/Purification Pump Rooms	0.973	0.371	0.1	2.43	49	1,333	1,026	N	Y	Y
S05077N	AB Elev 77' Filter Pit "D"	1.192	0.438	0.2	2.82	56	1,401	1,094	N	Y	Y
S05077P	AB Elev 77' Filter Pit "E"	1.827	0.197	0.4	3.79	76	1,278	1,144	N	Y	Y
P62042A	D&DS Outfall Chamber/Pipe	1.871	0.254	1.7	3.54	86	1,571	1,460	N	Y	Y
P62208A	Embedded SFP Ducting 18" Diameter & Larger	1.033	0.688	0.1	2.64	53	1,213	1,026	N	Y	Y

5. FINAL SURVEY CONCLUSION

The final survey of the SFP-impacted areas was performed in accordance with the LTP and its implementing procedures. Final survey data of adequate quantity and quality were collected from each of the survey units. The survey data for each survey unit showed:

1. The difference between the average residual radioactivity of the final survey data set and the average of the background reference area was less than 0.8 x DCGL, which allows for the dose contribution due to penetrating radiation from embedded piping.

2. Individual measurements, representing small areas of residual radioactivity that exceeded the DCGL, did not exceed the EMC DCGL.

3. The average residual radioactivity passed the WRS statistical test.

4. Remediation was performed where it was ALARA to reduce the levels of residual radioactivity to below the concentrations necessary to meet the DCGLs.

These conditions satisfy the site release criteria established in the LTP and the radiological criteria for unrestricted use given in 10 CFR 20.1402 (see Section 1.3). Therefore, it is concluded that the SFP-impacted areas are suitable for release to unrestricted use.

6. REFERENCES

6-1 Code of Federal Regulations, Title 10, Part 20.1402, "Radiological Criteria for Unrestricted Use."

6-2 Portland General Electric Company Topical Report PGE-1061, "Trojan Nuclear Plant Defueled Safety Analysis Report and License Termination Plan (PGE-1078)"

6-3 Portland General Electric Company Topical Report PGE-8010, "Trojan Nuclear Quality Assurance Program."

6-4 Portland General Electric Company, "Trojan Nuclear Plant Radiological Site Characterization Report," Revision 0.1, February 8, 1995.

APPENDIX A

SURVEY PREPARATION ACTIVITIES

This appendix provides a general description of decommissioning activities in the nature of a historical assessment that was used to determine the final survey classification of each of the SFP-impacted areas. Detailed decommissioning information as well as a brief radiological history is found in the LTP, Section 3.

The SFP-impacted areas were prepared for final survey by a series of decommissioning activities, including radiological characterization, dismantlement or demolition, remediation, and turnover to final survey. Radiological characterization data were gathered and analyzed. The results guided decisions regarding the need for, extent of, and most effective means of remediation. Areas were remediated as needed, and then systematically turned over for final survey. An assessment of the operation and radiological history established the initial classification of SFP-impacted areas.

RADIOLOGICAL CHARACTERIZATION

Radiological characterization was completed in two phases. The initial radiological characterization was performed as Phase I. It is documented in the "Trojan Nuclear Plant Radiological Site Characterization Report," Revision 0.1, dated February 8, 1995. Phase II involved routine radiological surveys, referred to as operational surveys. These surveys were used to support dismantlement and remediation activities. Areas that were not, or could not be, surveyed during Phase I were surveyed during Phase II. Based on the surveys gathered as part of Phase II characterization, the predominant beta-emitting radionuclides were ^{60}Co, ^{90}Sr, ^{137}Cs, and ^{241}Pu. The predominant alpha emitters were $^{239/240}$Pu and ^{241}Am.

DISMANTLEMENT AND DEMOLITION ACTIVITIES

Equipment and components, as well as heavily contaminated concrete and masonry surfaces, were removed during decommissioning.

REMEDIATION ACTIVITIES

Remaining structural and component surfaces were remediated using a variety of techniques ranging from wiping to surface material removal. Removable surface radioactivity was remediated via simple means such as wiping down an area and vacuuming to collect dirt and loose radioactivity from recesses and corners. These were considered good practices and were typically applied. Concrete surfaces were remediated by scabbling. Abrasive blasting was used to remove fixed radioactivity from surfaces other than concrete.

Remediation levels were established for various types of remediation actions such as scrubbing, abrasive blasting, and scabbling. Remediation levels were developed using an unbiased analysis of remediation actions that could both avert future dose (a benefit to society) and cost money (a potential detriment to society). They are based on the methodology and assumptions given in the

LTP, Section 2.4.2. Where the level of residual radioactivity exceeded the remediation level, the remediation action was taken. Conversely, if the concentration was less than the remediation level, the level of residual radioactivity was considered ALARA and the remediation action was not performed.

The remediation levels applied to SFP-impacted areas are given below.

Remediation Levels

Remediation Action	Beta (dpm/100 cm^2)	Alpha (dpm/100 cm^2)
Hand scrubbing	11,000	26
Abrasive blasting	30,000	68
Scabbling	35,000	81

TURNOVER

A systematic approach was established for the turnover of the SFP-impacted areas from the Decommissioning organization to the Final Survey organization. Dismantlement and remediation activities were completed in areas that could be isolated or controlled in such a manner as to minimize the potential for the reintroduction of contamination from ongoing decommissioning activities in adjacent or nearby areas. These work areas were then prepared for final survey data collection. The SFP-impacted areas were divided into 9 work areas, listed in the following table, each of which was turned over separately.

Turnover List

Turnover Checklist Number	Work Area Description
81	Aux Bldg Elev. 77' filter pits
119	Fuel Bldg Elev. 61' SFP heat exchanger room
121	Fuel Bldg Elev. 93' SFP, fuel transfer canal, cask load pit, & adjacent flr areas
128	Embedded SFP ventilation ducting
132	Fuel Bldg Elev. 93' SFP adjacent floor/laydown area
146	Fuel Bldg Elev. 93' SFP adjacent floor/laydown area
147	Aux Bldg Elev. 45' SFP purification and cooling pump rooms
154	Fuel Bldg Elev. 93' SFP adjacent floor/laydown area
163	D&DS outfall chamber & pipe

Prior to turnover, a walkdown of the work area was performed when the final configuration was known, usually near or after the completion of dismantlement and remediation activities. The physical state of the area and the scope of work necessary to prepare it for final survey were assessed during the walkdown. Requirements for access, isolation, and control were also addressed during the walkdown. Support activities necessary to conduct the final survey, such as

scaffolding, interference removal, and electrical tag-outs, were identified. Safety concerns such as access to confined spaces, high walls, and ceilings were also identified.

Tools, equipment, and materials not needed for final survey data collection were removed. Housekeeping and clean-up activities were completed. Scaffolding and other temporary equipment needed for final survey data collection were put in place. Administrative and physical controls were instituted to minimize the possibility of introducing radioactive material from ongoing decommissioning activities in adjacent or nearby areas. These measures included personnel training, installation of barriers to control access to the area, installation of postings with access/egress requirements, and removing access to the area.

HISTORICAL ASSESSMENT AND INITIAL CLASSIFICATION

Based on an assessment of relevant historical information, an initial classification was assigned to the structural surfaces and equipment remaining following the completion of dismantlement, demolition, and remediation activities. Information used in the assessment included the operational and radiological history of the area, the remediation activities performed in the area, and the radiological characterization data collected during decommissioning prior to turnover. Measurement results are summarized in Section 2.1.2.

APPENDIX B

SURVEY UNIT SUMMARY REPORTS – SPENT FUEL POOL IMPACTED AREAS

Survey Unit ID Code	Page(s)
S04093F	B-2 through B-17
S04093G	B-18 through B-39
S04093H	B-40 through B-51
S04093J	B-52 through B-70
S04093Q	B-71 through B-82
S04093R	B-83 through B-95
S04093T	B-96 through B-111
S04093V	B-112 through B-123
S04093X	B-124 through B-135
S04061G	B-136 through B-147
S05045M	B-148 through B-160
S05077N	B-161 through B-172
S05077P	B-173 through B-184
P62042A	B-185 through B-200
P62208A	B-201 through B-211

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	51	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.368e+003
Maximum Value	:	4.278e+003
Range	:	2.910e+003
Median	:	1.936e+003
Std. Deviation	:	4.450e+002
Mean	:	1.989e+003
95% UCL	:	2.093e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	1.581e+003	000018	1.710e+003	000035	1.703e+003
000002	2.174e+003	000019	1.865e+003	000036	1.916e+003
000003	4.278e+003	000020	2.123e+003	000037	1.774e+003
000004	2.194e+003	000021	2.291e+003	000038	1.929e+003
000005	2.039e+003	000022	1.936e+003	000039	2.084e+003
000006	1.594e+003	000023	1.639e+003	000040	1.916e+003
000007	1.607e+003	000024	1.858e+003	000041	1.949e+003
000008	1.955e+003	000025	1.974e+003	000042	1.826e+003
000009	1.962e+003	000026	1.923e+003	000043	2.168e+003
000010	2.155e+003	000027	1.910e+003	000044	1.974e+003
000011	1.994e+003	000028	1.826e+003	000045	2.200e+003
000012	1.568e+003	000029	2.065e+003	000046	2.097e+003
000013	3.504e+003	000030	1.607e+003	000047	1.923e+003
000014	2.155e+003	000031	2.033e+003	000048	2.091e+003
000015	1.820e+003	000032	1.368e+003	000049	2.097e+003
000016	1.968e+003	000033	1.639e+003	000050	1.858e+003
000017	1.671e+003	000034	1.742e+003	000051	2.181e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Measurement Data Statistical Evaluation - Beta

Statistical Comparisons

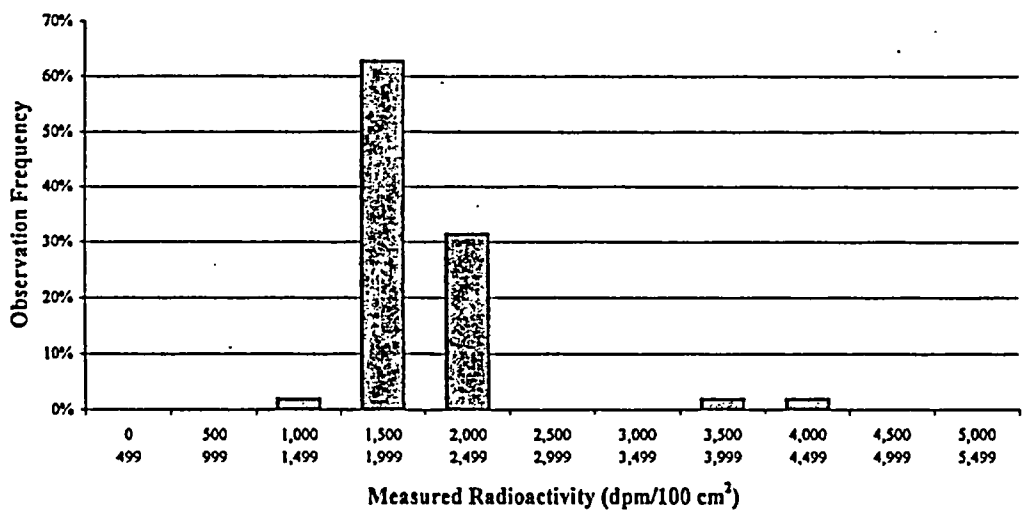
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	2,910	2,225	See comment below
Median	0.118	0.500	Pass
Mean	1,989	6,000	Pass
Std Dev	445	1,500	Pass

All values are <DCGL, WRS statistical test not required for data set.

Statistical Quantities

Range:	2,910
Median:	1,936
Mean:	1,989
Std Dev:	445
Minimum:	1,368
Maximum:	4,278
DCGL:	7,500

Data Frequency Distribution



Plot Parameters	
# of measurements:	51
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	0	0%
2	999	500	0	0%
3	1,499	1,000	1	2%
4	1,999	1,500	32	63%
5	2,499	2,000	16	31%
6	2,999	2,500	0	0%
7	3,499	3,000	0	0%
8	3,999	3,500	1	2%
9	4,499	4,000	1	2%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	51	100%

Comment:
Range failure is a test artifact due to 2 values exceeding 3,500 dpm with the other 49 values all less than 2,300 dpm, resulting in a range that is greater than the test criterion. All values are valid and accepted as representative of the survey unit.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Background Reference Area B04045X - Beta

Statistical Quantities:

Range	: 6.442e+002
Median	: 9.202e+002
Mean	: 9.454e+002
Std. Deviation:	: 1.153e+002

# of Measurements: 51 Min Value: 7.668e+002 Max Value: 1.411e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B
000031	9.202e+002	B
000032	8.627e+002	B
000033	9.048e+002	B
000034	9.087e+002	B
000035	7.937e+002	B
000036	1.024e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Background Reference Area B04045X – Beta (Continued)

Statistical Quantities:

Range	: 6.442e+002
Median	: 9.202e+002
Mean	: 9.454e+002
Std. Deviation:	: 1.153e+002

# of Measurements: 51 Min Value: 7.668e+002 Max Value: 1.411e+003

Measurement Location	Value	Data Status Code
000037	1.100e+003	B
000038	1.104e+003	B
000039	1.411e+003	B
000040	1.288e+003	B
000041	9.202e+002	B
000042	8.512e+002	B
000043	1.062e+003	B
000044	9.202e+002	B
000045	9.010e+002	B
000046	1.062e+003	B
000047	9.317e+002	B
000048	9.969e+002	B
000049	8.857e+002	B
000050	8.933e+002	B
000051	9.048e+002	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	51	DPM/100 CM²	2.800e+001	-	3.330e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	1.323e+001
Maximum Value	:	1.190e+002
Range	:	1.058e+002
Median	:	5.291e+001
Std. Deviation	:	2.300e+001
Mean	:	5.135e+001
95% UCL	:	5.675e+001

Measurement Values

Location	Value	Location	Value	Location	Value
000001	4.630e+001	000018	1.984e+001	000035	3.968e+001
000002	6.614e+001	000019	5.952e+001	000036	3.968e+001
000003	1.984e+001	000020	5.291e+001	000037	1.323e+001
000004	7.275e+001	000021	3.968e+001	000038	5.291e+001
000005	4.630e+001	000022	8.598e+001	000039	5.952e+001
000006	7.275e+001	000023	3.968e+001	000040	5.291e+001
000007	7.275e+001	000024	5.291e+001	000041	3.968e+001
000008	4.630e+001	000025	3.968e+001	000042	3.307e+001
000009	5.291e+001	000026	5.291e+001	000043	4.630e+001
000010	7.275e+001	000027	3.968e+001	000044	6.614e+001
000011	3.968e+001	000028	3.307e+001	000045	1.190e+002
000012	3.307e+001	000029	1.323e+001	000046	5.952e+001
000013	1.190e+002	000030	8.598e+001	000047	7.937e+001
000014	3.307e+001	000031	5.291e+001	000048	6.614e+001
000015	4.630e+001	000032	2.646e+001	000049	5.952e+001
000016	2.646e+001	000033	5.952e+001	000050	1.323e+001
000017	7.275e+001	000034	2.646e+001	000051	5.952e+001

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Measurement Data Statistical Evaluation - Alpha

Statistical Comparisons

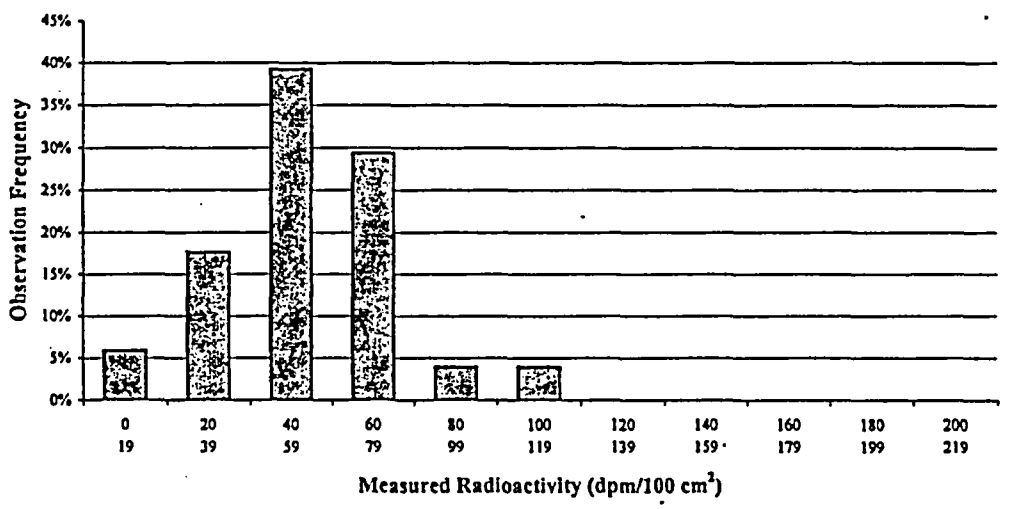
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	106	115	Pass
Median	0.066	0.500	Pass
Mean	51	28	See comment below
Std Dev	23	28	Pass
WRS	3330	2872	Pass

Data set passes the WRS statistical test as Wr (3330) is greater than k (2875).

Statistical Quantities

Range:	106
Median:	53
Mean:	51
Std Dev:	23
Minimum:	13
Maximum:	119
DCGL:	28

Data Frequency Distribution



Plot Parameters	
# of measurements:	51
# of intervals:	11
Interval increment:	20
Minimum:	0
Maximum:	219

Interval	High End	Low End	Number of Observations	Observation Frequency
1	19	0	3	6%
2	39	20	9	18%
3	59	40	20	39%
4	79	60	15	29%
5	99	80	2	4%
6	119	100	2	4%
7	139	120	0	0%
8	159	140	0	0%
9	179	160	0	0%
10	199	180	0	0%
11	219	200	0	0%
		Total:	51	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Background Reference Area B04045X - Alpha

Statistical Quantities:

Range	: 6.820e+001
Median	: 4.340e+001
Mean	: 4.376e+001
Std. Deviation:	: 1.661e+001

# of Measurements: 51 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000001	3.720e+001	B
000002	5.580e+001	B
000003	5.580e+001	B
000004	3.100e+001	B
000005	2.480e+001	B
000006	3.100e+001	B
000007	6.200e+000	B
000008	1.860e+001	B
000009	5.580e+001	B
000010	3.100e+001	B
000011	7.440e+001	B
000012	5.580e+001	B
000013	6.200e+001	B
000014	4.340e+001	B
000015	4.340e+001	B
000016	3.100e+001	B
000017	3.100e+001	B
000018	1.240e+001	B
000019	6.820e+001	B
000020	2.480e+001	B
000021	6.820e+001	B
000022	3.100e+001	B
000023	3.720e+001	B
000024	6.820e+001	B
000025	6.200e+001	B
000026	2.480e+001	B
000027	5.580e+001	B
000028	4.960e+001	B
000029	1.860e+001	B
000030	3.100e+001	B
000031	6.820e+001	B
000032	3.100e+001	B
000033	3.720e+001	B
000034	3.720e+001	B
000035	3.720e+001	B
000036	5.580e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Background Reference Area B04045X – Alpha (Continued)

Statistical Quantities:

Range	: 6.820e+001
Median	: 4.340e+001
Mean	: 4.376e+001
Std. Deviation:	: 1.661e+001

# of Measurements: 51 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000037	4.340e+001	B
000038	1.860e+001	B
000039	6.200e+001	B
000040	3.720e+001	B
000041	4.960e+001	B
000042	5.580e+001	B
000043	4.960e+001	B
000044	6.820e+001	B
000045	3.720e+001	B
000046	4.960e+001	B
000047	6.200e+001	B
000048	4.340e+001	B
000049	6.200e+001	B
000050	3.720e+001	B
000051	4.960e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 1,397
Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 10,110

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 51
Investigation Level: 750
Maximum Value: 6

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 51
Investigation Level: MDC
Maximum Value: 4

Discussion of Anomalous Measurement Data

Investigation Summary

Reason for Investigation: Forty-three alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	119
Size of Area Exceeding DCGL (m^2):	0.6
Size of Survey Unit (m^2):	283
Survey Unit Area >DCGL (%):	0.2
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
S93F01	1,581	46	0.211	1.643	1.854	947	37
S93F02	2,174	66	0.290	2.357	2.647	1062	56
S93F03	4,278	20	0.570	0.714	1.285	985.4	56
S93F04	2,194	73	0.293	2.607	2.900	958.5	31
S93F05	2,039	46	0.272	1.643	1.915	954.7	25
S93F06	1,594	73	0.213	2.607	2.820	897.2	31
S93F07	1,607	73	0.214	2.607	2.821	947	6
S93F08	1,955	46	0.261	1.643	1.904	885.7	19
S93F09	1,962	53	0.262	1.893	2.154	1016	56
S93F10	2,155	73	0.287	2.607	2.894	839.7	31
S93F11	1,994	40	0.266	1.429	1.694	782.1	74
S93F12	1,568	33	0.209	1.179	1.388	970	56
S93F13	3,504	119	0.467	4.250	4.717	950.8	62
S93F14	2,155	33	0.287	1.179	1.466	981.5	43
S93F15	1,820	46	0.243	1.643	1.886	828.2	43
S93F16	1,968	27	0.262	0.964	1.227	858.8	31
S93F17	1,671	73	0.223	2.607	2.830	916.3	31
S93F18	1,710	20	0.228	0.714	0.942	766.8	12
S93F19	1,865	60	0.249	2.143	2.392	962.3	68
S93F20	2,123	53	0.283	1.893	2.176	858.8	25
S93F21	2,291	40	0.305	1.429	1.734	947	68
S93F22	1,936	86	0.258	3.071	3.330	862.7	31
S93F23	1,639	40	0.219	1.429	1.647	889.5	37
S93F24	1,858	53	0.248	1.893	2.141	855	68
S93F25	1,974	40	0.263	1.429	1.692	828.2	62
S93F26	1,923	53	0.256	1.893	2.149	1039	25
S93F27	1,910	40	0.255	1.429	1.683	993	56
S93F28	1,826	33	0.243	1.179	1.422	862.7	50
S93F29	2,065	13	0.275	0.464	0.740	878	19
S93F30	1,607	86	0.214	3.071	3.286	1043	31
S93F31	2,033	53	0.271	1.893	2.164	920.2	68
S93F32	1,368	27	0.182	0.964	1.147	862.7	31
S93F33	1,639	60	0.219	2.143	2.361	904.8	37
S93F34	1,742	27	0.232	0.964	1.197	908.7	37
S93F35	1,703	40	0.227	1.429	1.656	793.7	37
S93F36	1,916	40	0.255	1.429	1.684	1024	56
S93F37	1,774	13	0.237	0.464	0.701	1100	43
S93F38	1,929	53	0.257	1.893	2.150	1104	19
S93F39	2,084	60	0.278	2.143	2.421	1411	62
S93F40	1,916	53	0.255	1.893	2.148	1288	37
S93F41	1,949	40	0.260	1.429	1.688	920.2	50
S93F42	1,826	33	0.243	1.179	1.422	851.2	56
S93F43	2,168	46	0.289	1.643	1.932	1062	50
S93F44	1,974	66	0.263	2.357	2.620	920.2	68
S93F45	2,200	119	0.293	4.250	4.543	901	37
S93F46	2,097	60	0.280	2.143	2.422	1062	50
S93F47	1,923	79	0.256	2.821	3.078	931.7	62
S93F48	2,091	66	0.279	2.357	2.636	996.9	43
S93F49	2,097	60	0.280	2.143	2.422	885.7	62
S93F50	1,858	13	0.248	0.464	0.712	893.3	37
S93F51	2,181	60	0.291	2.143	2.434	904.8	50
				mean:	2.103		
				maximum:	4.717		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	1.329	1.455	2.455
0.142	1.993	2.134	3.134
0.131	1.993	2.124	3.124
0.128	1.107	1.235	2.235
0.127	0.886	1.013	2.013
0.120	1.107	1.227	2.227
0.126	0.221	0.348	1.348
0.118	0.664	0.782	1.782
0.135	1.993	2.128	3.128
0.112	1.107	1.219	2.219
0.104	2.657	2.761	3.761
0.129	1.993	2.122	3.122
0.127	2.214	2.341	3.341
0.131	1.550	1.681	2.681
0.110	1.550	1.660	2.660
0.115	1.107	1.222	2.222
0.122	1.107	1.229	2.229
0.102	0.443	0.545	1.545
0.128	2.436	2.564	3.564
0.115	0.886	1.000	2.000
0.126	2.436	2.562	3.562
0.115	1.107	1.222	2.222
0.119	1.329	1.447	2.447
0.114	2.436	2.550	3.550
0.110	2.214	2.325	3.325
0.139	0.886	1.024	2.024
0.132	1.993	2.125	3.125
0.115	1.771	1.886	2.886
0.117	0.664	0.781	1.781
0.139	1.107	1.246	2.246
0.123	2.436	2.558	3.558
0.115	1.107	1.222	2.222
0.121	1.329	1.449	2.449
0.121	1.329	1.450	2.450
0.106	1.329	1.434	2.434
0.137	1.993	2.129	3.129
0.147	1.550	1.697	2.697
0.147	0.664	0.811	1.811
0.188	2.214	2.402	3.402
0.172	1.329	1.500	2.500
0.123	1.771	1.894	2.894
0.113	1.993	2.106	3.106
0.142	1.771	1.913	2.913
0.123	2.436	2.558	3.558
0.120	1.329	1.449	2.449
0.142	1.771	1.913	2.913
0.124	2.214	2.339	3.339
0.133	1.550	1.683	2.683
0.118	2.214	2.332	3.332
0.119	1.329	1.448	2.448
0.121	1.771	1.892	2.892
	mean:	1.689	
	minimum:	0.348	

Y, Z POOL	RANK#	Z Rank #
0.701	1.0	8.0
0.712	2.0	14.0
0.740	3.0	23.0
0.942	4.0	24.0
1.147	5.0	25.0
1.197	6.0	31.0
1.227	7.0	32.0
1.285	9.0	33.0
1.348	8.0	41.0
1.388	10.0	43.0
1.422	11.5	43.0
1.422	11.5	43.0
1.466	13.0	45.0
1.545	14.0	46.0
1.647	15.0	47.0
1.656	16.0	48.0
1.683	17.0	54.5
1.684	18.0	56.0
1.688	19.0	57.0
1.692	20.0	58.5
1.694	21.0	58.5
1.734	22.0	60.0
1.781	23.0	61.0
1.782	24.0	62.0
1.811	25.0	66.0
1.854	26.0	67.0
1.886	27.0	68.0
1.904	28.0	69.0
1.915	29.0	73.0
1.932	30.0	74.0
2.000	31.0	75.0
2.013	32.0	78.0
2.024	33.0	79.0
2.141	34.0	81.0
2.148	35.0	82.0
2.149	36.0	83.0
2.150	37.0	84.0
2.154	38.0	85.0
2.164	39.0	86.0
2.176	40.0	87.0
2.219	41.0	89.0
2.222	43.0	91.0
2.222	43.0	92.0
2.222	43.0	93.0
2.227	45.0	94.0
2.229	46.0	95.0
2.235	47.0	96.5
2.246	48.0	96.5
2.361	49.0	98.0
2.392	50.0	99.0
2.421	51.0	100.0
2.422	52.5	3295
2.422	52.5	Z Rank Sum = Wr

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Unity Rule Evaluation (Continued)

2.434	54.5
2.434	54.5
2.447	56.0
2.448	57.0
2.449	58.5
2.449	58.5
2.450	60.0
2.455	61.0
2.500	62.0
2.620	63.0
2.636	64.0
2.647	65.0
2.660	66.0
2.681	67.0
2.683	68.0
2.697	69.0
2.820	70.0
2.821	71.0
2.830	72.0
2.886	73.0
2.892	74.0
2.894	75.0
2.894	76.0
2.900	77.0
2.913	78.0
2.913	79.0
3.078	80.0
3.106	81.0
3.122	82.0
3.124	83.0
3.125	84.0
3.128	85.0
3.129	86.0
3.134	87.0
3.286	88.0
3.325	89.0
3.330	90.0
3.332	91.0
3.339	92.0
3.341	93.0
3.402	94.0
3.550	95.0
3.558	96.5
3.558	96.5
3.562	98.0
3.564	99.0
3.761	100.0
4.543	101.0
4.717	102.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Unity Rule Evaluation (Continued)

*Values from ***B04045X01***, which are first 51 values from background reference data set ***B04045Y01***.
Values from ***B04045X02*, which are first 51 values from background reference data set ***B04045Y02***.

Note: Highlighted background values to track for Wr

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean > Unity DCGL (1.2 > 1.0), go to means test.

Means test :
DM = (YMax - BMin) = (4.717 - 0.348) = 4.369 > Unity DCGL
DA = (YMean - BMean) = (2.103 - 1.689) = 0.414 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation.

WRS Test:
k = MARSSIM equation I.1
$k = m(n + m + 1)/2 + z(P)^{1/2}$
where: n = 51
m = 51
P= nm(n+m+1)/12 = 22,325
z = 1.645, for 0.05 Type I error
$k = 51(51+51+1)/2 + 1.645(22{,}325)^{1/2}$
k = 2627 + 1.645(149) = 2872

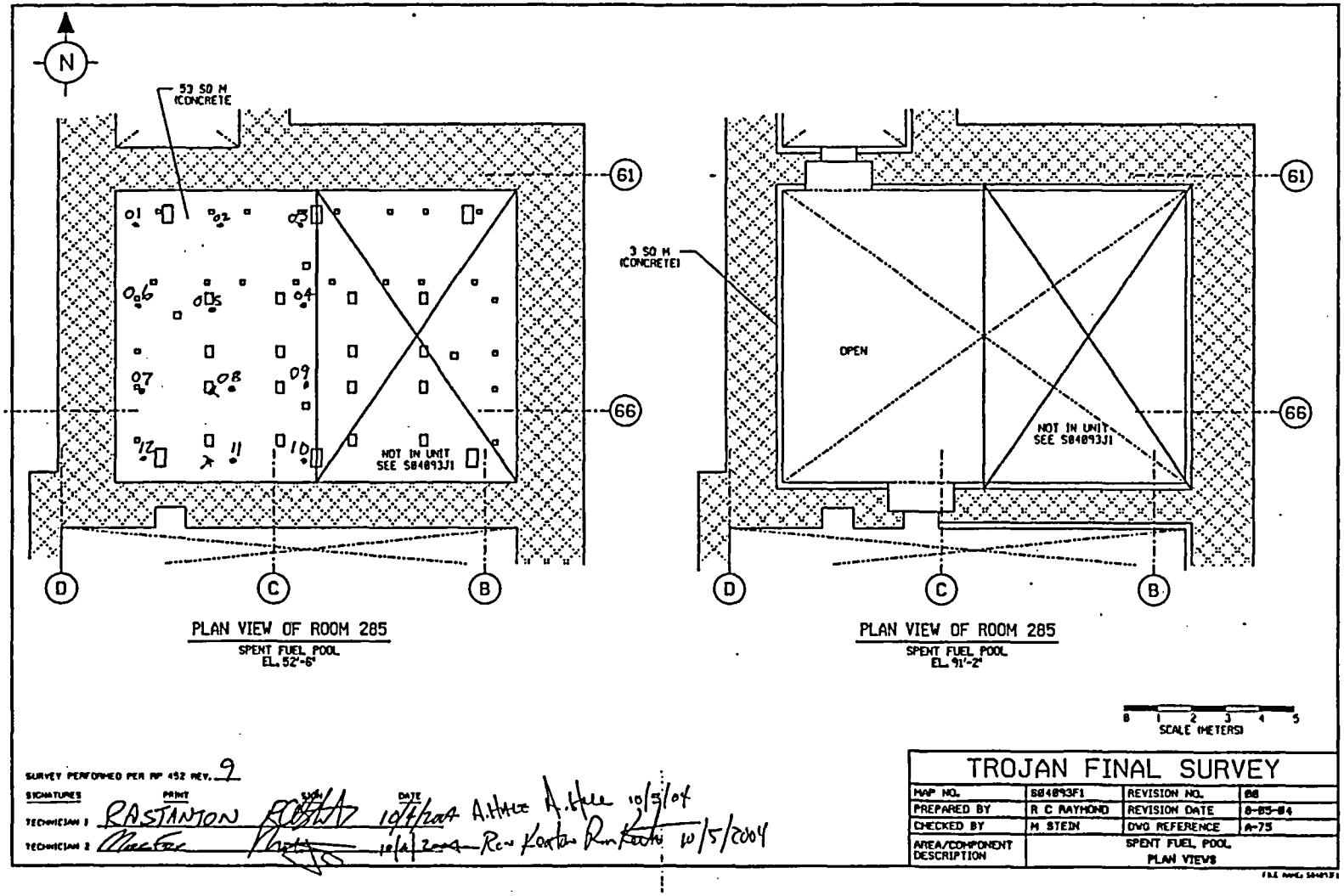
Conclusion:
Since Wr > k (3295 > 2872), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half

Classification: Class 1
Size (m^2): 283

Static Measurement Locations Map

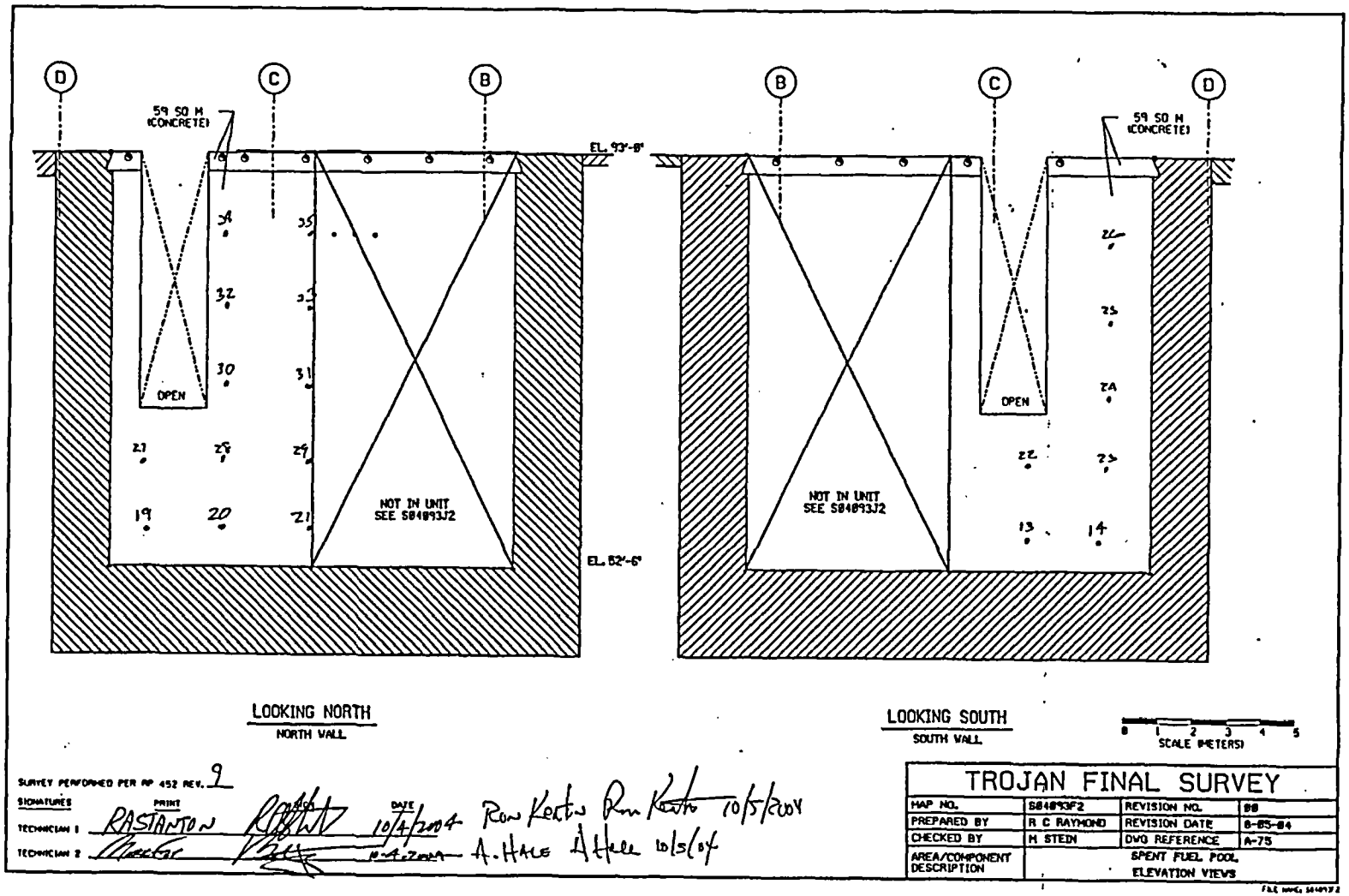


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half

Classification: Class 1
Size (m^2): 283

Static Measurement Locations Map

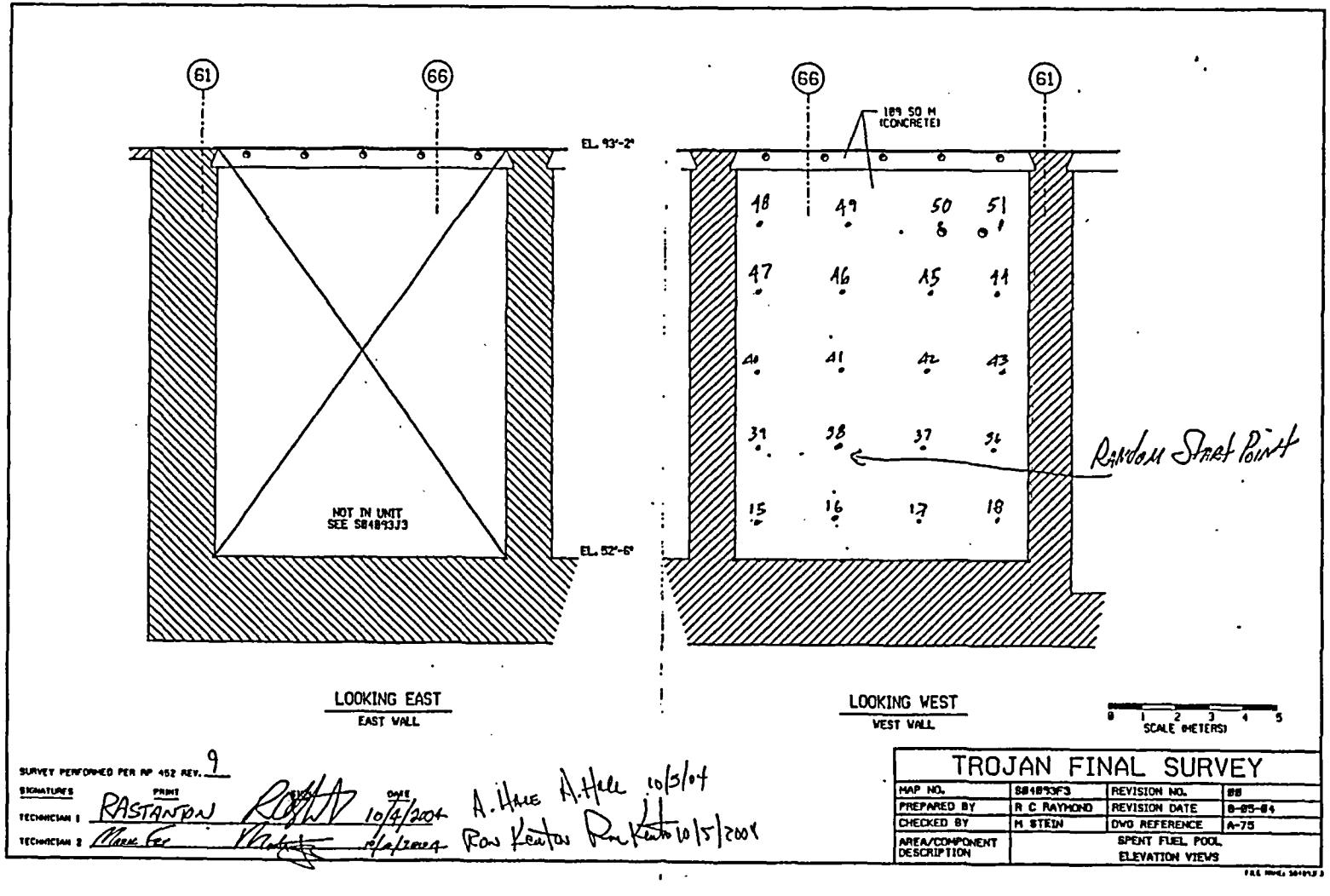


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half

Classification: Class 1
Size (m^2): 283

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	80	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.556e+003
Maximum Value	:	2.741e+003
Range	:	1.185e+003
Median	:	1.981e+003
Std. Deviation	:	2.355e+002
Mean	:	1.974e+003
95% UCL	:	2.018e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	1.671e+003	000018	1.792e+003	000035	1.804e+003
000002	1.910e+003	000019	2.065e+003	000036	1.922e+003
000003	1.891e+003	000020	2.090e+003	000037	1.854e+003
000004	1.904e+003	000021	1.910e+003	000038	1.953e+003
000005	2.127e+003	000022	1.730e+003	000039	1.873e+003
000006	1.866e+003	000023	1.842e+003	000040	1.990e+003
000007	1.687e+003	000024	1.705e+003	000041	2.046e+003
000008	1.632e+003	000025	2.238e+003	000042	2.040e+003
000009	1.823e+003	000026	2.201e+003	000043	2.015e+003
000010	2.350e+003	000027	2.189e+003	000044	2.077e+003
000011	1.842e+003	000028	1.891e+003	000045	2.034e+003
000012	2.369e+003	000029	2.009e+003	000046	2.617e+003
000013	1.755e+003	000030	2.183e+003	000047	1.618e+003
000014	1.984e+003	000031	1.885e+003	000048	1.997e+003
000015	2.207e+003	000032	2.040e+003	000049	1.619e+003
000016	1.556e+003	000033	1.773e+003	000050	1.761e+003
000017	2.040e+003	000034	1.798e+003	000051	2.145e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Data Quality Values – Beta (Continued)

Location	Value
000052	2.530e+003
000053	1.639e+003
000054	2.474e+003
000055	2.090e+003
000056	1.953e+003
000057	2.443e+003
000058	2.071e+003
000059	2.034e+003
000060	1.897e+003
000061	1.984e+003
000062	2.090e+003
000063	2.741e+003
000064	2.195e+003
000065	2.183e+003
000066	1.786e+003
000067	2.096e+003
000068	1.575e+003
000069	1.724e+003
000070	2.009e+003
000071	1.817e+003
000072	2.028e+003
000073	2.046e+003
000074	1.736e+003
000075	1.947e+003
000076	1.742e+003
000077	2.065e+003
000078	1.990e+003
000079	1.773e+003
000080	1.978e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Measurement Data Statistical Evaluation - Beta

Statistical Comparisons

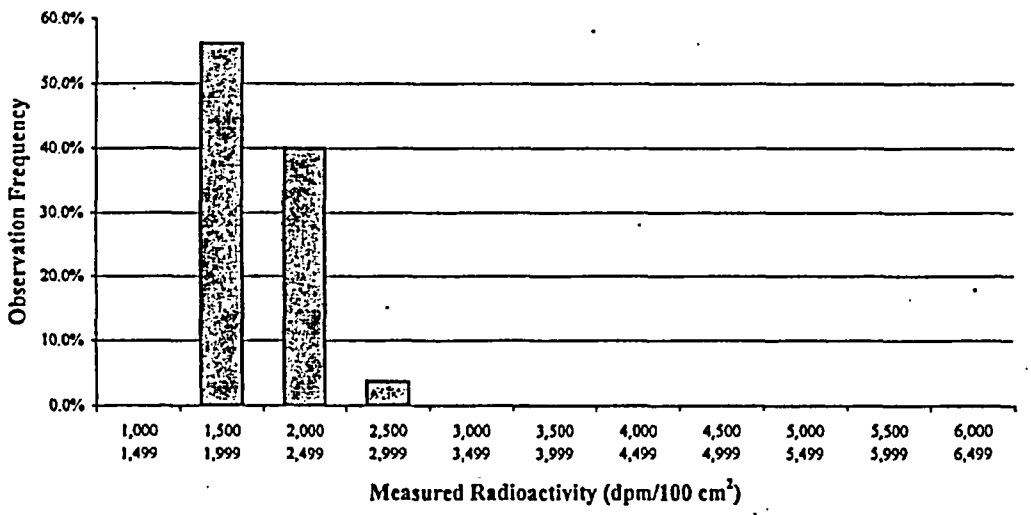
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	1,185	1,177	See comment below
Median	0.028	0.500	Pass
Mean	1,974	6,000	Pass
Std Dev	235	1,500	Pass

All values are <DCGL, WRS statistical test not required for data set.

Statistical Quantities

Range:	1,185
Median:	1,981
Mean:	1,974
Std Dev:	235
Minimum:	1,556
Maximum:	2,741
DCGL:	7,500

Data Frequency Distribution



Plot Parameters	
# of measurements:	80
# of intervals:	11
Interval increment:	500
Minimum:	1,000
Maximum:	6,499

Interval	High End	Low End	Number of Observations	Observation Frequency
1	1,499	1,000	0	0.0%
2	1,999	1,500	45	56.3%
3	2,499	2,000	32	40.0%
4	2,999	2,500	3	3.8%
5	3,499	3,000	0	0.0%
6	3,999	3,500	0	0.0%
7	4,499	4,000	0	0.0%
8	4,999	4,500	0	0.0%
9	5,499	5,000	0	0.0%
10	5,999	5,500	0	0.0%
11	6,499	6,000	0	0.0%
		Total:	80	100%

Comment:
Range failure is a test artifact due to a small standard deviation, & all measurement values less than 3,000 dpm, resulting in a range value that is greater than the test criterion. All data values are valid and accepted as representative of the survey unit.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Background Reference Area B04045Y- Beta

Statistical Quantities:

Range	: 6.442e+002
Median	: 9.202e+002
Mean	: 9.299e+002
Std. Deviation:	: 1.007e+002

# of Measurements: 80 Min Value: 7.668e+002 Max Value: 1.411e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B
000031	9.202e+002	B
000032	8.627e+002	B
000033	9.048e+002	B
000034	9.087e+002	B
000035	7.937e+002	B
000036	1.024e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal **Size (m^2):** 437

Background Reference Area B04045Y – Beta (Continued)

Statistical Quantities:

Range	: 6.442e+002
Median	: 9.202e+002
Mean	: 9.299e+002
Std. Deviation:	: 1.007e+002

# of Measurements: 80 Min Value: 7.668e+002 Max Value: 1.411e+003

Measurement Location	Value	Data Status Code
000037	1.100e+003	B
000038	1.104e+003	B
000039	1.411e+003	B
000040	1.288e+003	B
000041	9.202e+002	B
000042	8.512e+002	B
000043	1.062e+003	B
000044	9.202e+002	B
000045	9.010e+002	B
000046	1.062e+003	B
000047	9.317e+002	B
000048	9.969e+002	B
000049	8.857e+002	B
000050	8.933e+002	B
000051	9.048e+002	B
000052	8.473e+002	B
000053	8.703e+002	B
000054	8.473e+002	B
000055	8.128e+002	B
000056	8.397e+002	B
000057	7.898e+002	B
000058	8.052e+002	B
000059	8.742e+002	B
000060	9.393e+002	B
000061	8.473e+002	B
000062	8.818e+002	B
000063	9.547e+002	B
000064	9.355e+002	B
000065	9.317e+002	B
000066	9.393e+002	B
000067	9.317e+002	B
000068	9.739e+002	B
000069	9.777e+002	B
000070	9.585e+002	B
000071	8.780e+002	B
000072	8.282e+002	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Background Reference Area B04045Y – Beta (Continued)

```
Statistical Quantities:
-----------------------
Range                  : 6.442e+002
Median                 : 9.202e+002
Mean                   : 9.299e+002
Std. Deviation:        : 1.007e+002

# of Measurements: 80   Min Value: 7.668e+002      Max Value:  1.411e+003
```

Measurement Location	Value	Data Status Code
000073	9.087e+002	B
000074	9.317e+002	B
000075	9.125e+002	B
000076	9.317e+002	B
000077	1.005e+003	B
000078	8.550e+002	B
000079	9.662e+002	B
000080	1.001e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	80	DPM/100 CM²	2.800e+001	-	7.854e+003

Statistical Quantities

Measurement Name:

Minimum Value :	6.614e+000
Maximum Value :	1.058e+002
Range :	9.919e+001
Median :	5.291e+001
Std. Deviation :	2.193e+001
Mean :	5.250e+001
95% UCL :	5.658e+001

Measurement Values

Location	Value	Location	Value	Location	Value
000001	3.307e+001	000018	6.614e+001	000035	1.984e+001
000002	5.952e+001	000019	4.630e+001	000036	2.646e+001
000003	1.984e+001	000020	3.968e+001	000037	5.952e+001
000004	5.291e+001	000021	6.614e+001	000038	6.614e+001
000005	5.952e+001	000022	3.307e+001	000039	3.968e+001
000006	3.968e+001	000023	7.275e+001	000040	4.630e+001
000007	3.307e+001	000024	7.275e+001	000041	5.291e+001
000008	5.291e+001	000025	5.952e+001	000042	3.968e+001
000009	7.937e+001	000026	1.058e+002	000043	7.937e+001
000010	4.630e+001	000027	7.937e+001	000044	7.275e+001
000011	5.291e+001	000028	3.968e+001	000045	7.937e+001
000012	1.984e+001	000029	2.646e+001	000046	3.307e+001
000013	2.646e+001	000030	7.275e+001	000047	3.968e+001
000014	5.291e+001	000031	6.614e+001	000048	3.307e+001
000015	2.646e+001	000032	3.968e+001	000049	5.291e+001
000016	3.968e+001	000033	5.291e+001	000050	2.646e+001
000017	4.630e+001	000034	4.630e+001	000051	6.614e+001

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Data Quality Values – Alpha (Continued)

Location	Value
000052	9.259e+001
000053	5.952e+001
000054	6.614e+001
000055	8.598e+001
000056	3.307e+001
000057	3.307e+001
000058	3.307e+001
000059	3.968e+001
000060	5.291e+001
000061	9.259e+001
000062	5.291e+001
000063	9.259e+001
000064	1.984e+001
000065	9.259e+001
000066	8.598e+001
000067	6.614e+000
000068	2.646e+001
000069	6.614e+001
000070	3.307e+001
000071	8.598e+001
000072	8.598e+001
000073	8.598e+001
000074	5.291e+001
000075	5.291e+001
000076	5.952e+001
000077	5.952e+001
000078	3.307e+001
000079	2.646e+001
000080	3.307e+001

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Measurement Data Statistical Evaluation - Alpha

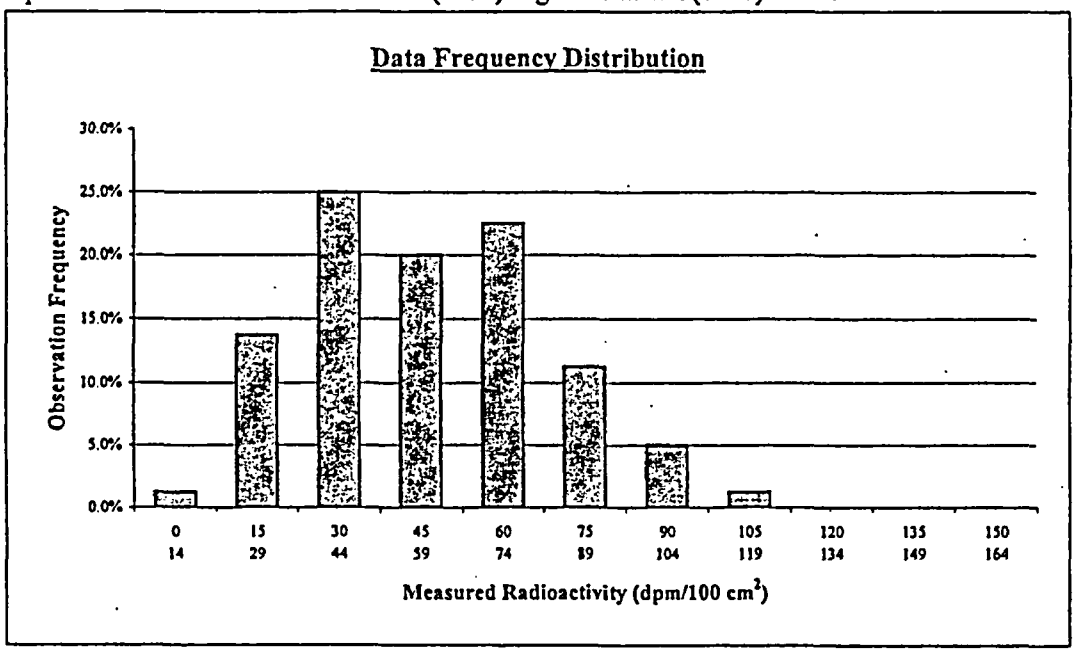
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	99	110	Pass
Median	0.018	0.500	Pass
Mean	53	28	See comment below
Std Dev	22	28	Pass
WRS	7854	6840	Pass

Statistical Quantities

Range:	99
Median:	53
Mean:	53
Std Dev:	22
Minimum:	7
Maximum:	106
DCGL:	28

Data set passes the WRS statistical test as Wr (7854) is greater than k (6840).



Plot Parameters	
# of measurements:	80
# of intervals:	11
Interval increment:	15
Minimum:	0
Maximum:	164

Interval	High End	Low End	Number of Observations	Observation Frequency
1	14	0	1	1.3%
2	29	15	11	13.8%
3	44	30	20	25.0%
4	59	45	16	20.0%
5	74	60	18	22.5%
6	89	75	9	11.3%
7	104	90	4	5.0%
8	119	105	1	1.3%
9	134	120	0	0.0%
10	149	135	0	0.0%
11	164	150	0	0.0%
		Total:	80	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Background Reference Area B04045Y - Alpha

Statistical Quantities:

Range	: 2.542e+002
Median	: 4.340e+001
Mean	: 4.596e+001
Std. Deviation:	: 3.125e+001

# of Measurements: 80 Min Value: 6.200e+000 Max Value: 2.604e+002

Measurement Location	Value	Data Status Code
000001	3.720e+001	B
000002	5.580e+001	B
000003	5.580e+001	B
000004	3.100e+001	B
000005	2.480e+001	B
000006	3.100e+001	B
000007	6.200e+000	B
000008	1.860e+001	B
000009	5.580e+001	B
000010	3.100e+001	B
000011	7.440e+001	B
000012	5.580e+001	B
000013	6.200e+001	B
000014	4.340e+001	B
000015	4.340e+001	B
000016	3.100e+001	B
000017	3.100e+001	B
000018	1.240e+001	B
000019	6.820e+001	B
000020	2.480e+001	B
000021	6.820e+001	B
000022	3.100e+001	B
000023	3.720e+001	B
000024	6.820e+001	B
000025	6.200e+001	B
000026	2.480e+001	B
000027	5.580e+001	B
000028	4.960e+001	B
000029	1.860e+001	B
000030	3.100e+001	B
000031	6.820e+001	B
000032	3.100e+001	B
000033	3.720e+001	B
000034	3.720e+001	B
000035	3.720e+001	B
000036	5.580e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Background Reference Area B04045Y – Alpha (Continued)

Statistical Quantities:

Range	: 2.542e+002
Median	: 4.340e+001
Mean	: 4.596e+001
Std. Deviation:	: 3.125e+001

# of Measurements: 80 Min Value: 6.200e+000 Max Value: 2.604e+002

Measurement Location	Value	Data Status Code
000037	4.340e+001	B
000038	1.860e+001	B
000039	6.200e+001	B
000040	3.720e+001	B
000041	4.960e+001	B
000042	5.580e+001	B
000043	4.960e+001	B
000044	6.820e+001	B
000045	3.720e+001	B
000046	4.960e+001	B
000047	6.200e+001	B
000048	4.340e+001	B
000049	6.200e+001	B
000050	3.720e+001	B
000051	4.960e+001	B
000052	2.604e+002	B
000053	4.340e+001	B
000054	5.580e+001	B
000055	5.580e+001	B
000056	2.480e+001	B
000057	4.960e+001	B
000058	4.960e+001	B
000059	3.100e+001	B
000060	4.960e+001	B
000061	2.480e+001	B
000062	8.681e+001	B
000063	2.480e+001	B
000064	1.860e+001	B
000065	4.340e+001	B
000066	1.860e+001	B
000067	3.100e+001	B
000068	2.480e+001	B
000069	4.340e+001	B
000070	2.480e+001	B
000071	2.480e+001	B
000072	1.054e+002	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Background Reference Area B04045Y – Alpha (Continued)

Statistical Quantities:

Range	: 2.542e+002
Median	: 4.340e+001
Mean	: 4.596e+001
Std. Deviation: .	: 3.125e+001

# of Measurements: 80 Min Value: 6.200e+000 Max Value: 2.604e+002

Measurement Location	Value	Data Status Code
000073	1.240e+001	B
000074	4.340e+001	B
000075	1.240e+001	B
000076	2.480e+001	B
000077	1.054e+002	B
000078	6.820e+001	B
000079	5.580e+001	B
000080	3.100e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal
Classification: Class 1
Size (m^2): 437

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 1,658
Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 7,859

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 80
Investigation Level: 750
Maximum Value: 64

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 80
Investigation Level: MDC
Maximum Value: 6

Discussion of Anomalous Measurement Data

Investigation Summary

Reason for Investigation: Sixty-eight alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	331
Size of Area Exceeding DCGL (m^2):	0.9
Size of Survey Unit (m^2):	437
Survey Unit Area >DCGL (%):	0.2
EMC Value:	140

Action Taken: Remediated static measurement locations 01, 08, 49, & 53, and resurveyed. Replaced original results in SDMS with post-remediation results. Applied EMC data processing to alpha static measurements that remain elevated.

Basis for Action Taken: Static measurement locations that approached or exceeded EMC DCGL were remediated. Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha*
S93G01	1,671	33	0.223	1.179	1.401	947	37
S93G02	1,910	60	0.255	2.126	2.380	1,062	56
S93G03	1,891	20	0.252	0.709	0.961	985	56
S93G04	1,904	53	0.254	1.890	2.144	959	31
S93G05	2,127	60	0.284	2.126	2.409	955	25
S93G06	1,866	40	0.249	1.417	1.666	897	31
S93G07	1,687	33	0.225	1.181	1.406	947	6
S93G08	1,632	53	0.218	1.893	2.110	886	19
S93G09	1,823	79	0.243	2.835	3.078	1,016	56
S93G10	2,350	46	0.313	1.654	1.967	840	31
S93G11	1,842	53	0.246	1.890	2.135	782	74
S93G12	2,369	20	0.316	0.709	1.024	970	56
S93G13	1,755	26	0.234	0.945	1.179	951	62
S93G14	1,984	53	0.265	1.890	2.154	982	43
S93G15	2,207	26	0.294	0.945	1.239	828	43
S93G16	1,556	40	0.207	1.417	1.625	859	31
S93G17	2,040	46	0.272	1.654	1.926	916	31
S93G18	1,792	66	0.239	2.362	2.601	767	12
S93G19	2,065	46	0.275	1.654	1.929	962	68
S93G20	2,090	40	0.279	1.417	1.696	859	25
S93G21	1,910	66	0.255	2.362	2.617	947	68
S93G22	1,730	33	0.231	1.181	1.412	863	31
S93G23	1,842	73	0.246	2.598	2.844	890	37
S93G24	1,705	73	0.227	2.598	2.826	855	68
S93G25	2,238	60	0.298	2.126	2.424	828	62
S93G26	2,201	106	0.293	3.779	4.072	1,039	25
S93G27	2,189	79	0.292	2.835	3.127	993	56
S93G28	1,891	40	0.252	1.417	1.669	863	50
S93G29	2,009	26	0.268	0.945	1.213	878	19
S93G30	2,183	73	0.291	2.598	2.889	1,043	31
S93G31	1,885	66	0.251	2.362	2.613	920	68
S93G32	2,040	40	0.272	1.417	1.689	863	31
S93G33	1,773	53	0.236	1.890	2.126	905	37
S93G34	1,798	46	0.240	1.654	1.893	909	37
S93G35	1,804	20	0.241	0.709	0.949	794	37
S93G36	1,922	26	0.256	0.945	1.201	1,024	56
S93G37	1,854	60	0.247	2.126	2.373	1,100	43
S93G38	1,953	66	0.260	2.362	2.623	1,104	19
S93G39	1,873	40	0.250	1.417	1.667	1,411	62
S93G40	1,990	46	0.265	1.654	1.919	1,288	37
S93G41	2,046	53	0.273	1.890	2.162	920	50
S93G42	2,040	40	0.272	1.417	1.689	851	56
S93G43	2,015	79	0.269	2.835	3.103	1,062	50
S93G44	2,077	73	0.277	2.598	2.875	920	68
S93G45	2,034	79	0.271	2.835	3.106	901	37
S93G46	2,617	33	0.349	1.181	1.530	1,062	50
S93G47	1,618	40	0.216	1.417	1.633	932	62
S93G48	1,997	33	0.266	1.181	1.447	997	43
S93G49	1,619	53	0.216	1.893	2.109	886	62

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Unity Rule Evaluation (Continued)

S93G50	1,761	26	0.235	0.945	1.180	893	37
S93G51	2,145	66	0.286	2.362	2.648	905	50
S93G52	2,530	93	0.337	3.307	3.644	847	260
S93G53	1,639	60	0.219	2.143	2.361	870	43
S93G54	2,474	66	0.330	2.362	2.692	847	56
S93G55	2,090	86	0.279	3.071	3.349	813	56
S93G56	1,953	33	0.260	1.181	1.441	840	25
S93G57	2,443	33	0.326	1.181	1.507	790	50
S93G58	2,071	33	0.276	1.181	1.457	805	50
S93G59	2,034	40	0.271	1.417	1.688	874	31
S93G60	1,897	53	0.253	1.890	2.143	939	50
S93G61	1,984	93	0.265	3.307	3.571	847	25
S93G62	2,090	53	0.279	1.890	2.168	882	87
S93G63	2,741	93	0.365	3.307	3.672	955	25
S93G64	2,195	20	0.293	0.709	1.001	936	19
S93G65	2,183	93	0.291	3.307	3.598	932	43
S93G66	1,786	86	0.238	3.071	3.309	939	19
S93G67	2,096	7	0.279	0.236	0.516	932	31
S93G68	1,575	26	0.210	0.945	1.155	974	25
S93G69	1,724	66	0.230	2.362	2.592	978	43
S93G70	2,009	33	0.268	1.181	1.449	959	25
S93G71	1,817	86	0.242	3.071	3.313	878	25
S93G72	2,028	86	0.270	3.071	3.341	828	105
S93G73	2,046	86	0.273	3.071	3.344	909	12
S93G74	1,736	53	0.231	1.890	2.121	932	43
S93G75	1,947	53	0.260	1.890	2.149	913	12
S93G76	1,742	60	0.232	2.126	2.358	932	25
S93G77	2,065	60	0.275	2.126	2.401	1,005	105
S93G78	1,990	33	0.265	1.181	1.446	855	68
S93G79	1,773	26	0.236	0.945	1.181	966	56
S93G80	1,978	33	0.264	1.181	1.445	1,001	31
				mean:	2.138		
				maximum:	4.072		

*Values from background reference survey unit ***B04045Y***.

Note: Highlighted background values to track for Wr

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean > Unity DCGL (2.1 > 1.0), go to means test.

<u>Means test :</u>
DM = (YMax - BMin) = (4.072 - 0.348) = 3.72 > Unity DCGL
DA = (YMean - BMean) = (2.138 - 1.765) = 0.373 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation (see last page).

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)	Y, Z POOL	RANK#	Z Rank #
0.126	1.329	1.455	2.455	0.516	1.0	13.0
0.142	1.993	2.134	3.134	0.949	2.0	25.0
0.131	1.993	2.124	3.124	0.961	3.0	26.0
0.128	1.107	1.235	2.235	1.001	4.0	27.0
0.127	0.886	1.013	2.013	1.024	5.0	37.0
0.120	1.107	1.227	2.227	1.155	6.0	38.0
0.126	0.221	0.348	1.348	1.179	7.0	39.0
0.118	0.664	0.782	1.782	1.180	8.0	40.0
0.135	1.993	2.128	3.128	1.181	9.0	41.0
0.112	1.107	1.219	2.219	1.201	10.0	47.0
0.104	2.657	2.761	3.761	1.213	11.0	48.0
0.129	1.993	2.122	3.122	1.239	12.0	49.0
0.127	2.214	2.341	3.341	1.348	13.0	50.0
0.131	1.550	1.681	2.681	1.401	14.0	51.0
0.110	1.550	1.660	2.660	1.406	15.0	52.5
0.115	1.107	1.222	2.222	1.412	16.0	52.5
0.122	1.107	1.229	2.229	1.441	17.0	54.0
0.102	0.443	0.545	1.545	1.445	18.0	55.0
0.128	2.436	2.564	3.564	1.446	19.0	56.0
0.115	0.886	1.000	2.000	1.447	20.0	68.0
0.126	2.436	2.562	3.562	1.449	21.0	69.0
0.115	1.107	1.222	2.222	1.457	22.0	70.5
0.119	1.329	1.447	2.447	1.507	23.0	70.5
0.114	2.436	2.550	3.550	1.530	24.0	72.0
0.110	2.214	2.325	3.325	1.545	25.0	73.0
0.139	0.886	1.024	2.024	1.564	26.0	74.0
0.132	1.993	2.125	3.125	1.565	27.0	75.0
0.115	1.771	1.886	2.886	1.625	28.0	76.0
0.117	0.664	0.781	1.781	1.633	29.0	77.0
0.139	1.107	1.246	2.246	1.666	30.0	78.0
0.123	2.436	2.558	3.558	1.667	31.0	86.0
0.115	1.107	1.222	2.222	1.669	32.0	87.0
0.121	1.329	1.449	2.449	1.688	33.0	88.0
0.121	1.329	1.450	2.450	1.689	34.5	89.5
0.106	1.329	1.434	2.434	1.689	34.5	89.5
0.137	1.993	2.129	3.129	1.696	36.0	91.0
0.147	1.550	1.697	2.697	1.781	37.0	92.0
0.147	0.664	0.811	1.811	1.782	38.0	93.0
0.188	2.214	2.402	3.402	1.789	39.0	100.0
0.172	1.329	1.500	2.500	1.790	40.0	101.0
0.123	1.771	1.894	2.894	1.811	41.0	102.5
0.113	1.993	2.106	3.106	1.893	42.0	102.5
0.142	1.771	1.913	2.913	1.919	43.0	104.0
0.123	2.436	2.558	3.558	1.926	44.0	105.0
0.120	1.329	1.449	2.449	1.929	45.0	106.0
0.142	1.771	1.913	2.913	1.967	46.0	108.0
0.124	2.214	2.339	3.339	1.998	47.0	112.0
0.133	1.550	1.683	2.683	1.999	48.0	113.0
0.118	2.214	2.332	3.332	2.000	49.0	114.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Unity Rule Evaluation (Continued)

0.119	1.329	1.448	2.448
0.121	1.771	1.892	2.892
0.113	9.300	9.413	10.413
0.116	1.550	1.666	2.666
0.113	1.993	2.106	3.106
0.108	1.993	2.101	3.101
0.112	0.886	0.998	1.998
0.105	1.771	1.877	2.877
0.107	1.771	1.879	2.879
0.117	1.107	1.224	2.224
0.125	1.771	1.897	2.897
0.113	0.886	0.999	1.999
0.118	3.100	3.218	4.218
0.127	0.886	1.013	2.013
0.125	0.664	0.789	1.789
0.124	1.550	1.674	2.674
0.125	0.664	0.790	1.790
0.124	1.107	1.231	2.231
0.130	0.886	1.016	2.016
0.130	1.550	1.680	2.680
0.128	0.886	1.014	2.014
0.117	0.886	1.003	2.003
0.110	3.764	3.875	4.875
0.121	0.443	0.564	1.564
0.124	1.550	1.674	2.674
0.122	0.443	0.565	1.565
0.124	0.886	1.010	2.010
0.134	3.764	3.898	4.898
0.114	2.436	2.550	3.550
0.129	1.993	2.122	3.122
0.133	1.107	1.241	2.241
	mean:	1.765	
	minimum:	0.348	

2.003	50.0	116.0
2.010	51.0	117.0
2.013	52.5	118.0
2.013	52.5	119.5
2.014	54.0	119.5
2.016	55.0	122.0
2.024	56.0	124.5
2.109	57.0	126.0
2.110	58.0	127.5
2.121	59.0	127.5
2.126	60.0	129.0
2.135	61.0	130.0
2.143	62.0	132.0
2.144	63.0	133.0
2.149	64.0	134.0
2.154	65.0	137.0
2.162	66.0	138.0
2.168	67.0	139.0
2.219	68.0	140.5
2.222	69.0	144.0
2.222	70.5	145.5
2.222	70.5	145.5
2.224	72.0	147.5
2.227	73.0	147.5
2.229	74.0	149.0
2.231	75.0	150.0
2.235	76.0	155.0
2.241	77.0	157.0
2.246	78.0	158.0
2.358	79.0	159.0
2.361	80.0	160.0
2.373	81.0	7736.0
2.380	82.0	Z Rank Sum = Wr
2.401	83.0	
2.409	84.0	
2.424	85.0	
2.434	86.0	
2.447	87.0	
2.448	88.0	
2.449	89.5	
2.449	89.5	
2.450	91.0	
2.455	92.0	
2.500	93.0	
2.592	94.0	
2.601	95.0	
2.613	96.0	
2.617	97.0	
2.623	98.0	
2.648	99.0	
2.660	100.0	
2.666	101.0	

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Unity Rule Evaluation (Continued)

2.674	102.5
2.674	102.5
2.680	104.0
2.681	105.0
2.683	106.0
2.692	107.0
2.697	108.0
2.826	109.0
2.844	110.0
2.875	111.0
2.877	112.0
2.879	113.0
2.886	114.0
2.889	115.0
2.892	116.0
2.894	117.0
2.897	118.0
2.913	119.5
2.913	119.5
3.078	121.0
3.101	122.0
3.103	123.0
3.106	124.5
3.106	124.5
3.106	126.0
3.122	127.5
3.122	127.5
3.124	129.0
3.125	130.0
3.127	131.0
3.128	132.0
3.129	133.0
3.134	134.0
3.309	135.0
3.313	136.0
3.325	137.0
3.332	138.0
3.339	139.0
3.341	140.5
3.341	140.5
3.344	142.0
3.349	143.0
3.402	144.0
3.550	145.5
3.550	145.5
3.558	147.5
3.558	147.5
3.562	149.0
3.564	150.0
3.571	151.0
3.598	152.0
3.644	153.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Unity Rule Evaluation (Continued)

3.672	154.0
3.761	155.0
4.072	156.0
4.218	157.0
4.875	158.0
4.898	159.0
10.413	160.0

- **WRS Test:**

  k = MARSSIM equation I.1

  $k = m(n + m + 1)/2 + z(P)^{1/2}$

  where: m = number of Z = 80
  n = number of Y = 80
  P= nm(n+m+1)/12 = 85,867
  z = 1.645, for 0.05 Type I error

  $k = 80(80+80+1)/2 + 1.645(85,867)^{1/2}$

  k = 6440 + 1.645(293) = 6922

  Wr = 7736 (see Z Rank sum)

  Conclusion:

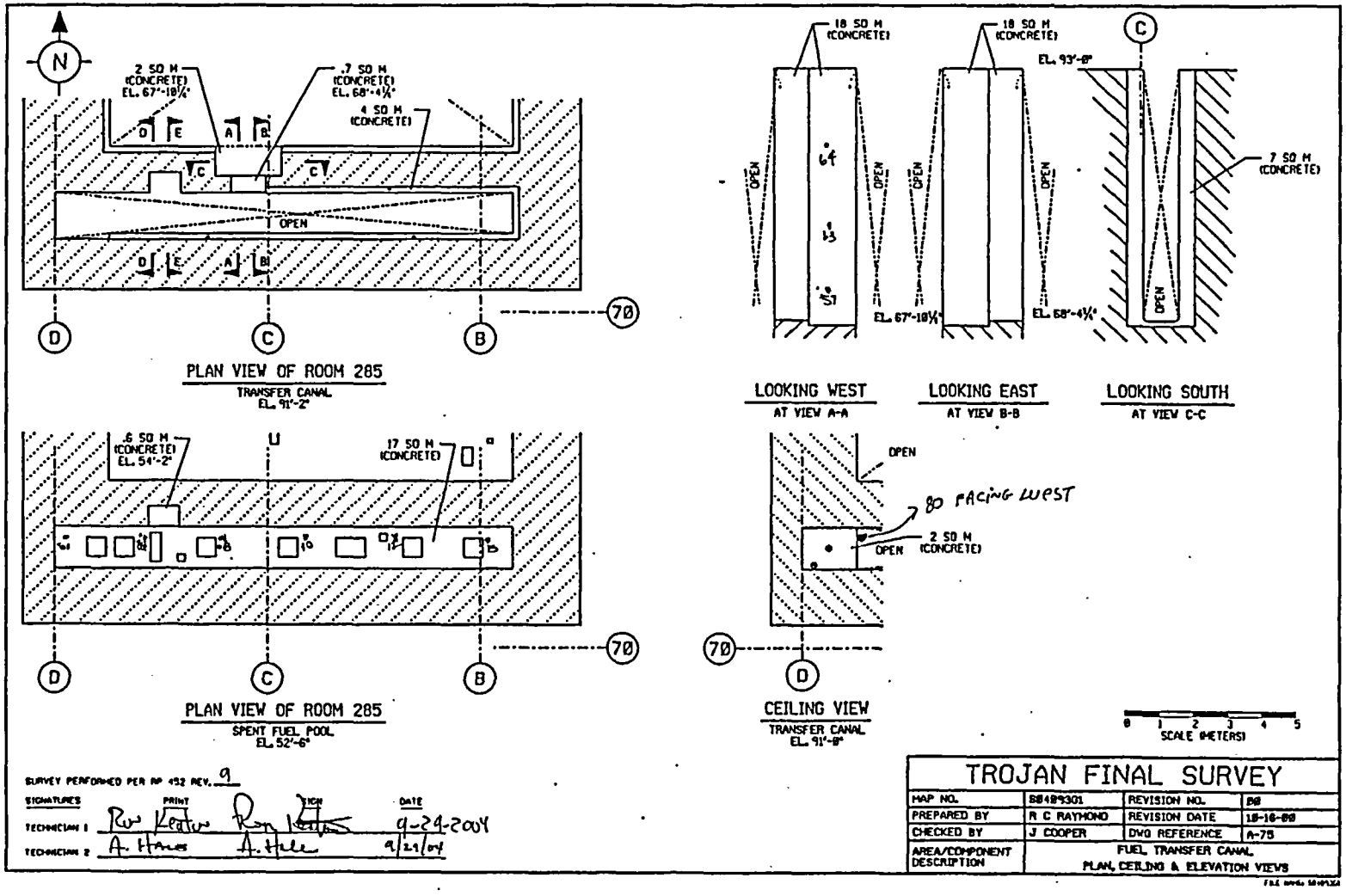
  Since Wr > k (7736 > 6922), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Static Measurement Locations Map

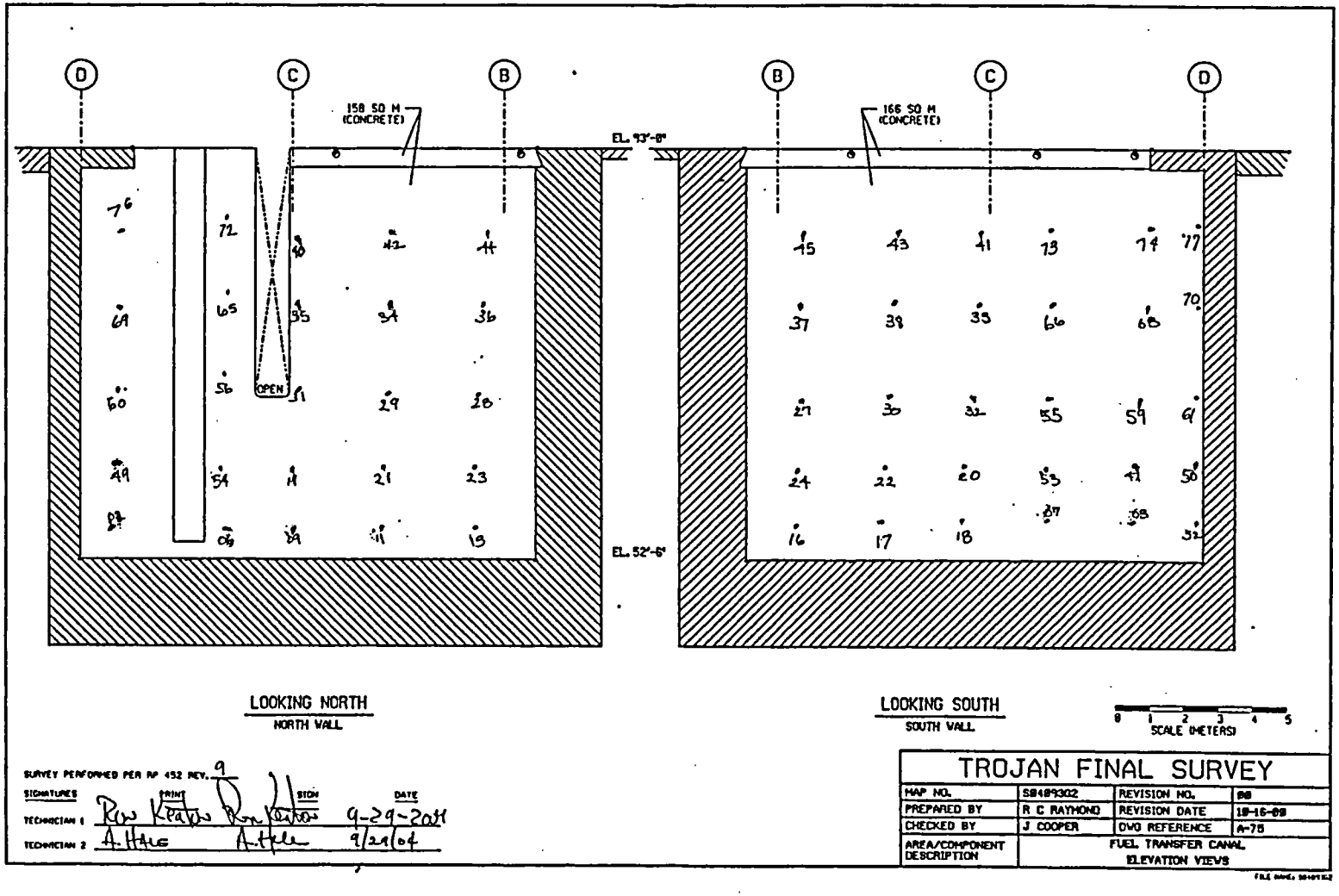


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Static Measurement Locations Map

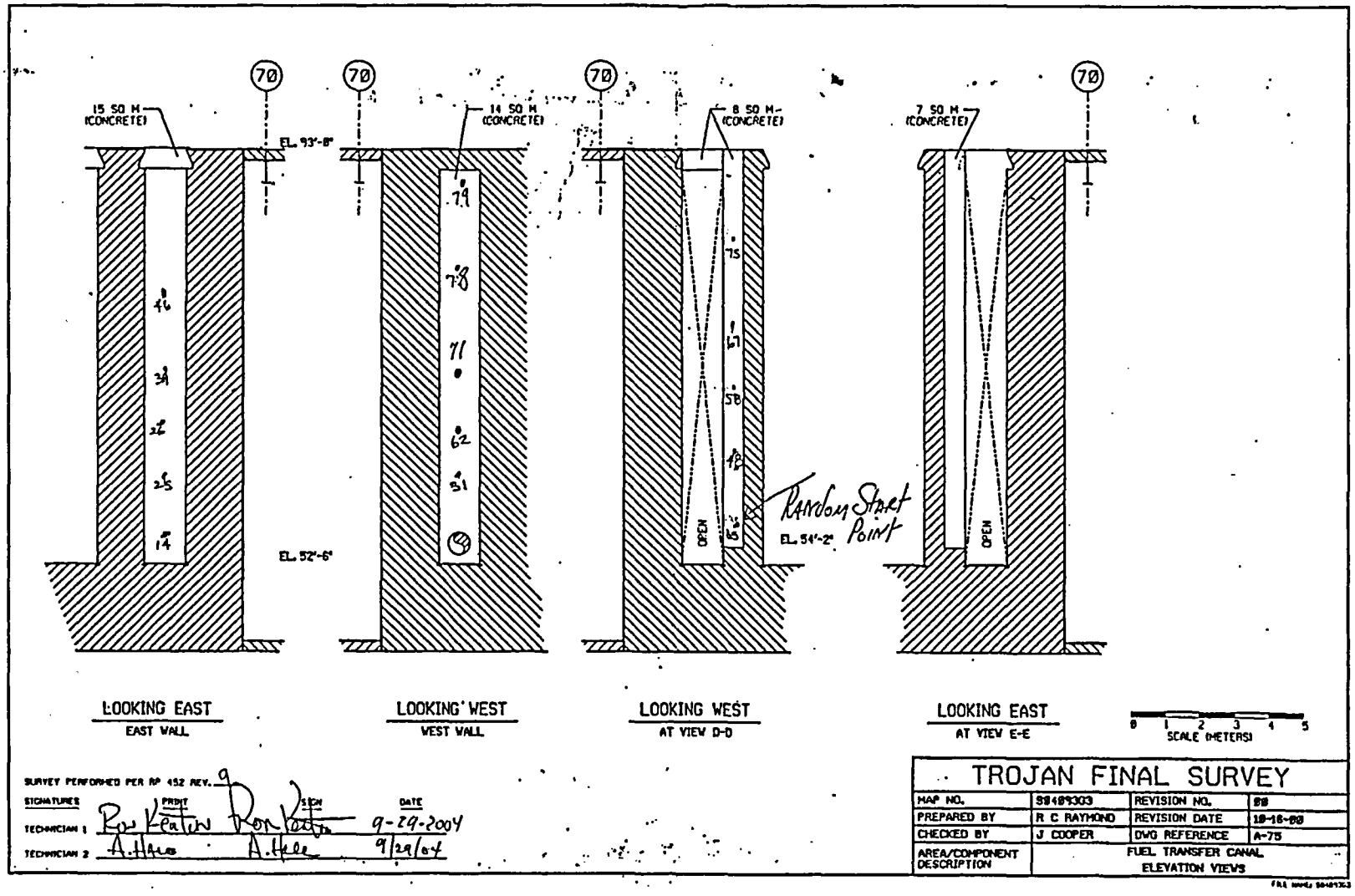


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	36	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.658e+003
Maximum Value	:	2.684e+003
Range	:	1.026e+003
Median	:	1.910e+003
Std. Deviation	:	2.352e+002
Mean	:	1.973e+003
95% UCL	:	2.039e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	2.065e+003	000018	2.684e+003	000035	1.903e+003
000002	1.839e+003	000019	1.794e+003	000036	2.065e+003
000003	1.865e+003	000020	2.265e+003		
000004	2.026e+003	000021	2.355e+003		
000005	2.265e+003	000022	2.020e+003		
000006	2.284e+003	000023	1.768e+003		
000007	2.033e+003	000024	1.813e+003		
000008	1.916e+003	000025	1.678e+003		
000009	2.078e+003	000026	1.774e+003		
000010	1.736e+003	000027	1.710e+003		
000011	2.039e+003	000028	1.839e+003		
000012	1.710e+003	000029	1.865e+003		
000013	1.987e+003	000030	1.658e+003		
000014	1.800e+003	000031	1.749e+003		
000015	1.878e+003	000032	2.078e+003		
000016	1.813e+003	000033	2.400e+003		
000017	2.033e+003	000034	2.252e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Measurement Data Statistical Evaluation - Beta

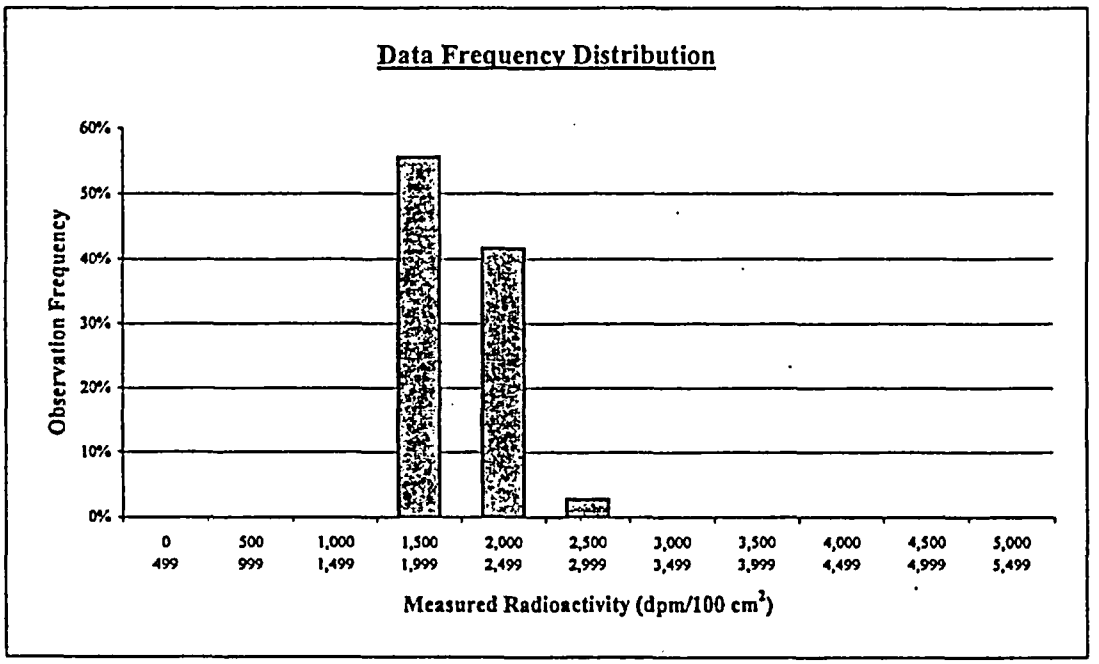
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	1,026	1,176	Pass
Median	0.271	0.500	Pass
Mean	1,973	6,000	Pass
Std Dev	235	1,500	Pass

All values are <DCGL, WRS statistical test not required for data set.

Statistical Quantities

Range:	1,026
Median:	1,910
Mean:	1,973
Std Dev:	235
Minimum:	1,658
Maximum:	2,684
DCGL:	7,500



Plot Parameters

# of measurements:	36
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	0	0%
2	999	500	0	0%
3	1,499	1,000	0	0%
4	1,999	1,500	20	56%
5	2,499	2,000	15	42%
6	2,999	2,500	1	3%
7	3,499	3,000	0	0%
8	3,999	3,500	0	0%
9	4,499	4,000	0	0%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	36	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Background Reference Area B04045Z - Beta

Statistical Quantities:

Range	: 2.952e+002
Median	: 9.125e+002
Mean	: 9.161e+002
Std. Deviation:	: 7.569e+001

# of Measurements: 36 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B
000031	9.202e+002	B
000032	8.627e+002	B
000033	9.048e+002	B
000034	9.087e+002	B
000035	7.937e+002	B
000036	1.024e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	36	DPM/100 CM²	2.800e+001	-	1.770e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	1.984e+001
Maximum Value	:	7.275e+001
Range	:	5.291e+001
Median	:	4.630e+001
Std. Deviation	:	1.469e+001
Mean	:	4.464e+001
95% UCL	:	4.878e+001

Measurement Values

Location	Value	Location	Value	Location	Value
000001	4.630e+001	000018	5.291e+001	000035	4.630e+001
000002	3.968e+001	000019	3.307e+001	000036	1.984e+001
000003	5.291e+001	000020	4.630e+001		
000004	3.968e+001	000021	6.614e+001		
000005	3.307e+001	000022	3.968e+001		
000006	3.968e+001	000023	7.275e+001		
000007	4.630e+001	000024	7.275e+001		
000008	3.968e+001	000025	2.646e+001		
000009	3.968e+001	000026	1.984e+001		
000010	3.968e+001	000027	3.968e+001		
000011	5.952e+001	000028	1.984e+001		
000012	5.952e+001	000029	4.630e+001		
000013	5.291e+001	000030	3.968e+001		
000014	5.952e+001	000031	4.630e+001		
000015	2.646e+001	000032	4.630e+001		
000016	4.630e+001	000033	1.984e+001		
000017	7.275e+001	000034	5.952e+001		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Measurement Data Statistical Evaluation - Alpha

Statistical Comparisons

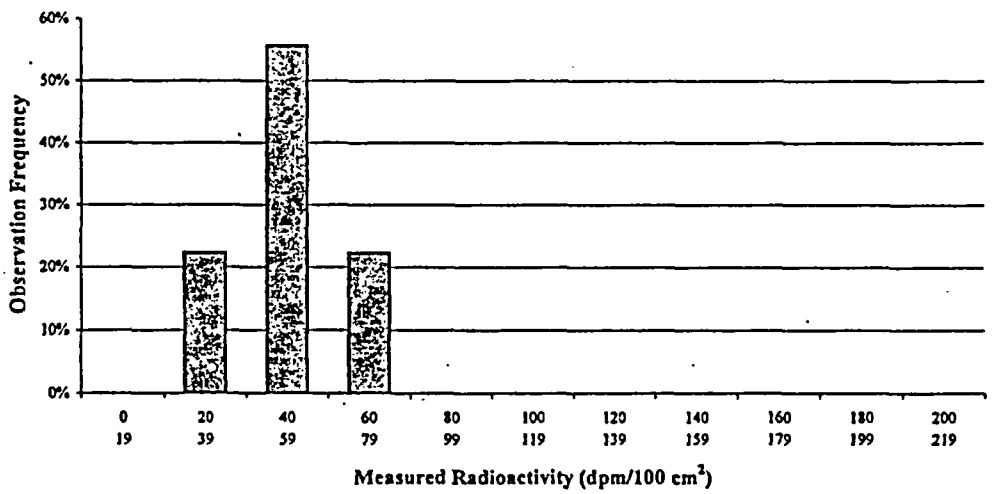
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	53	74	Pass
Median	0.087	0.500	Pass
Mean	45	28	See comment below
Std Dev	15	28	Pass
WRS	1770	1460	Pass

Data set passes the WRS statistical test as Wr (1770) is greater than k (1460).

Statistical Quantities

Range:	53
Median:	46
Mean:	45
Std Dev:	15
Minimum:	20
Maximum:	73
DCGL:	28

Data Frequency Distribution



Plot Parameters

# of measurements:	36
# of intervals:	11
Interval increment:	20
Minimum:	0
Maximum:	219

Interval	High End	Low End	Number of Observations	Observation Frequency
1	19	0	0	0%
2	39	20	8	22%
3	59	40	20	56%
4	79	60	8	22%
5	99	80	0	0%
6	119	100	0	0%
7	139	120	0	0%
8	159	140	0	0%
9	179	160	0	0%
10	199	180	0	0%
11	219	200	0	0%
		Total:	36	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Background Reference Area B04045Z - Alpha

Statistical Quantities:

Range	: 6.820e+001
Median	: 3.720e+001
Mean	: 4.185e+001
Std. Deviation:	: 1.775e+001

# of Measurements: 36 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000001	3.720e+001	B
000002	5.580e+001	B
000003	5.580e+001	B
000004	3.100e+001	B
000005	2.480e+001	B
000006	3.100e+001	B
000007	6.200e+000	B
000008	1.860e+001	B
000009	5.580e+001	B
000010	3.100e+001	B
000011	7.440e+001	B
000012	5.580e+001	B
000013	6.200e+001	B
000014	4.340e+001	B
000015	4.340e+001	B
000016	3.100e+001	B
000017	3.100e+001	B
000018	1.240e+001	B
000019	6.820e+001	B
000020	2.480e+001	B
000021	6.820e+001	B
000022	3.100e+001	B
000023	3.720e+001	B
000024	6.820e+001	B
000025	6.200e+001	B
000026	2.480e+001	B
000027	5.580e+001	B
000028	4.960e+001	B
000029	1.860e+001	B
000030	3.100e+001	B
000031	6.820e+001	B
000032	3.100e+001	B
000033	3.720e+001	B
000034	3.720e+001	B
000035	3.720e+001	B
000036	5.580e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 1,808

Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 7,015

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 36
Investigation Level: 750
Maximum Value: 21

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 36
Investigation Level: MDC
Maximum Value: 4

Discussion of Anomalous Measurement Data

Investigation Summary

Reason for Investigation: Thirty alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	73
Size of Area Exceeding DCGL (m^2):	0.4
Size of Survey Unit (m^2):	206
Survey Unit Area >DCGL (%):	0.2
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
S93H01	2,065	46	0.275	1.643	1.918	947	37
S93H02	1,839	40	0.245	1.429	1.674	1,062	56
S93H03	1,865	53	0.249	1.893	2.142	985	56
S93H04	2,026	40	0.270	1.429	1.699	959	31
S93H05	2,265	33	0.302	1.179	1.481	955	25
S93H06	2,284	40	0.305	1.429	1.733	897	31
S93H07	2,033	46	0.271	1.643	1.914	947	6
S93H08	1,916	40	0.255	1.429	1.684	886	19
S93H09	2,078	40	0.277	1.429	1.706	1,016	56
S93H10	1,736	40	0.231	1.429	1.660	840	31
S93H11	2,039	60	0.272	2.143	2.415	782	74
S93H12	1,710	60	0.228	2.143	2.371	970	56
S93H13	1,987	53	0.265	1.893	2.158	951	62
S93H14	1,800	60	0.240	2.143	2.383	982	43
S93H15	1,878	26	0.250	0.929	1.179	828	43
S93H16	1,813	46	0.242	1.643	1.885	859	31
S93H17	2,033	73	0.271	2.607	2.878	916	31
S93H18	2,684	53	0.358	1.893	2.251	767	12
S93H19	1,794	33	0.239	1.179	1.418	962	68
S93H20	2,265	46	0.302	1.643	1.945	859	25
S93H21	2,355	66	0.314	2.357	2.671	947	68
S93H22	2,020	40	0.269	1.429	1.698	863	31
S93H23	1,768	73	0.236	2.607	2.843	890	37
S93H24	1,813	73	0.242	2.607	2.849	855	68
S93H25	1,678	26	0.224	0.929	1.152	828	62
S93H26	1,774	20	0.237	0.714	0.951	1,039	25
S93H27	1,710	40	0.228	1.429	1.657	993	59
S93H28	1,839	20	0.245	0.714	0.959	863	50
S93H29	1,865	46	0.249	1.643	1.892	878	19
S93H30	1,658	40	0.221	1.429	1.650	1,043	31
S93H31	1,749	46	0.233	1.643	1.876	920	68
S93H32	2,078	46	0.277	1.643	1.920	863	31
S93H33	2,400	20	0.320	0.714	1.034	905	37
S93H34	2,252	60	0.300	2.143	2.443	909	37
S93H35	1,903	46	0.254	1.643	1.897	794	37
S93H36	2,065	20	0.275	0.714	0.990	1,024	56
				mean:	1.860		
				maximum:	2.878		

*Values from ***B04045Z01***, which are first 36 values from background reference data set ***B04045Y01***.
Values from ***B04045Z02*, which are first 36 values from background reference data set ***B04045Y02***.
Note: Highlighted background values to track for Wr

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean > Unity DCGL (2.1 > 1.0), go to means test (see next page).

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	1.321	1.448	2.448
0.142	2.000	2.142	3.142
0.131	2.000	2.131	3.131
0.128	1.107	1.235	2.235
0.127	0.893	1.020	2.020
0.120	1.107	1.227	2.227
0.126	0.214	0.341	1.341
0.118	0.679	0.797	1.797
0.135	2.000	2.135	3.135
0.112	1.107	1.219	2.219
0.104	2.643	2.747	3.747
0.129	2.000	2.129	3.129
0.127	2.214	2.341	3.341
0.131	1.536	1.667	2.667
0.110	1.536	1.646	2.646
0.115	1.107	1.222	2.222
0.122	1.107	1.229	2.229
0.102	0.429	0.531	1.531
0.128	2.429	2.557	3.557
0.115	0.893	1.007	2.007
0.126	2.429	2.555	3.555
0.115	1.107	1.222	2.222
0.119	1.321	1.440	2.440
0.114	2.429	2.543	3.543
0.110	2.214	2.325	3.325
0.139	0.893	1.031	2.031
0.132	2.107	2.240	3.240
0.115	1.786	1.901	2.901
0.117	0.679	0.796	1.796
0.139	1.107	1.246	2.246
0.123	2.429	2.551	3.551
0.115	1.107	1.222	2.222
0.121	1.321	1.442	2.442
0.121	1.321	1.443	2.443
0.106	1.321	1.427	2.427
0.137	2.000	2.137	3.137
	mean:	1.619	
	minimum:	0.341	

Y, Z POOL	RANK#	Z Rank #
0.951	1.0	7.0
0.959	2.0	10.0
0.990	3.0	20.0
1.034	4.0	21.0
1.152	5.0	30.0
1.179	6.0	31.0
1.341	7.0	32.0
1.418	8.0	35.0
1.481	9.0	37.0
1.531	10.0	37.0
1.650	11.0	37.0
1.657	12.0	39.0
1.660	13.0	40.0
1.674	14.0	41.0
1.684	15.0	42.0
1.698	16.0	47.0
1.699	17.0	48.0
1.706	18.0	49.0
1.733	19.0	50.5
1.796	20.0	52.0
1.797	21.0	53.0
1.876	22.0	54.0
1.885	23.0	59.0
1.892	24.0	60.0
1.897	25.0	61.0
1.914	26.0	62.0
1.918	27.0	63.0
1.920	28.0	64.0
1.945	29.0	65.0
2.007	30.0	66.0
2.020	31.0	67.0
2.031	32.0	68.0
2.142	33.0	69.0
2.158	34.0	70.0
2.219	35.0	71.0
2.222	37.0	72.0
2.222	37.0	1729.5
2.222	37.0	Z Rank Sum = Wr
2.227	39.0	
2.229	40.0	
2.235	41.0	
2.246	42.0	
2.251	43.0	
2.371	44.0	
2.383	45.0	
2.415	46.0	
2.427	47.0	
2.440	48.0	

Means test :

DM = (YMax - BMin)
(2.878 - 0.341) = 2.537 > Unity DCGL
DA = (YMean - BMean)
(1.860 - 1.619) = 0.241 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation (see next page).

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Unity Rule Evaluation (Continued)

2.442	49.0
2.443	50.5
2.443	50.5
2.448	52.0
2.646	53.0
2.667	54.0
2.671	55.0
2.843	56.0
2.849	57.0
2.878	58.0
2.901	59.0
3.129	60.0
3.131	61.0
3.135	62.0
3.137	63.0
3.142	64.0
3.240	65.0
3.325	66.0
3.341	67.0
3.543	68.0
3.551	69.0
3.555	70.0
3.557	71.0
3.747	72.0

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + z(P)^{1/2}$

where: n = 36

m = 36

P= nm(n+m+1)/12 = 7,884

z = 1.645, for 0.05 Type I error

$k = 36(36+36+1)/2 + 1.645(7884)^{1/2}$

k = 1314 + 1.645(88.5) = 1460

Conclusion:

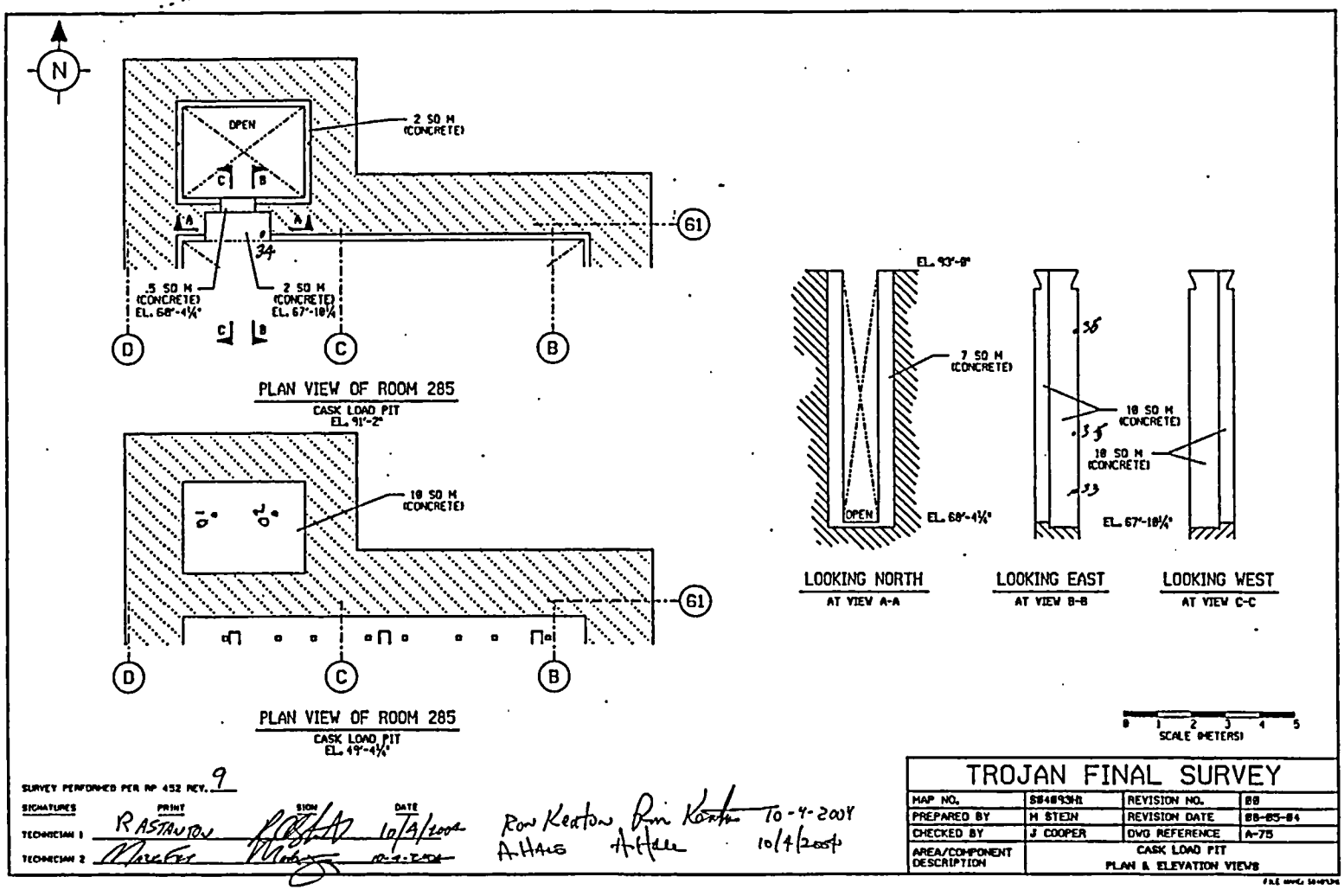
Since Wr > k 1729 > 1460), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Static Measurement Locations Map

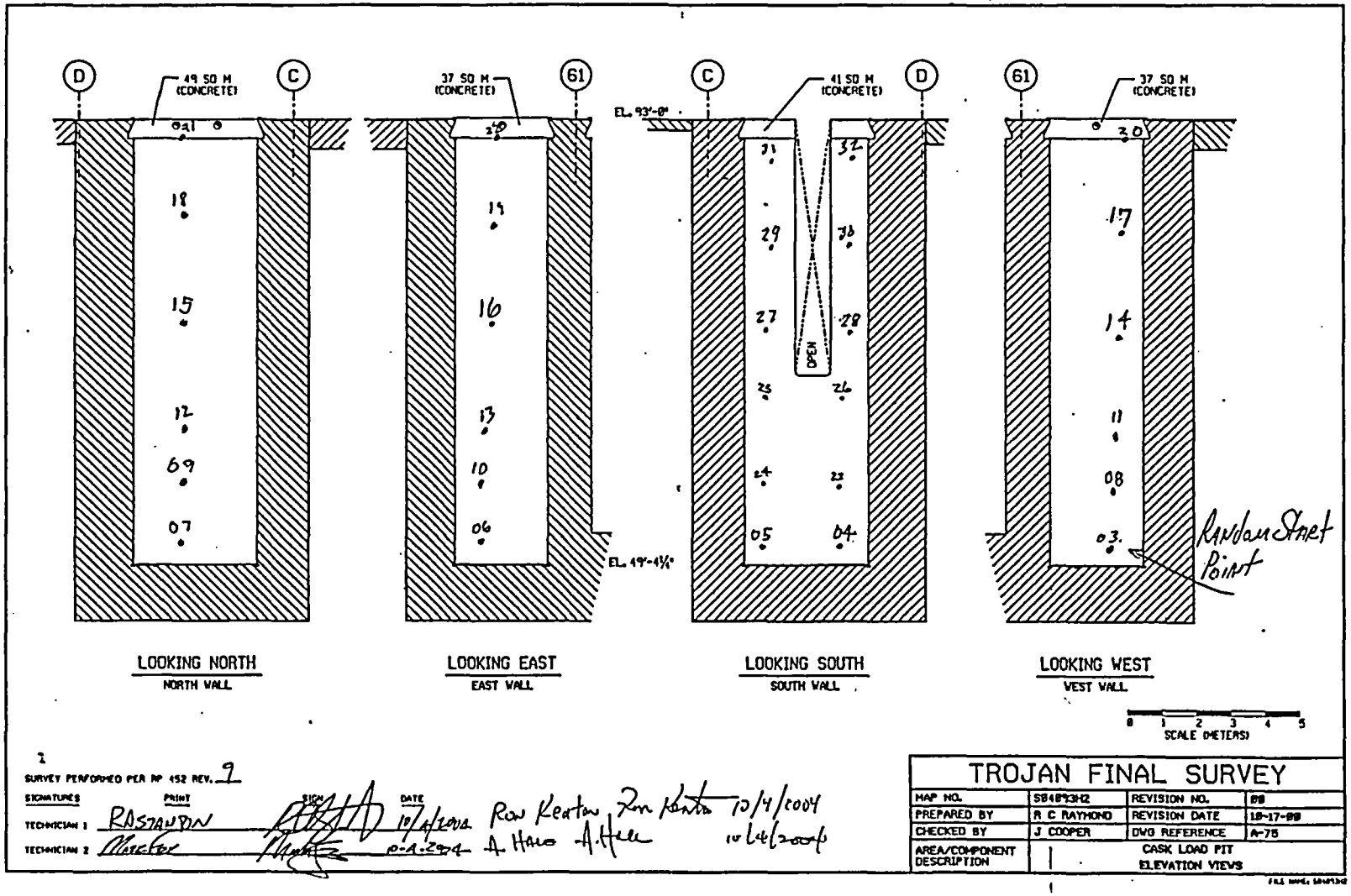


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	57	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.555e+003
Maximum Value	:	2.929e+003
Range	:	1.374e+003
Median	:	1.878e+003
Std. Deviation	:	2.871e+002
Mean	:	1.945e+003
95% UCL	:	2.009e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	1.832e+003	000018	2.020e+003	000035	1.697e+003
000002	1.884e+003	000019	1.786e+003	000036	1.742e+003
000003	1.736e+003	000020	2.123e+003	000037	1.813e+003
000004	1.774e+003	000021	1.955e+003	000038	1.723e+003
000005	1.555e+003	000022	2.458e+003	000039	2.045e+003
000006	1.755e+003	000023	2.194e+003	000040	1.865e+003
000007	1.845e+003	000024	2.349e+003	000041	1.723e+003
000008	1.749e+003	000025	2.929e+003	000042	2.162e+003
000009	1.684e+003	000026	1.813e+003	000043	2.220e+003
000010	1.665e+003	000027	1.884e+003	000044	2.929e+003
000011	1.768e+003	000028	2.458e+003	000045	2.478e+003
000012	1.755e+003	000029	2.245e+003	000046	1.897e+003
000013	2.058e+003	000030	2.278e+003	000047	1.929e+003
000014	1.652e+003	000031	1.736e+003	000048	1.878e+003
000015	2.020e+003	000032	1.755e+003	000049	1.749e+003
000016	1.962e+003	000033	1.736e+003	000050	1.897e+003
000017	1.916e+003	000034	1.762e+003	000051	1.936e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Data Quality Values – Beta (Continued)

Location	Value
000052	1.620e+003
000053	1.936e+003
000054	1.929e+003
000055	1.768e+003
000056	2.000e+003
000057	1.845e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Measurement Data Statistical Evaluation - Beta

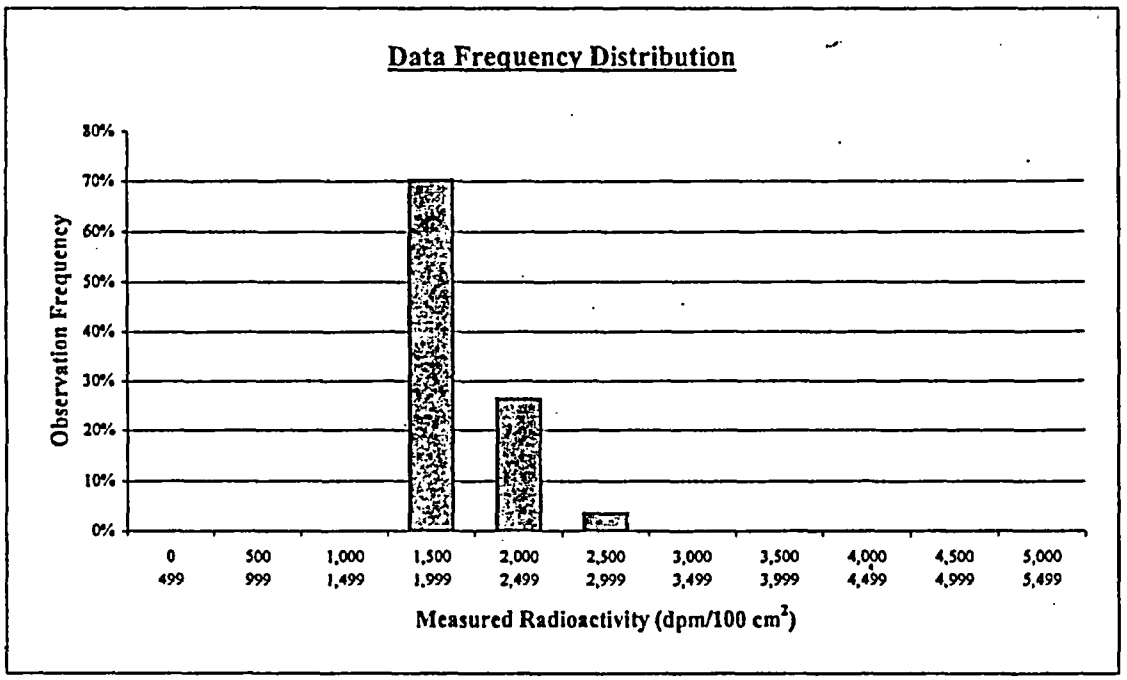
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	1,374	1,435	Pass
Median	0.234	0.500	Pass
Mean	1,945	6,000	Pass
Std Dev	287	1,500	Pass

All values are <DCGL, WRS statistical test not required for data set.

Statistical Quantities

Range:	1,374
Median:	1,878
Mean:	1,945
Std Dev:	287
Minimum:	1,555
Maximum:	2,929
DCGL:	7,500



Plot Parameters	
# of measurements:	57
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
NONE.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	0	0%
2	999	500	0	0%
3	1,499	1,000	0	0%
4	1,999	1,500	40	70%
5	2,499	2,000	15	26%
6	2,999	2,500	2	4%
7	3,499	3,000	0	0%
8	3,999	3,500	0	0%
9	4,499	4,000	0	0%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	57	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Background Reference Area B04045X - Beta

Statistical Quantities:

Range	: 6.442e+002
Median	: 9.202e+002
Mean	: 9.454e+002
Std. Deviation:	: 1.153e+002

# of Measurements: 51 Min Value: 7.668e+002 Max Value: 1.411e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B
000031	9.202e+002	B
000032	8.627e+002	B
000033	9.048e+002	B
000034	9.087e+002	B
000035	7.937e+002	B
000036	1.024e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Background Reference Area B04045X – Beta (Continued)

Statistical Quantities:

Range	: 6.442e+002
Median	: 9.202e+002
Mean	: 9.454e+002
Std. Deviation:	: 1.153e+002

# of Measurements: 51 Min Value: 7.668e+002 Max Value: 1.411e+003

Measurement Location	Value	Data Status Code
000037	1.100e+003	B
000038	1.104e+003	B
000039	1.411e+003	B
000040	1.288e+003	B
000041	9.202e+002	B
000042	8.512e+002	B
000043	1.062e+003	B
000044	9.202e+002	B
000045	9.010e+002	B
000046	1.062e+003	B
000047	9.317e+002	B
000048	9.969e+002	B
000049	8.857e+002	B
000050	8.933e+002	B
000051	9.048e+002	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	57	DPM/100 CM²	2.800e+001	-	3.762e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	1.323e+001
Maximum Value	:	9.921e+001
Range	:	8.598e+001
Median	:	4.630e+001
Std. Deviation	:	1.913e+001
Mean	:	4.572e+001
95% UCL	:	4.996e+001

Measurement Values

Location	Value	Location	Value	Location	Value
000001	3.307e+001	000018	7.937e+001	000035	9.921e+001
000002	5.952e+001	000019	1.323e+001	000036	7.275e+001
000003	1.984e+001	000020	3.968e+001	000037	4.630e+001
000004	8.598e+001	000021	3.968e+001	000038	1.323e+001
000005	3.307e+001	000022	5.952e+001	000039	3.968e+001
000006	2.646e+001	000023	2.646e+001	000040	2.646e+001
000007	3.968e+001	000024	5.291e+001	000041	1.984e+001
000008	3.307e+001	000025	5.952e+001	000042	3.968e+001
000009	4.630e+001	000026	4.630e+001	000043	5.291e+001
000010	6.614e+001	000027	7.275e+001	000044	5.291e+001
000011	4.630e+001	000028	3.968e+001	000045	5.952e+001
000012	5.291e+001	000029	4.630e+001	000046	1.323e+001
000013	3.968e+001	000030	7.275e+001	000047	4.630e+001
000014	7.275e+001	000031	2.646e+001	000048	5.291e+001
000015	3.968e+001	000032	6.614e+001	000049	4.630e+001
000016	5.952e+001	000033	3.968e+001	000050	4.630e+001
000017	4.630e+001	000034	3.968e+001	000051	1.323e+001

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Data Quality Values – Alpha (Continued)

Location	Value
000052	5.291e+001
000053	1.323e+001
000054	5.952e+001
000055	2.646e+001
000056	3.307e+001
000057	5.952e+001

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Measurement Data Statistical Evaluation - Alpha

Statistical Comparisons

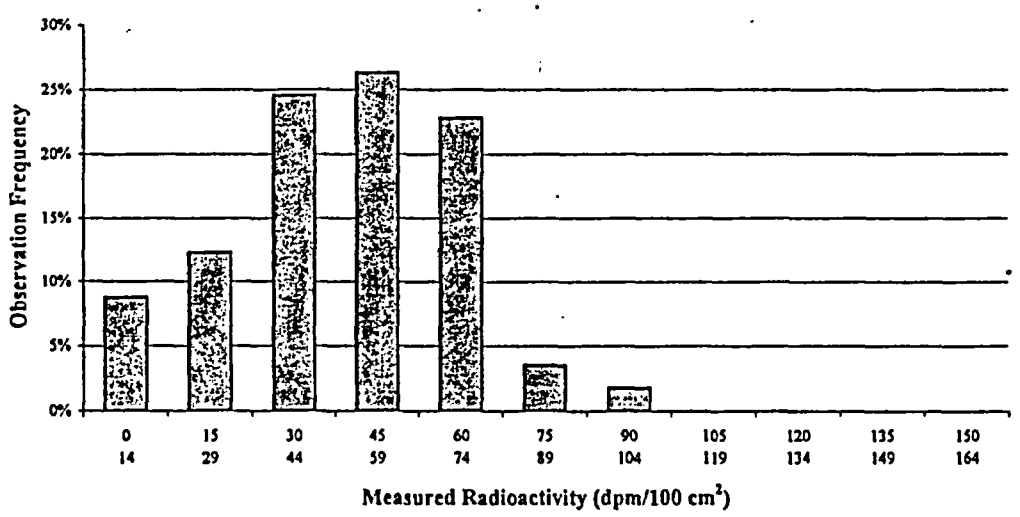
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	86	96	Pass
Median	0.031	0.500	Pass
Mean	46	28	See comment below
Std Dev	19	28	Pass
WRS	3762	3046	Pass

Data set passes the WRS statistical test as Wr (3762) is greater than k (3046).

Statistical Quantities

Range:	86
Median:	46
Mean:	46
Std Dev:	19
Minimum:	13
Maximum:	99
DCGL:	28

Data Frequency Distribution



Plot Parameters	
# of measurements:	57
# of intervals:	11
Interval increment:	15
Minimum:	0
Maximum:	164

Interval	High End	Low End	Number of Observations	Observation Frequency
1	14	0	5	9%
2	29	15	7	12%
3	44	30	14	25%
4	59	45	15	26%
5	74	60	13	23%
6	89	75	2	4%
7	104	90	1	2%
8	119	105	0	0%
9	134	120	0	0%
10	149	135	0	0%
11	164	150	0	0%
		Total:	57	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Background Reference Area B04045X - Alpha

Statistical Quantities:

Range	: 6.820e+001
Median	: 4.340e+001
Mean	: 4.376e+001
Std. Deviation:	: 1.661e+001

# of Measurements: 51 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000001	3.720e+001	B
000002	5.580e+001	B
000003	5.580e+001	B
000004	3.100e+001	B
000005	2.480e+001	B
000006	3.100e+001	B
000007	6.200e+000	B
000008	1.860e+001	B
000009	5.580e+001	B
000010	3.100e+001	B
000011	7.440e+001	B
000012	5.580e+001	B
000013	6.200e+001	B
000014	4.340e+001	B
000015	4.340e+001	B
000016	3.100e+001	B
000017	3.100e+001	B
000018	1.240e+001	B
000019	6.820e+001	B
000020	2.480e+001	B
000021	6.820e+001	B
000022	3.100e+001	B
000023	3.720e+001	B
000024	6.820e+001	B
000025	6.200e+001	B
000026	2.480e+001	B
000027	5.580e+001	B
000028	4.960e+001	B
000029	1.860e+001	B
000030	3.100e+001	B
000031	6.820e+001	B
000032	3.100e+001	B
000033	3.720e+001	B
000034	3.720e+001	B
000035	3.720e+001	B
000036	5.580e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Background Reference Area B04045X – Alpha (Continued)

Statistical Quantities:

Range	: 6.820e+001
Median	: 4.340e+001
Mean	: 4.376e+001
Std. Deviation:	: 1.661e+001

# of Measurements: 51 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000037	4.340e+001	B
000038	1.860e+001	B
000039	6.200e+001	B
000040	3.720e+001	B
000041	4.960e+001	B
000042	5.580e+001	B
000043	4.960e+001	B
000044	6.820e+001	B
000045	3.720e+001	B
000046	4.960e+001	B
000047	6.200e+001	B
000048	4.340e+001	B
000049	6.200e+001	B
000050	3.720e+001	B
000051	4.960e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 1,673
Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 7,130

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 57
Investigation Level: 750
Maximum Value: 3

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 57
Investigation Level: MDC
Maximum Value: 4

Discussion of Anomalous Measurement Data

Investigation Summary

Reason for Investigation: Forty-six alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	159
Size of Area Exceeding DCGL (m^2):	0.6
Size of Survey Unit (m^2):	314
Survey Unit Area >DCGL (%):	0.2
EMC Value:	140

Action Taken: Remediated static measurement location 19 and resurveyed. Replaced original results in SDMS with post-remediation results. Applied EMC data processing to alpha static measurements that remain elevated.

Basis for Action Taken: Static measurement locations that approached or exceeded EMC DCGL were remediated. Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
S93J01	1832	33	0.244	1.181	1.425	947	37
S93J02	1884	60	0.251	2.126	2.377	1062	56
S93J03	1736	20	0.231	0.709	0.940	985	56
S93J04	1774	86	0.237	3.071	3.307	959	31
S93J05	1555	33	0.207	1.181	1.388	955	25
S93J06	1755	26	0.234	0.945	1.179	897	31
S93J07	1845	40	0.246	1.417	1.663	947	6
S93J08	1749	33	0.233	1.181	1.414	886	19
S93J09	1684	46	0.225	1.654	1.878	1016	56
S93J10	1665	66	0.222	2.362	2.584	840	31
S93J11	1768	46	0.236	1.654	1.889	782	74
S93J12	1755	53	0.234	1.890	2.124	970	56
S93J13	2058	40	0.274	1.417	1.692	951	62
S93J14	1652	73	0.220	2.598	2.818	982	43
S93J15	2020	40	0.269	1.417	1.686	828	43
S93J16	1962	60	0.262	2.126	2.387	859	31
S93J17	1916	46	0.255	1.654	1.909	916	31
S93J18	2020	79	0.269	2.835	3.104	767	12
S93J19	1786	13	0.238	0.464	0.702	962	68
S93J20	2123	40	0.283	1.417	1.700	859	25
S93J21	1955	40	0.261	1.417	1.678	947	68
S93J22	2458	60	0.328	2.126	2.453	863	31
S93J23	2194	26	0.293	0.945	1.238	890	37
S93J24	2349	53	0.313	1.890	2.203	855	68
S93J25	2929	60	0.391	2.126	2.516	828	62
S93J26	1813	46	0.242	1.654	1.895	1039	25
S93J27	1884	73	0.251	2.598	2.849	993	56
S93J28	2458	40	0.328	1.417	1.745	863	50
S93J29	2245	46	0.299	1.654	1.953	878	19
S93J30	2278	73	0.304	2.598	2.902	1043	31
S93J31	1736	26	0.231	0.945	1.176	920	68
S93J32	1755	66	0.234	2.362	2.596	863	31
S93J33	1736	40	0.231	1.417	1.649	905	37
S93J34	1762	40	0.235	1.417	1.652	909	37
S93J35	1697	99	0.226	3.543	3.769	794	37
S93J36	1742	73	0.232	2.598	2.830	1024	56
S93J37	1813	46	0.242	1.654	1.895	1100	43
S93J38	1723	13	0.230	0.473	0.702	1104	19
S93J39	2045	40	0.273	1.417	1.690	1411	62
S93J40	1865	26	0.249	0.945	1.194	1288	37
S93J41	1723	20	0.230	0.709	0.938	920	50
S93J42	2162	40	0.288	1.417	1.705	851	56
S93J43	2220	53	0.296	1.890	2.186	1062	50
S93J44	2929	53	0.391	1.890	2.280	920	68
S93J45	2478	60	0.330	2.126	2.456	901	37
S93J46	1897	13	0.253	0.473	0.725	1062	50
S93J47	1929	46	0.257	1.654	1.911	932	62
S93J48	1878	53	0.250	1.890	2.140	997	43
S93J49	1749	46	0.233	1.654	1.887	886	62

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Unity Rule Evaluation (Continued)

S93J50	1897	46	0.253	1.654	1.907	893	37
S93J51	1936	13	0.258	0.473	0.731	905	50
S93J52	1620	53	0.216	1.890	2.106		
S93J53	1936	13	0.258	0.473	0.731		
S93J54	1929	60	0.257	2.126	2.383		
S93J55	1768	26	0.236	0.945	1.181		
S93J56	2000	33	0.267	1.181	1.448		
S93J57	1845	60	0.246	2.126	2.372		
				mean:	1.892		
				maximum:	3.769		

*Values from ***B04045X01***, which are first 51 values from background reference data set ***B04045Y01***.
Values from ***B04045X02*, which are first 51 values from background reference data set ***B04045Y02***.

Note: Highlighted background values to track for Wr

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean > Unity DCGL (1.9 > 1.0), go to means test.

Means test :
DM = (YMax - BMin) = (3.769 - 0.348) = 3.421 > Unity DCGL
DA = (YMean - BMean) = (1.892 - 1.689) = 0.2 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation.

WRS Test:
k = MARSSIM equation I.1
$k = m(n + m + 1)/2 + z(P)^{1/2}$
where: m = number of Z = 51
n = number of Y = 57
P= nm(n+m+1)/12 = 26,405
z = 1.645, for 0.05 Type I error
$k = 51(57+51+1)/2 + 1.645(26{,}405)^{1/2}$
k = 2780 + 1.645(162) = 3047

Wr = 3688 (see Z Rank sum)

Conclusion:
Since Wr > k (3688 > 3047), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)	Y, Z POOL	RANK#	Z Rank #
0.126	1.329	1.455	2.455	0.702	1.0	13.0
0.142	1.993	2.134	3.134	0.702	2.0	18.0
0.131	1.993	2.124	3.124	0.725	3.0	29.0
0.128	1.107	1.235	2.235	0.731	4.5	30.0
0.127	0.886	1.013	2.013	0.731	4.5	31.0
0.120	1.107	1.227	2.227	0.938	6.0	41.0
0.126	0.221	0.348	1.348	0.940	7.0	42.0
0.118	0.664	0.782	1.782	1.176	8.0	43.0
0.135	1.993	2.128	3.128	1.179	9.0	49.0
0.112	1.107	1.219	2.219	1.181	10.0	51.0
0.104	2.657	2.761	3.761	1.194	11.0	51.0
0.129	1.993	2.122	3.122	1.238	12.0	51.0
0.127	2.214	2.341	3.341	1.348	13.0	53.0
0.131	1.550	1.681	2.681	1.388	14.0	54.0
0.110	1.550	1.660	2.660	1.414	15.0	55.0
0.115	1.107	1.222	2.222	1.425	16.0	56.0
0.122	1.107	1.229	2.229	1.448	17.0	62.0
0.102	0.443	0.545	1.545	1.545	18.0	63.0
0.128	2.436	2.564	3.564	1.649	19.0	64.0
0.115	0.886	1.000	2.000	1.652	20.0	65.5
0.126	2.436	2.562	3.562	1.663	21.0	65.5
0.115	1.107	1.222	2.222	1.678	22.0	67.0
0.119	1.329	1.447	2.447	1.686	23.0	69.0
0.114	2.436	2.550	3.550	1.690	24.0	71.0
0.110	2.214	2.325	3.325	1.692	25.0	75.0
0.139	0.886	1.024	2.024	1.700	26.0	76.0
0.132	1.993	2.125	3.125	1.705	27.0	77.0
0.115	1.771	1.886	2.886	1.745	28.0	78.0
0.117	0.664	0.781	1.781	1.781	29.0	82.0
0.139	1.107	1.246	2.246	1.782	30.0	83.0
0.123	2.436	2.558	3.558	1.811	31.0	84.0
0.115	1.107	1.222	2.222	1.878	32.0	86.5
0.121	1.329	1.449	2.449	1.887	33.0	86.5
0.121	1.329	1.450	2.450	1.889	34.0	89.0
0.106	1.329	1.434	2.434	1.895	35.0	90.0
0.137	1.993	2.129	3.129	1.895	36.0	91.0
0.147	1.550	1.697	2.697	1.907	37.0	92.0
0.147	0.664	0.811	1.811	1.909	38.0	93.0
0.188	2.214	2.402	3.402	1.911	39.0	94.0
0.172	1.329	1.500	2.500	1.953	40.0	95.0
0.123	1.771	1.894	2.894	2.000	41.0	97.0
0.113	1.993	2.106	3.106	2.013	42.0	98.0
0.142	1.771	1.913	2.913	2.024	43.0	99.0
0.123	2.436	2.558	3.558	2.106	44.0	100.0
0.120	1.329	1.449	2.449	2.124	45.0	101.0
0.142	1.771	1.913	2.913	2.140	46.0	102.0
0.124	2.214	2.339	3.339	2.186	47.0	103.0
0.133	1.550	1.683	2.683	2.203	48.0	104.0
0.118	2.214	2.332	3.332	2.219	49.0	105.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Unity Rule Evaluation (Continued)

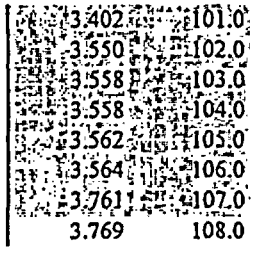
0.119	1.329	1.448	2.448
0.121	1.771	1.892	2.892
	mean:	1.689	
	minimum:	0.348	

2.222	51.0	106.0
2.222	51.0	107.0
2.222	51.0	3688.0
2.227	53.0	Z Rank Sum = Wr
2.229	54.0	
2.235	55.0	
2.246	56.0	
2.280	57.0	
2.372	58.0	
2.377	59.0	
2.383	60.0	
2.387	61.0	
2.434	62.0	
2.447	63.0	
2.448	64.0	
2.449	65.5	
2.449	65.5	
2.450	67.0	
2.453	68.0	
2.455	69.0	
2.456	70.0	
2.500	71.0	
2.516	72.0	
2.584	73.0	
2.596	74.0	
2.660	75.0	
2.681	76.0	
2.683	77.0	
2.697	78.0	
2.818	79.0	
2.830	80.0	
2.849	81.0	
2.886	82.0	
2.892	83.0	
2.894	84.0	
2.902	85.0	
2.913	86.5	
2.913	86.5	
3.104	88.0	
3.106	89.0	
3.122	90.0	
3.124	91.0	
3.125	92.0	
3.128	93.0	
3.129	94.0	
3.134	95.0	
3.307	96.0	
3.325	97.0	
3.332	98.0	
3.339	99.0	
3.341	100.0	

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Unity Rule Evaluation (Continued)

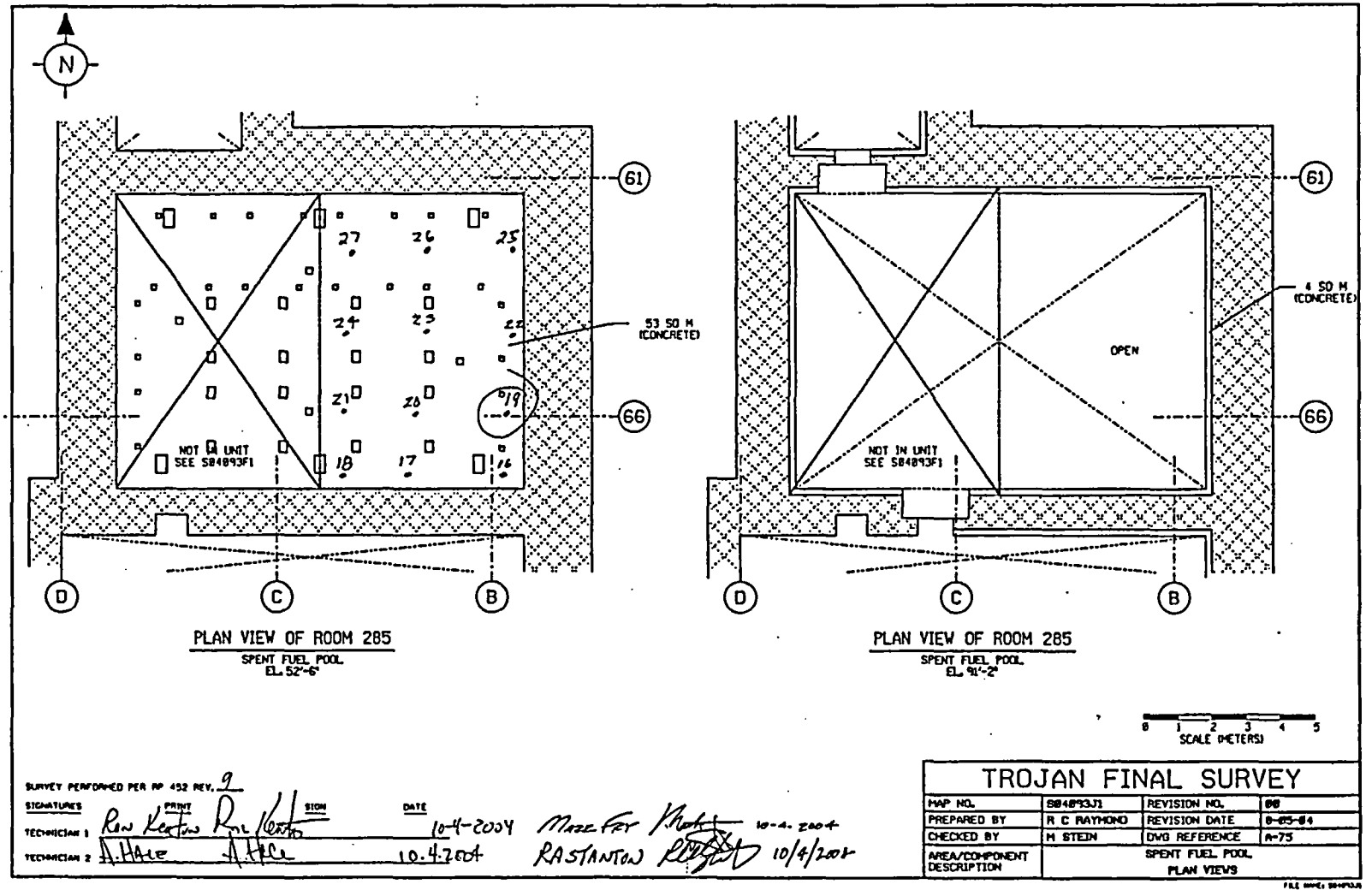


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half

Classification: Class 1
Size (m^2): 314

Static Measurement Locations Map

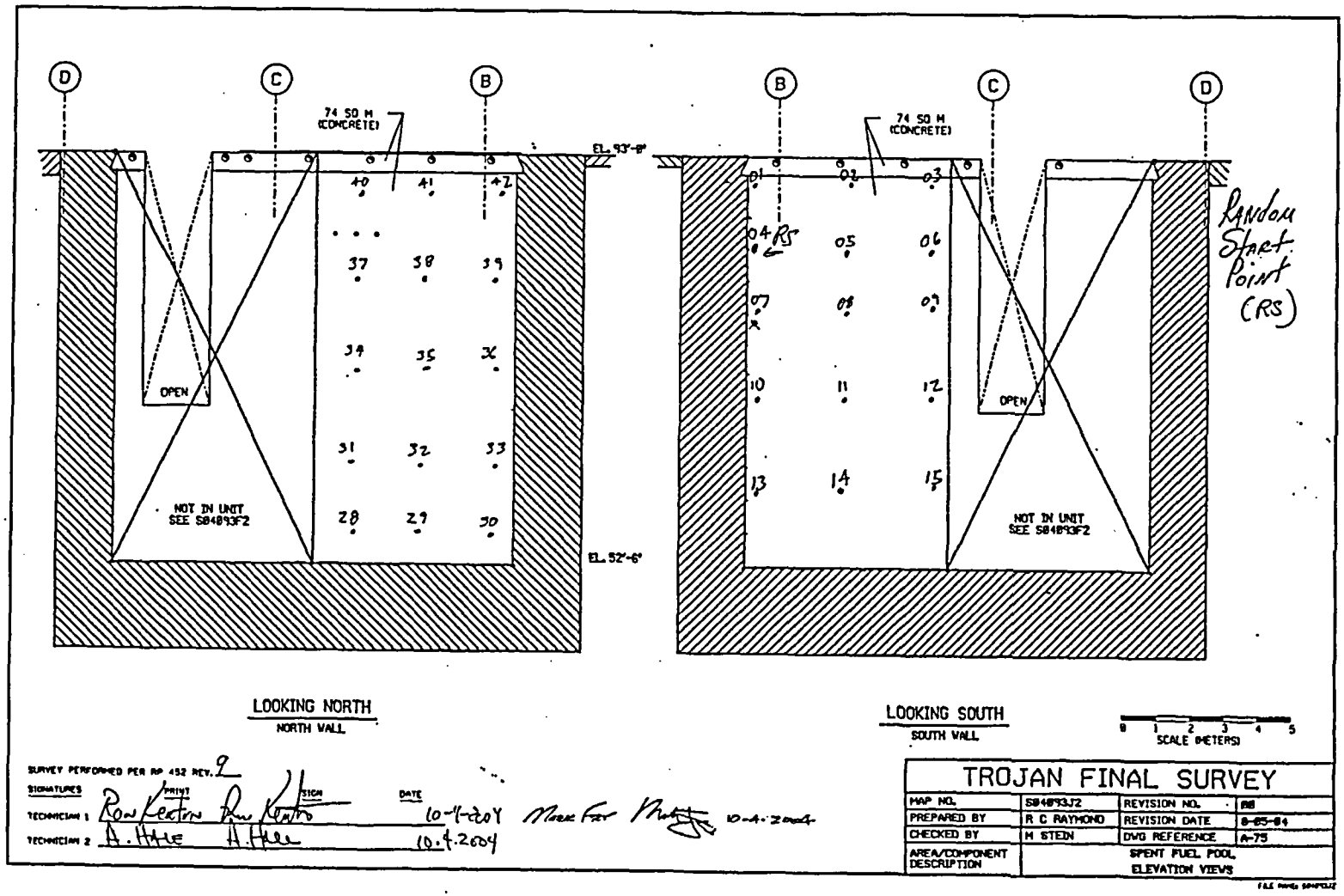


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half

Classification: Class 1
Size (m^2): 314

Static Measurement Locations Map

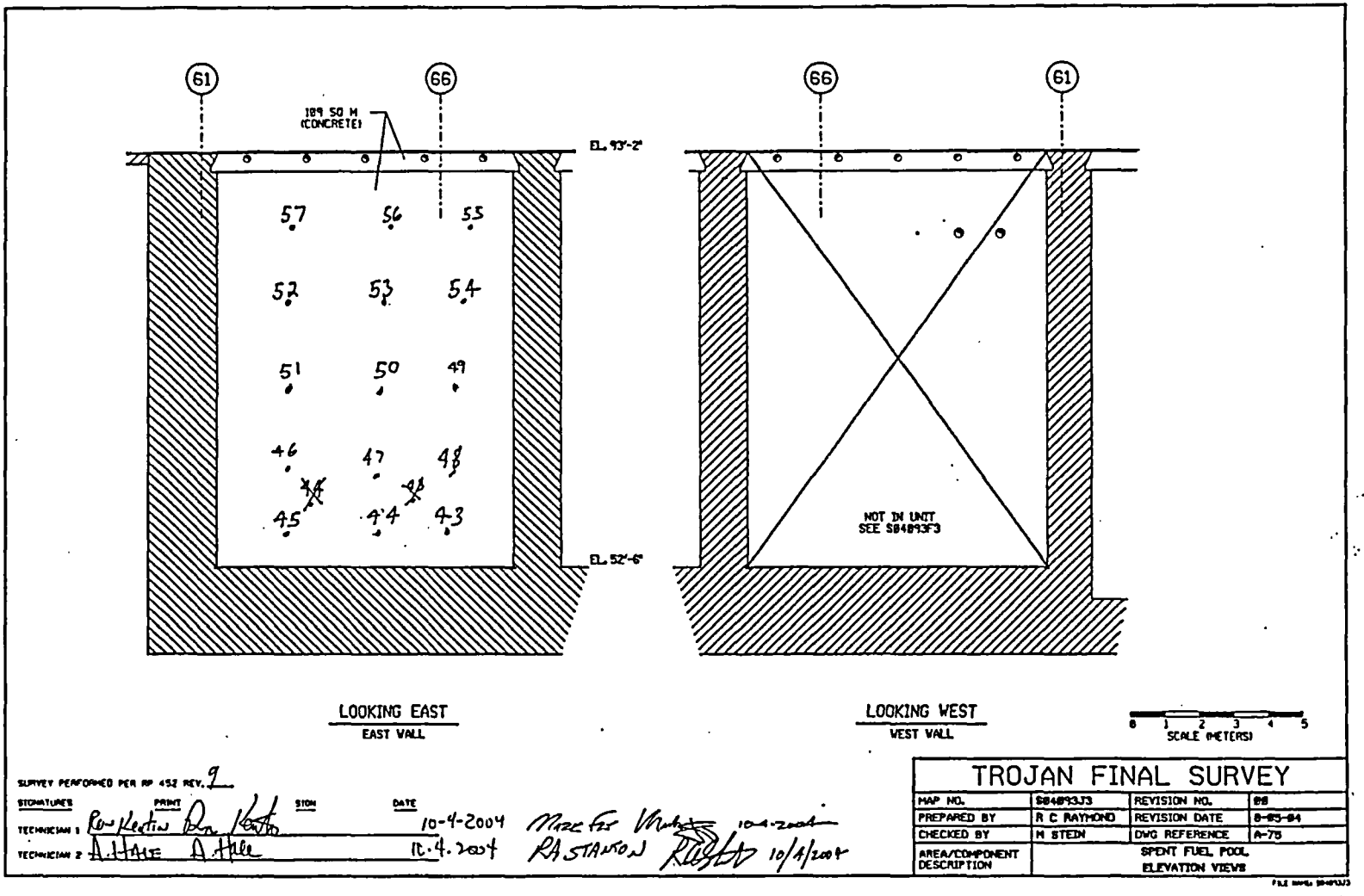


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half

Classification: Class 1
Size (m^2): 314

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	30	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.502e+003
Maximum Value	:	2.506e+003
Range	:	1.004e+003
Median	:	1.879e+003
Std. Deviation	:	2.047e+002
Mean	:	1.857e+003
95% UCL	:	1.921e+003

Measurement Values

Location	Value	Location	Value
000001	1.502e+003	000018	1.692e+003
000002	1.646e+003	000019	1.948e+003
000003	1.843e+003	000020	1.974e+003
000004	1.863e+003	000021	1.915e+003
000005	1.889e+003	000022	1.869e+003
000006	1.830e+003	000023	1.987e+003
000007	1.941e+003	000024	2.506e+003
000008	1.948e+003	000025	1.607e+003
000009	1.974e+003	000026	1.653e+003
000010	1.751e+003	000027	1.620e+003
000011	2.105e+003	000028	1.535e+003
000012	1.948e+003	000029	1.718e+003
000013	1.902e+003	000030	1.607e+003
000014	2.086e+003		
000015	1.981e+003		
000016	2.020e+003		
000017	1.863e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half

Classification: Class 1
Size (m^2): 121

Measurement Data Statistical Evaluation - Beta

Statistical Comparisons

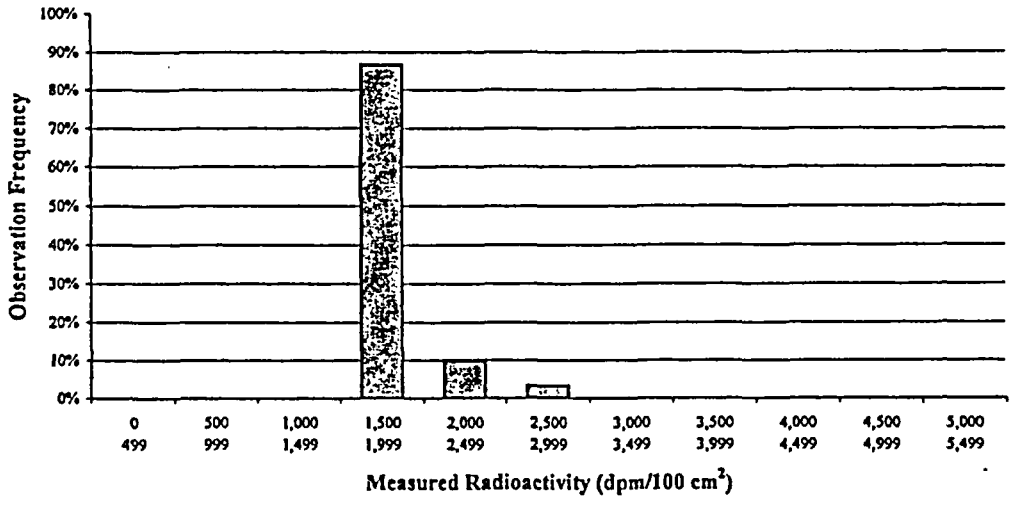
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	1,004	1,024	Pass
Median	0.105	0.500	Pass
Mean	1,857	6,000	Pass
Std Dev	205	1,500	Pass

All values are <DCGL, WRS statistical test not required for data set.

Statistical Quantities

Range:	1,004
Median:	1,879
Mean:	1,857
Std Dev:	205
Minimum:	1,502
Maximum:	2,506
DCGL:	7,500

Data Frequency Distribution



Plot Parameters

# of measurements:	30
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	0	0%
2	999	500	0	0%
3	1,499	1,000	0	0%
4	1,999	1,500	26	87%
5	2,499	2,000	3	10%
6	2,999	2,500	1	3%
7	3,499	3,000	0	0%
8	3,999	3,500	0	0%
9	4,499	4,000	0	0%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	30	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Background Reference Area B02027B - Beta

Statistical Quantities:

Range	: 2.952e+002
Median	: 9.316e+002
Mean	: 9.189e+002
Std. Deviation:	: 7.670e+001

# of Measurements: 30 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	30	DPM/100 CM²	2.800e+001	-	1.259e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	0.000e+000
Maximum Value	:	6.200e+001
Range	:	6.200e+001
Median	:	3.100e+001
Std. Deviation	:	1.642e+001
Mean	:	3.183e+001
95% UCL	:	3.691e+001

Measurement Values

Location	Value	Location	Value
000001	0.000e+000	000018	3.100e+001
000002	6.200e+000	000019	1.240e+001
000003	1.240e+001	000020	2.480e+001
000004	3.100e+001	000021	4.960e+001
000005	1.860e+001	000022	3.100e+001
000006	3.100e+001	000023	4.960e+001
000007	1.860e+001	000024	6.200e+000
000008	2.480e+001	000025	4.340e+001
000009	3.100e+001	000026	1.860e+001
000010	3.720e+001	000027	4.960e+001
000011	1.860e+001	000028	3.100e+001
000012	4.960e+001	000029	3.100e+001
000013	4.960e+001	000030	3.100e+001
000014	5.580e+001		
000015	4.340e+001		
000016	6.200e+001		
000017	5.580e+001		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Measurement Data Statistical Evaluation - Alpha

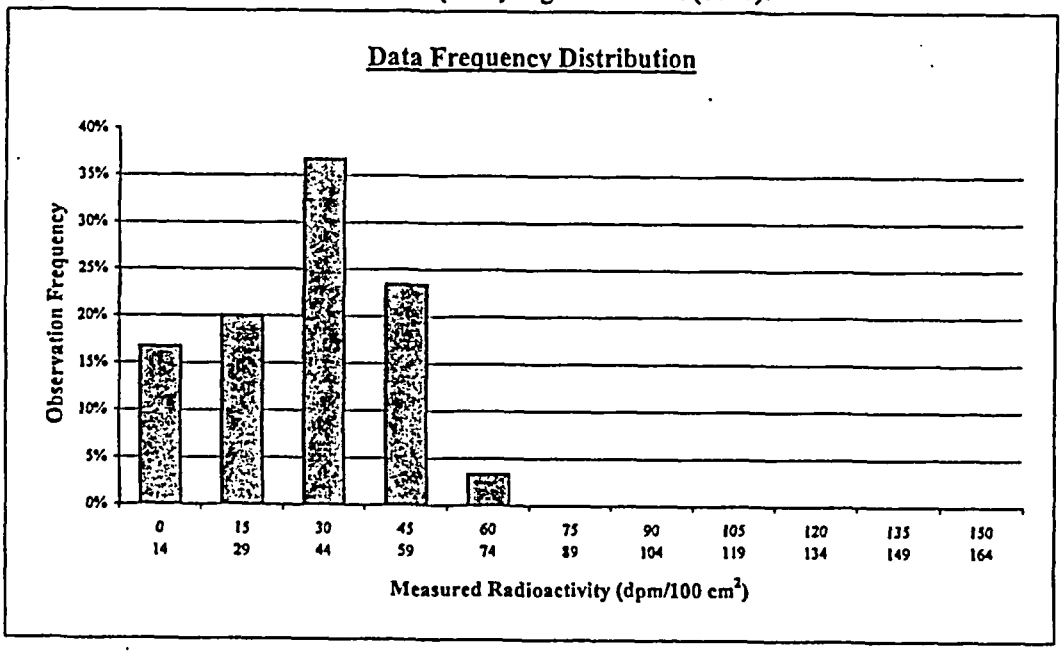
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	62	82	Pass
Median	0.050	0.500	Pass
Mean	32	28	See comment below
Std Dev	16	28	Pass
WRS	1259	1026	Pass

Data set passes the WRS statistical test as Wr (1259) is greater than k (1026).

Statistical Quantities

Range:	62
Median:	31
Mean:	32
Std Dev:	16
Minimum:	0
Maximum:	62
DCGL:	28



Plot Parameters

# of measurements:	30
# of intervals:	11
Interval increment:	15
Minimum:	0
Maximum:	164

Interval	High End	Low End	Number of Observations	Observation Frequency
1	14	0	5	17%
2	29	15	6	20%
3	44	30	11	37%
4	59	45	7	23%
5	74	60	1	3%
6	89	75	0	0%
7	104	90	0	0%
8	119	105	0	0%
9	134	120	0	0%
10	149	135	0	0%
11	164	150	0	0%
		Total:	30	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Background Reference Area B02027B - Alpha

Statistical Quantities:

Range	: 8.895e+001
Median	: 2.737e+001
Mean	: 3.421e+001
Std. Deviation:	: 2.017e+001

# of Measurements: 30 Min Value: 6.842e+000 Max Value: 9.579e+001

Measurement Location	Value	Data Status Code
000001	2.737e+001	B
000002	2.053e+001	B
000003	5.473e+001	B
000004	6.842e+001	B
000005	9.579e+001	B
000006	4.105e+001	B
000007	6.842e+000	B
000008	4.105e+001	B
000009	2.053e+001	B
000010	4.105e+001	B
000011	1.368e+001	B
000012	2.737e+001	B
000013	5.473e+001	B
000014	6.842e+000	B
000015	2.737e+001	B
000016	4.105e+001	B
000017	3.421e+001	B
000018	4.105e+001	B
000019	2.737e+001	B
000020	2.737e+001	B
000021	2.737e+001	B
000022	1.368e+001	B
000023	3.421e+001	B
000024	2.053e+001	B
000025	5.473e+001	B
000026	2.737e+001	B
000027	6.842e+001	B
000028	2.053e+001	B
000029	3.421e+001	B
000030	6.842e+000	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 1,128
Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 12,340

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 30
Investigation Level: 750
Maximum Value: 14

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 30
Investigation Level: MDC
Maximum Value: 1

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Ten beta scan measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	22,540
Size of Area Exceeding DCGL (m^2):	0.06
Size of Survey Unit (m^2):	121
Survey Unit Area >DCGL (%):	0.05
EMC Value:	37,500

Action Taken: Corrected measurement values for scan locations per guidance in memo FS-018-03. Deleted scan results for scan locations to be remediated. Replaced original scan results in SDMS with the corrected results for the others. Rescanned remediated areas. Applied EMC data processing to corrected results for scan locations that remain elevated.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Discussion of Anomalous Measurement Data (Continued)

Investigation #2 Summary

Reason for Investigation: Nineteen alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	62
Size of Area Exceeding DCGL (m^2):	0.25
Size of Survey Unit (m^2):	121
Survey Unit Area >DCGL (%):	0.2
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
S93Q01	1,502	0	0.200	0.000	0.200	947	27
S93Q02	1,646	6	0.219	0.221	0.441	1,062	21
S93Q03	1,843	12	0.246	0.443	0.689	985	55
S93Q04	1,863	31	0.248	1.107	1.356	959	68
S93Q05	1,889	19	0.252	0.664	0.916	955	96
S93Q06	1,830	31	0.244	1.107	1.351	897	41
S93Q07	1,941	19	0.259	0.664	0.923	947	7
S93Q08	1,948	25	0.260	0.886	1.145	886	41
S93Q09	1,974	31	0.263	1.107	1.370	1,016	21
S93Q10	1,751	37	0.233	1.329	1.562	840	41
S93Q11	2,105	19	0.281	0.664	0.945	782	14
S93Q12	1,948	50	0.260	1.771	2.031	970	27
S93Q13	1,902	50	0.254	1.771	2.025	951	55
S93Q14	2,086	56	0.278	1.993	2.271	982	7
S93Q15	1,981	43	0.264	1.550	1.814	828	27
S93Q16	2,020	62	0.269	2.214	2.484	859	41
S93Q17	1,863	56	0.248	1.993	2.241	916	34
S93Q18	1,692	31	0.226	1.107	1.333	767	41
S93Q19	1,948	12	0.260	0.443	0.703	962	27
S93Q20	1,974	25	0.263	0.886	1.149	859	27
S93Q21	1,915	50	0.255	1.771	2.027	947	27
S93Q22	1,869	31	0.249	1.107	1.356	863	14
S93Q23	1,987	50	0.265	1.771	2.036	890	34
S93Q24	2,506	6	0.334	0.221	0.556	855	21
S93Q25	1,607	43	0.214	1.550	1.764	828	55
S93Q26	1,653	19	0.220	0.664	0.885	1,039	27
S93Q27	1,620	50	0.216	1.771	1.987	993	68
S93Q28	1,535	31	0.205	1.107	1.312	863	21
S93Q29	1,718	31	0.229	1.107	1.336	878	34
S93Q30	1,607	31	0.214	1.107	1.321	1,043	7
				mean:	1.384		
				maximum:	2.484		

*Values from B02027B which are measurement values 1-30 from background reference data set B04045Y01.
**Values from background reference area survey unit B02027B.
Note: Highlighted background values to track for Wr

Since Y mean > Unity DCGL (1.384 > 1.0), go to means test.

Means test :
DM = (YMax - BMin) = (2.484 - 0.376) = 2.108 > Unity DCGL
DA = (YMean - BMean) = (1.384 - 1.344) = 0.04 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation (see last page).

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	0.964	1.091	2.091
0.142	0.750	0.892	1.892
0.131	1.964	2.096	3.096
0.128	2.429	2.556	3.556
0.127	3.429	3.556	4.556
0.120	1.464	1.584	2.584
0.126	0.250	0.376	1.376
0.118	1.464	1.582	2.582
0.135	0.750	0.885	1.885
0.112	1.464	1.576	2.576
0.104	0.500	0.604	1.604
0.129	0.964	1.094	2.094
0.127	1.964	2.091	3.091
0.131	0.250	0.381	1.381
0.110	0.964	1.075	2.075
0.115	1.464	1.579	2.579
0.122	1.214	1.336	2.336
0.102	1.464	1.567	2.567
0.128	0.964	1.093	2.093
0.115	0.964	1.079	2.079
0.126	0.964	1.091	2.091
0.115	0.500	0.615	1.615
0.119	1.214	1.333	2.333
0.114	0.750	0.864	1.864
0.110	1.964	2.075	3.075
0.139	0.964	1.103	2.103
0.132	2.429	2.561	3.561
0.115	0.750	0.865	1.865
0.117	1.214	1.331	2.331
0.139	0.250	0.389	1.389
	mean:	1.344	
	minimum:	0.376	

Y, Z POOL	RANK#	Z Rank #
0.200	1.0	20.0
0.441	2.0	21.0
0.556	3.0	22.0
0.689	4.0	24.0
0.703	5.0	25.0
0.885	6.0	28.0
0.916	7.0	29.0
0.923	8.0	30.0
0.945	9.0	31.0
1.145	10.0	37.0
1.149	11.0	38.0
1.312	12.0	39.0
1.321	13.0	40.0
1.333	14.0	41.0
1.336	15.0	42.0
1.351	16.0	43.0
1.356	17.5	46.0
1.356	17.5	47.0
1.370	19.0	48.0
1.376	20.0	50.0
1.381	21.0	51.0
1.389	22.0	52.0
1.562	23.0	53.0
1.604	24.0	54.0
1.615	25.0	55.0
1.764	26.0	56.0
1.814	27.0	57.0
1.864	28.0	58.0
1.865	29.0	59.0
1.885	30.0	60.0
1.892	31.0	1256.0
1.987	32.0	Z Rank Sum = Wr
2.025	33.0	
2.027	34.0	
2.031	35.0	
2.036	36.0	
2.075	37.0	
2.079	38.0	
2.091	39.0	
2.091	40.0	
2.093	41.0	
2.094	42.0	
2.103	43.0	
2.241	44.0	
2.271	45.0	
2.331	46.0	
2.333	47.0	
2.336	48.0	
2.484	49.0	

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Unity Rule Evaluation (Continued)

2.567	50.0
2.576	51.0
2.579	52.0
2.582	53.0
2.584	54.0
3.075	55.0
3.091	56.0
3.096	57.0
3.556	58.0
3.561	59.0
4.556	60.0

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + z(P)^{1/2}$

where: n = 30

m = 30

P= nm(n+m+1)/12 = 4,575

z = 1.645, for 0.05 Type I error

$k = 30(30+30+1)/2 + 1.645(4575)^{1/2}$

k = 915 + 1.645(67.6) = 1026

Conclusion:

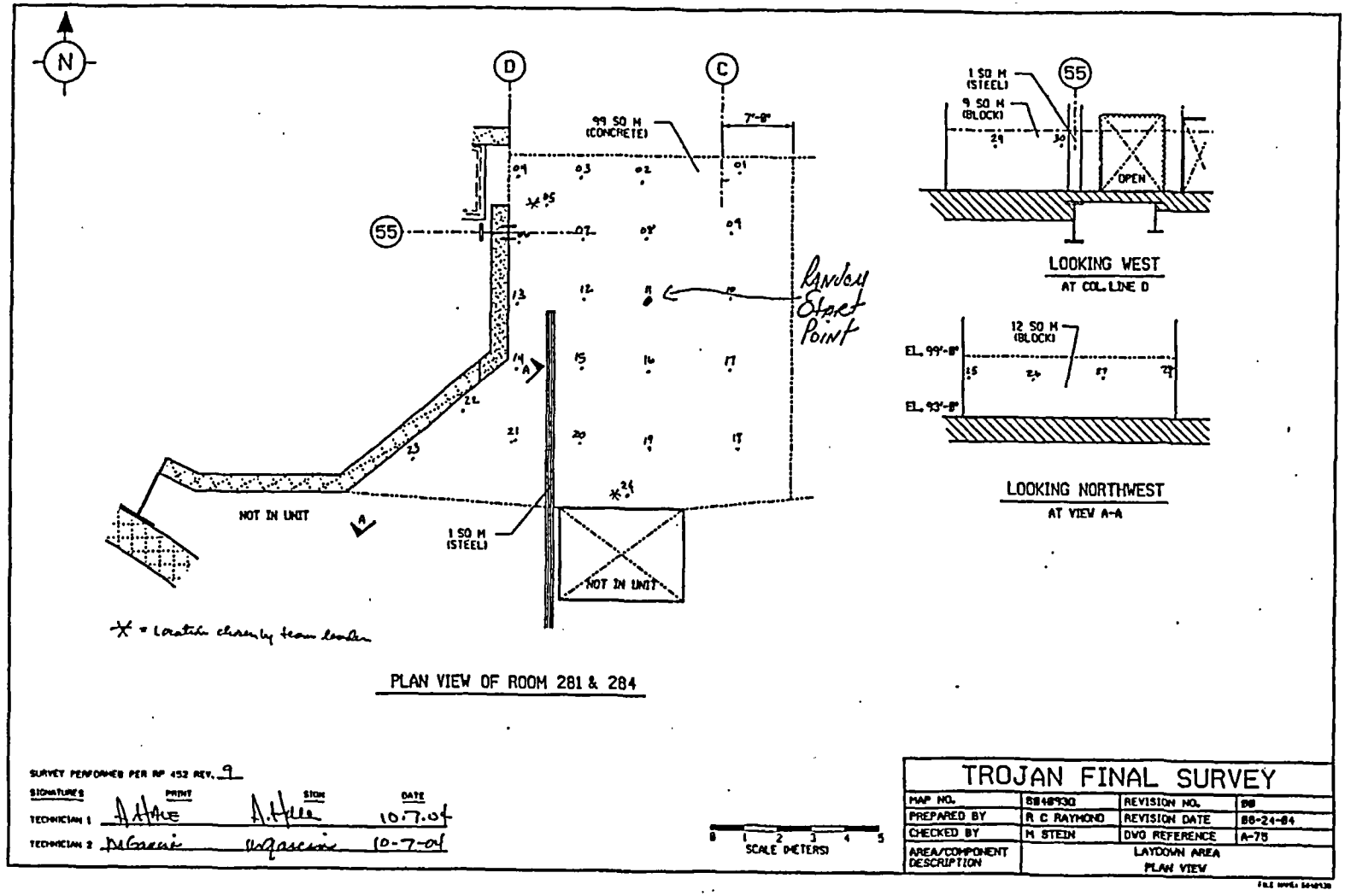
Since Wr > k (1256 > 1026), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half

Classification: Class 1
Size (m^2): 121

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	30	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.090e+003
Maximum Value	:	5.704e+003
Range	:	4.614e+003
Median	:	1.842e+003
Std. Deviation	:	8.239e+002
Mean	:	1.916e+003
95% UCL	:	2.171e+003

Measurement Values

Location	Value	Location	Value
000001	1.729e+003	000018	1.510e+003
000002	1.884e+003	000019	1.090e+003
000003	1.955e+003	000020	1.651e+003
000004	1.839e+003	000021	1.632e+003
000005	1.910e+003	000022	1.103e+003
000006	2.045e+003	000023	1.484e+003
000007	1.845e+003	000024	1.245e+003
000008	2.020e+003	000025	1.297e+003
000009	2.071e+003	000026	1.265e+003
000010	2.620e+003	000027	1.194e+003
000011	2.381e+003	000028	1.516e+003
000012	2.245e+003	000029	1.703e+003
000013	5.704e+003	000030	2.549e+003
000014	2.149e+003		
000015	2.168e+003		
000016	2.007e+003		
000017	1.671e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Measurement Data Statistical Evaluation - Beta

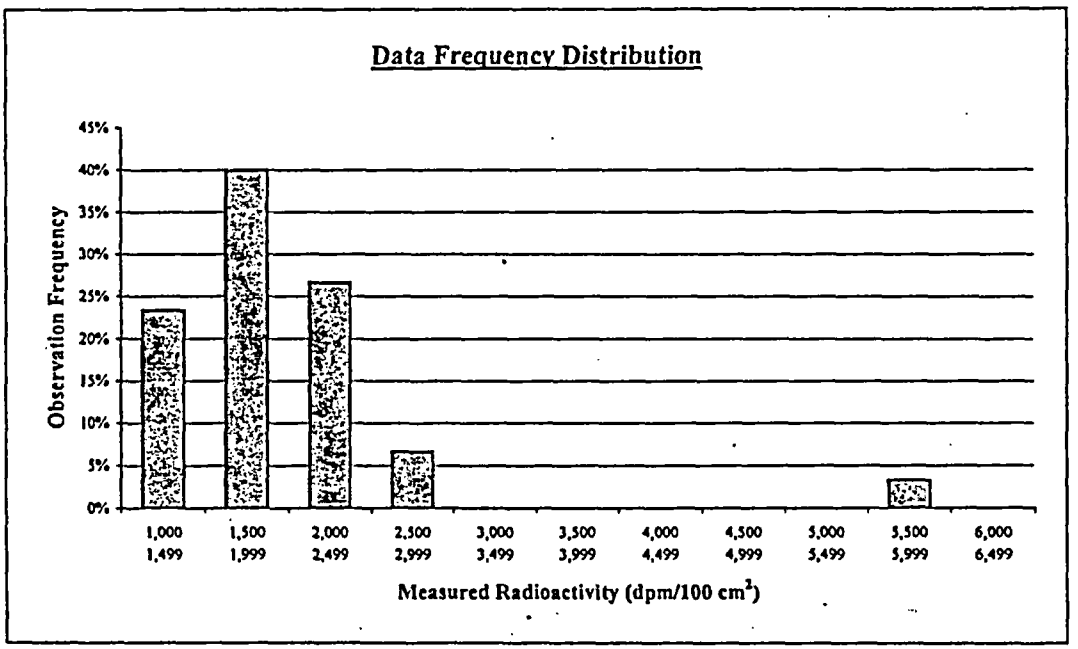
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	4,614	4,119	See comment below
Median	0.090	0.500	Pass
Mean	1,916	6,000	Pass
Std Dev	824	1,500	Pass

All values are <DCGL, WRS statistical test not required for data set.

Statistical Quantities

Range:	4,614
Median:	1,842
Mean:	1,916
Std Dev:	824
Minimum:	1,090
Maximum:	5,704
DCGL:	7,500



Plot Parameters	
# of measurements:	30
# of intervals:	11
Interval increment:	500
Minimum:	1,000
Maximum:	6,499

Interval	High End	Low End	Number of Observations	Observation Frequency
1	1,499	1,000	7	23%
2	1,999	1,500	12	40%
3	2,499	2,000	8	27%
4	2,999	2,500	2	7%
5	3,499	3,000	0	0%
6	3,999	3,500	0	0%
7	4,499	4,000	0	0%
8	4,999	4,500	0	0%
9	5,499	5,000	0	0%
10	5,999	5,500	1	3%
11	6,499	6,000	0	0%
		Total:	30	100%

Comment:
Range failure is a test artifact due to a single measurement value of 5,700 dpm, with the other 29 values less than 3,000 dpm, resulting in a range that exceeds the test criterion of of 5(Std.Dev.). All values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Background Reference Area B02027B - Beta

Statistical Quantities:

Range	: 2.952e+002
Median	: 9.316e+002
Mean	: 9.189e+002
Std. Deviation:	: 7.670e+001

# of Measurements: 30 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	30	DPM/100 CM²	2.800e+001	-	1.118e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	1.323e+001
Maximum Value	:	8.598e+001
Range	:	7.275e+001
Median	:	5.291e+001
Std. Deviation	:	1.891e+001
Mean	:	4.608e+001
95% UCL	:	5.193e+001

Measurement Values

Location	Value	Location	Value
000001	7.275e+001	000018	5.291e+001
000002	5.291e+001	000019	3.307e+001
000003	5.291e+001	000020	2.646e+001
000004	3.968e+001	000021	5.952e+001
000005	5.291e+001	000022	4.630e+001
000006	1.323e+001	000023	1.984e+001
000007	5.291e+001	000024	3.968e+001
000008	4.630e+001	000025	2.646e+001
000009	5.291e+001	000026	1.984e+001
000010	2.646e+001	000027	1.984e+001
000011	5.952e+001	000028	1.984e+001
000012	7.937e+001	000029	7.275e+001
000013	5.952e+001	000030	8.598e+001
000014	5.291e+001		
000015	5.291e+001		
000016	5.291e+001		
000017	3.968e+001		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Measurement Data Statistical Evaluation - Alpha

Statistical Comparisons

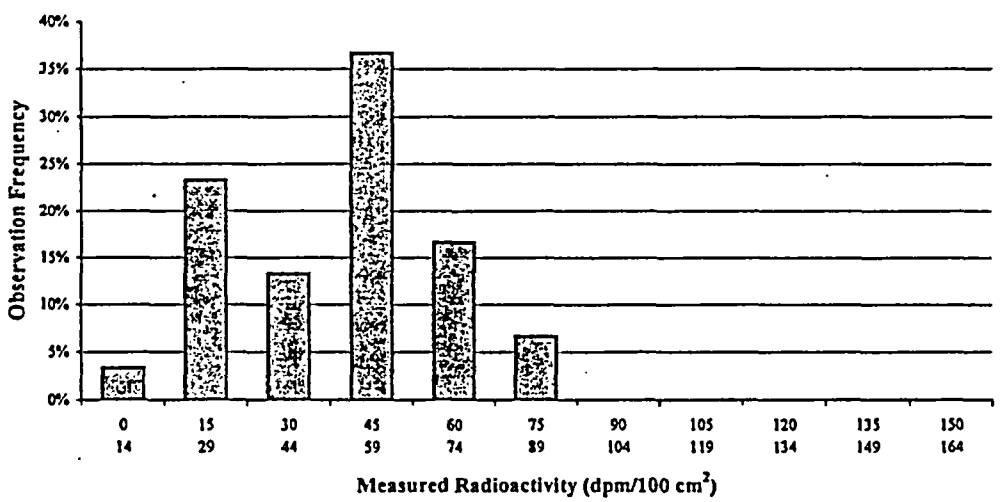
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	73	95	Pass
Median	0.359	0.500	Pass
Mean	46	28	See comment below
Std Dev	19	28	Pass
WRS	1118	1026	Pass

Statistical Quantities

Range:	73
Median:	53
Mean:	46
Std Dev:	19
Minimum:	13
Maximum:	86
DCGL:	28

Data set passes the WRS statistical test as Wr (1118) is greater than k (1026).

Data Frequency Distribution



Plot Parameters	
# of measurements:	30
# of intervals:	11
Interval increment:	15
Minimum:	0
Maximum:	164

Interval	High End	Low End	Number of Observations	Observation Frequency
1	14	0	1	3%
2	29	15	7	23%
3	44	30	4	13%
4	59	45	11	37%
5	74	60	5	17%
6	89	75	2	7%
7	104	90	0	0%
8	119	105	0	0%
9	134	120	0	0%
10	149	135	0	0%
11	164	150	0	0%
		Total:	30	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Background Reference Area B02027B - Alpha

Statistical Quantities:

Range	: 8.895e+001
Median	: 2.737e+001
Mean	: 3.421e+001
Std. Deviation:	: 2.017e+001

# of Measurements: 30 Min Value: 6.842e+000 Max Value: 9.579e+001

Measurement Location	Value	Data Status Code
000001	2.737e+001	B
000002	2.053e+001	B
000003	5.473e+001	B
000004	6.842e+001	B
000005	9.579e+001	B
000006	4.105e+001	B
000007	6.842e+000	B
000008	4.105e+001	B
000009	2.053e+001	B
000010	4.105e+001	B
000011	1.368e+001	B
000012	2.737e+001	B
000013	5.473e+001	B
000014	6.842e+000	B
000015	2.737e+001	B
000016	4.105e+001	B
000017	3.421e+001	B
000018	4.105e+001	B
000019	2.737e+001	B
000020	2.737e+001	B
000021	2.737e+001	B
000022	1.368e+001	B
000023	3.421e+001	B
000024	2.053e+001	B
000025	5.473e+001	B
000026	2.737e+001	B
000027	6.842e+001	B
000028	2.053e+001	B
000029	3.421e+001	B
000030	6.842e+000	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 919
Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 6,402

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 30
Investigation Level: 750
Maximum Value: 15

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 30
Investigation Level: MDC
Maximum Value: 5

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Nine beta scan measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	42,450
Size of Area Exceeding DCGL (m^2):	0.18
Size of Survey Unit (m^2):	158
Survey Unit Area >DCGL (%):	0.12
EMC Value:	37,500

Action Taken: Corrected measurement values for scan locations per guidance in memo FS-018-03. Deleted scan results for scan locations to be remediated. Replaced original scan results in SDMS with the corrected results for the others. Rescanned remediated areas. Applied EMC data processing to corrected results for scan locations that remain elevated.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Discussion of Anomalous Measurement Data (Continued)

Investigation #2 Summary

Reason for Investigation: Twenty-three alpha static measurements exceeded investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	172
Size of Area Exceeding DCGL (m^2):	0.3
Size of Survey Unit (m^2):	158
Survey Unit Area >DCGL (%):	0.2
EMC Value:	140

Action Taken: Remediated static measurement locations 17, 18, 20, & 21 and resurveyed. Replaced original results in SDMS with post-remediation results. Applied EMC data processing to alpha static measurements that remain elevated.

Basis for Action Taken: Static measurement locations that approached or exceeded EMC DCGL were remediated. Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
S93R01	1,729	73	0.231	2.607	2.838	947	27
S93R02	1,884	53	0.251	1.893	2.144	1,062	21
S93R03	1,955	53	0.261	1.893	2.154	985	55
S93R04	1,839	40	0.245	1.429	1.674	959	68
S93R05	1,910	53	0.255	1.893	2.148	955	96
S93R06	2,045	13	0.273	0.464	0.737	897	41
S93R07	1,845	53	0.246	1.893	2.139	947	7
S93R08	2,020	46	0.269	1.643	1.912	886	41
S93R09	2,071	53	0.276	1.893	2.169	1,016	21
S93R10	2,620	26	0.349	0.929	1.278	840	41
S93R11	2,381	60	0.317	2.143	2.460	782	14
S93R12	2,245	80	0.299	2.857	3.156	970	27
S93R13	5,704	60	0.761	2.143	2.903	951	55
S93R14	2,149	53	0.287	1.893	2.179	982	7
S93R15	2,168	53	0.289	1.893	2.182	828	27
S93R16	2,007	53	0.268	1.893	2.160	859	41
S93R17	1,671	40	0.223	1.429	1.651	916	34
S93R18	1,510	53	0.201	1.893	2.094	767	41
S93R19	1,090	33	0.145	1.179	1.324	962	27
S93R20	1,651	26	0.220	0.929	1.149	859	27
S93R21	1,632	60	0.218	2.143	2.360	947	27
S93R22	1,103	46	0.147	1.643	1.790	863	14
S93R23	1,484	20	0.198	0.714	0.912	890	34
S93R24	1,245	40	0.166	1.429	1.595	855	21
S93R25	1,297	26	0.173	0.929	1.102	828	55
S93R26	1,265	20	0.169	0.714	0.883	1,039	27
S93R27	1,194	20	0.159	0.714	0.873	993	68
S93R28	1,516	20	0.202	0.714	0.916	863	21
S93R29	1,703	73	0.227	2.607	2.834	878	34
S93R30	2,549	86	0.340	3.071	3.411	1,043	7
				mean:	1.904		
				maximum:	3.411		

*Values from B02027B which are measurement values 1-30 from background reference data set B04045Y01.
**Values from background reference area survey unit B02027B.
Note: Highlighted background values to track for Wr

Since Y mean > Unity DCGL (1.904 > 1.0), go to means test.

Means test :
DM = (YMax - BMin) = (3.411 - 0.376) = 3.035 > Unity DCGL
DA = (YMean - BMean) = (1.904 - 1.344) = 0.56 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation (see last page).

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	0.964	1.091	2.091
0.142	0.750	0.892	1.892
0.131	1.964	2.096	3.096
0.128	2.429	2.556	3.556
0.127	3.429	3.556	4.556
0.120	1.464	1.584	2.584
0.126	0.250	0.376	1.376
0.118	1.464	1.582	2.582
0.135	0.750	0.885	1.885
0.112	1.464	1.576	2.576
0.104	0.500	0.604	1.604
0.129	0.964	1.094	2.094
0.127	1.964	2.091	3.091
0.131	0.250	0.381	1.381
0.110	0.964	1.075	2.075
0.115	1.464	1.579	2.579
0.122	1.214	1.336	2.336
0.102	1.464	1.567	2.567
0.128	0.964	1.093	2.093
0.115	0.964	1.079	2.079
0.126	0.964	1.091	2.091
0.115	0.500	0.615	1.615
0.119	1.214	1.333	2.333
0.114	0.750	0.864	1.864
0.110	1.964	2.075	3.075
0.139	0.964	1.103	2.103
0.132	2.429	2.561	3.561
0.115	0.750	0.865	1.865
0.117	1.214	1.331	2.331
0.139	0.250	0.389	1.389
	mean:	1.344	
	minimum:	0.376	

Y, Z POOL	RANK#	Z Rank #
0.737	1.0	10.0
0.873	2.0	11.0
0.883	3.0	12.0
0.912	4.0	14.0
0.916	5.0	15.0
1.102	6.0	19.0
1.149	7.0	20.0
1.278	8.0	21.0
1.324	9.0	22.0
1.376	10.0	24.0
1.381	11.0	25.0
1.389	12.0	26.5
1.595	13.0	26.5
1.604	14.0	28.0
1.615	15.0	29.5
1.651	16.0	31.0
1.674	17.0	40.0
1.790	18.0	41.0
1.864	19.0	42.0
1.865	20.0	45.0
1.885	21.0	46.0
1.892	22.0	47.0
1.912	23.0	48.0
2.075	24.0	49.0
2.079	25.0	53.0
2.091	26.5	54.0
2.091	26.5	55.0
2.093	28.0	58.0
2.094	29.5	59.0
2.094	29.5	60.0
2.103	31.0	1031.5
2.139	32.0	Z Rank Sum = Wr
2.144	33.0	
2.148	34.0	
2.154	35.0	
2.160	36.0	
2.169	37.0	
2.179	38.0	
2.182	39.0	
2.331	40.0	
2.3331	41.0	
2.336	42.0	
2.360	43.0	
2.460	44.0	
2.567	45.0	
2.576	46.0	
2.579	47.0	
2.582	48.0	
2.584	49.0	

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half

Classification: Class 1
Size (m^2): 158

Unity Rule Evaluation (Continued)

2.834	50.0
2.838	51.0
2.903	52.0
3.075	53.0
3.091	54.0
3.096	55.0
3.156	56.0
3.411	57.0
3.556	58.0
3.561	59.0
4.556	60.0

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + z(P)^{1/2}$

where: n = 30
m = 30
P = nm(n+m+1)/12 = 4,575
z = 1.645, for 0.05 Type I error

$k = 30(30+30+1)/2 + 1.645(4575)^{1/2}$

k = 915 + 1.645(67.6) = 1026

Conclusion:

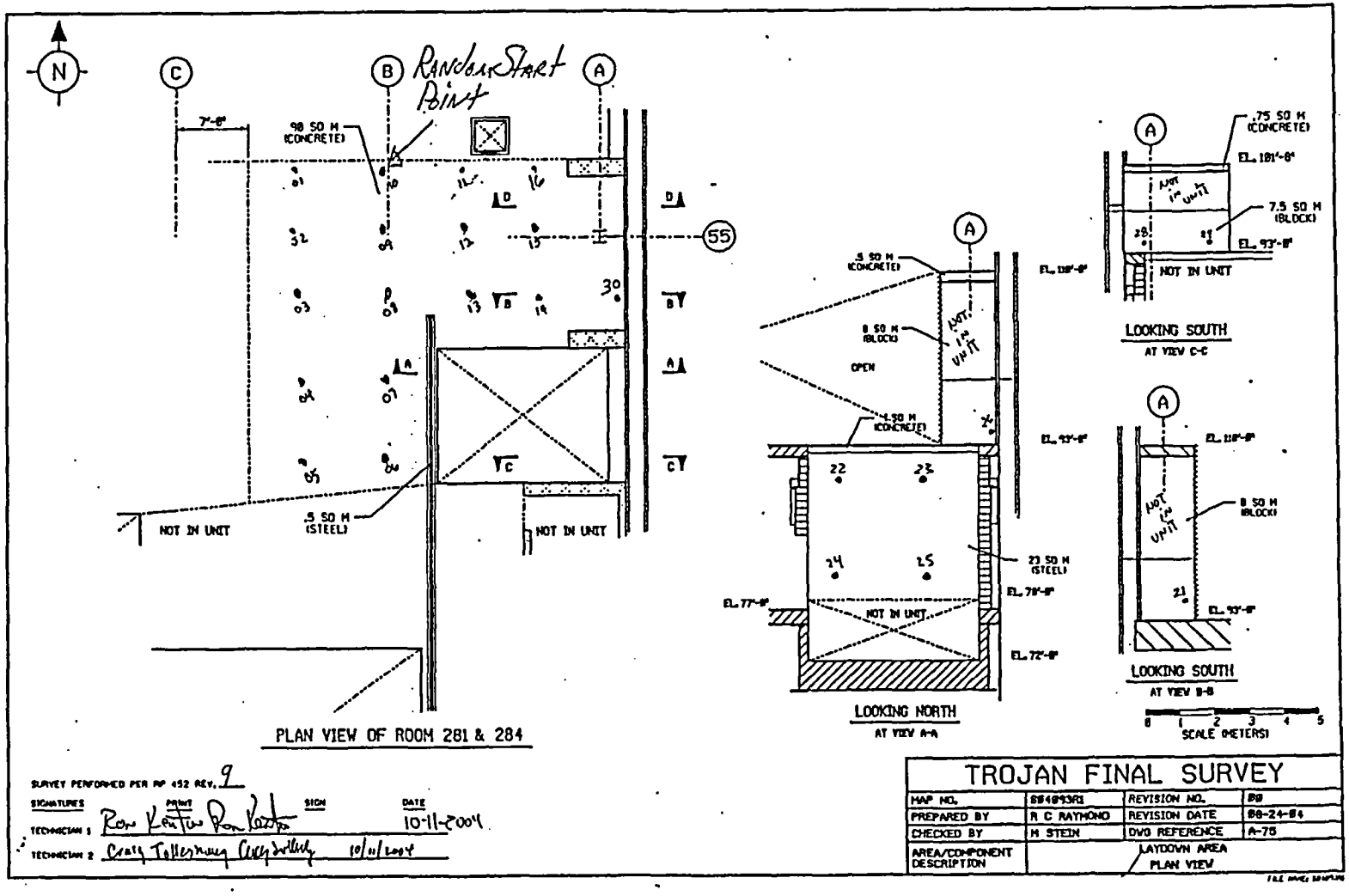
Since Wr > k (1031 > 1026), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half

Classification: Class 1
Size (m^2): 158

Static Measurement Locations Map

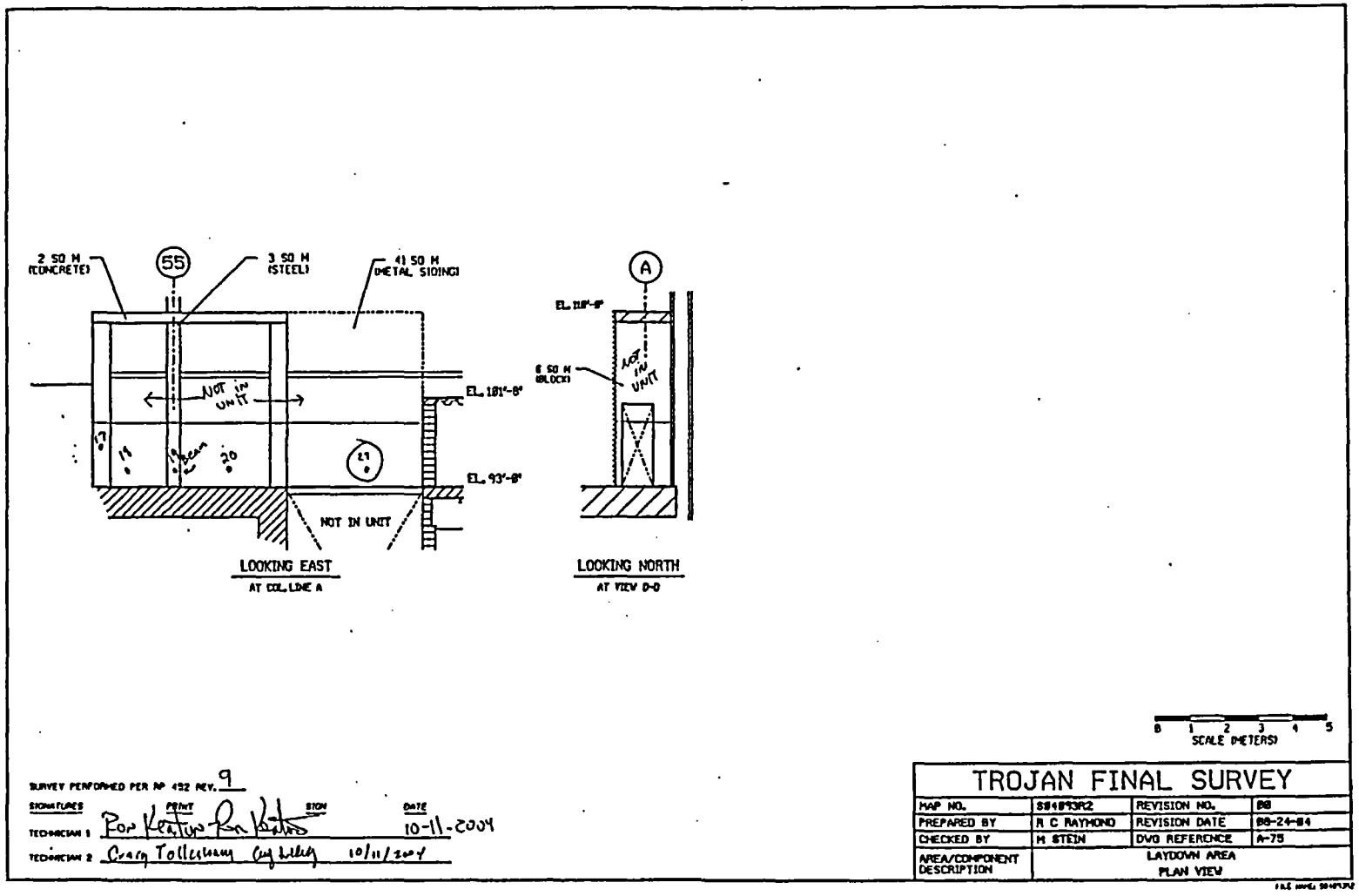


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half

Classification: Class 1
Size (m^2): 158

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	50	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.114e+003
Maximum Value	:	4.371e+003
Range	:	3.257e+003
Median	:	2.039e+003
Std. Deviation	:	7.690e+002
Mean	:	2.073e+003
95% UCL	:	2.255e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	2.695e+003	000018	3.514e+003	000035	2.503e+003
000002	2.355e+003	000019	4.090e+003	000036	2.765e+003
000003	2.170e+003	000020	4.371e+003	000037	1.312e+003
000004	2.394e+003	000021	1.165e+003	000038	2.586e+003
000005	2.829e+003	000022	2.010e+003	000039	2.061e+003
000006	3.066e+003	000023	1.421e+003	000040	1.843e+003
000007	2.375e+003	000024	1.299e+003	000041	1.632e+003
000008	1.831e+003	000025	2.407e+003	000042	1.395e+003
000009	1.440e+003	000026	2.176e+003	000043	1.114e+003
000010	1.229e+003	000027	2.496e+003	000044	1.920e+003
000011	2.029e+003	000028	2.253e+003	000045	1.184e+003
000012	2.087e+003	000029	2.515e+003	000046	1.286e+003
000013	2.317e+003	000030	3.578e+003	000047	1.267e+003
000014	2.144e+003	000031	1.306e+003	000048	1.248e+003
000015	1.434e+003	000032	1.299e+003	000049	1.395e+003
000016	1.946e+003	000033	2.048e+003	000050	1.267e+003
000017	2.887e+003	000034	1.671e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Measurement Data Statistical Evaluation - Beta

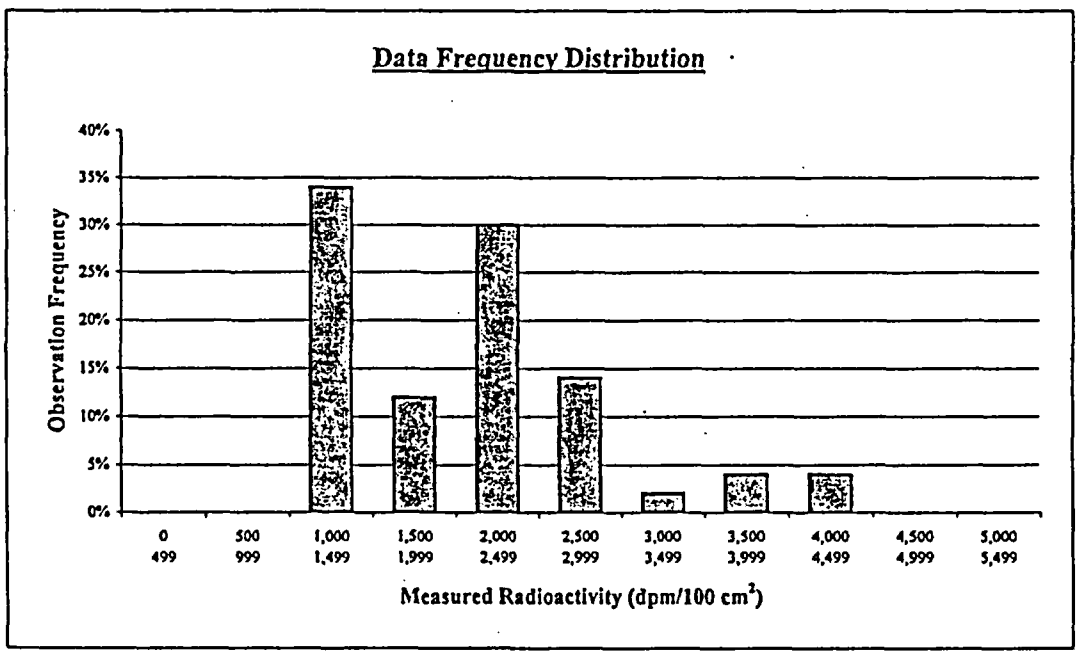
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	3,257	3,845	Pass
Median	0.044	0.500	Pass
Mean	2,073	6,000	Pass
Std Dev	769	1,500	Pass

All values are <DCGL, WRS statistical test not required for data set.

Statistical Quantities

Range:	3,257
Median:	2,039
Mean:	2,073
Std Dev:	769
Minimum:	1,114
Maximum:	4,371
DCGL:	7,500



Plot Parameters	
# of measurements:	50
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	0	0%
2	999	500	0	0%
3	1,499	1,000	17	34%
4	1,999	1,500	6	12%
5	2,499	2,000	15	30%
6	2,999	2,500	7	14%
7	3,499	3,000	1	2%
8	3,999	3,500	2	4%
9	4,499	4,000	2	4%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	50	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Background Reference Area B04045X - Beta

Statistical Quantities:

Range	: 6.442e+002
Median	: 9.202e+002
Mean	: 9.454e+002
Std. Deviation:	: 1.153e+002

# of Measurements: 51 Min Value: 7.668e+002 Max Value: 1.411e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B
000031	9.202e+002	B
000032	8.627e+002	B
000033	9.048e+002	B
000034	9.087e+002	B
000035	7.937e+002	B
000036	1.024e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Background Reference Area B04045X – Beta (Continued)

Statistical Quantities:

Range	: 6.442e+002
Median	: 9.202e+002
Mean	: 9.454e+002
Std. Deviation:	: 1.153e+002

# of Measurements: 51 Min Value: 7.668e+002 Max Value: 1.411e+003

Measurement Location	Value	Data Status Code
000037	1.100e+003	B
000038	1.104e+003	B
000039	1.411e+003	B
000040	1.288e+003	B
000041	9.202e+002	B
000042	8.512e+002	B
000043	1.062e+003	B
000044	9.202e+002	B
000045	9.010e+002	B
000046	1.062e+003	B
000047	9.317e+002	B
000048	9.969e+002	B
000049	8.857e+002	B
000050	8.933e+002	B
000051	9.048e+002	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	50	DPM/100 CM²	2.800e+001	-	3.376e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	1.323e+001
Maximum Value	:	1.058e+002
Range	:	9.257e+001
Median	:	4.630e+001
Std. Deviation	:	1.931e+001
Mean	:	4.881e+001
95% UCL	:	5.339e+001

Measurement Values

Location	Value	Location	Value	Location	Value
000001	3.307e+001	000018	4.630e+001	000035	3.307e+001
000002	4.630e+001	000019	5.952e+001	000036	1.058e+002
000003	6.614e+001	000020	5.291e+001	000037	2.646e+001
000004	5.291e+001	000021	2.646e+001	000038	3.968e+001
000005	5.291e+001	000022	2.646e+001	000039	5.291e+001
000006	3.968e+001	000023	7.937e+001	000040	7.275e+001
000007	6.614e+001	000024	3.307e+001	000041	5.952e+001
000008	4.630e+001	000025	7.937e+001	000042	3.968e+001
000009	5.952e+001	000026	4.630e+001	000043	4.630e+001
000010	1.323e+001	000027	5.291e+001	000044	3.968e+001
000011	6.614e+001	000028	7.937e+001	000045	2.646e+001
000012	3.307e+001	000029	5.952e+001	000046	3.307e+001
000013	2.646e+001	000030	7.937e+001	000047	2.646e+001
000014	7.275e+001	000031	3.307e+001	000048	3.968e+001
000015	3.307e+001	000032	1.984e+001	000049	6.614e+001
000016	4.630e+001	000033	2.646e+001	000050	7.275e+001
000017	5.291e+001	000034	5.291e+001		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Measurement Data Statistical Evaluation - Alpha

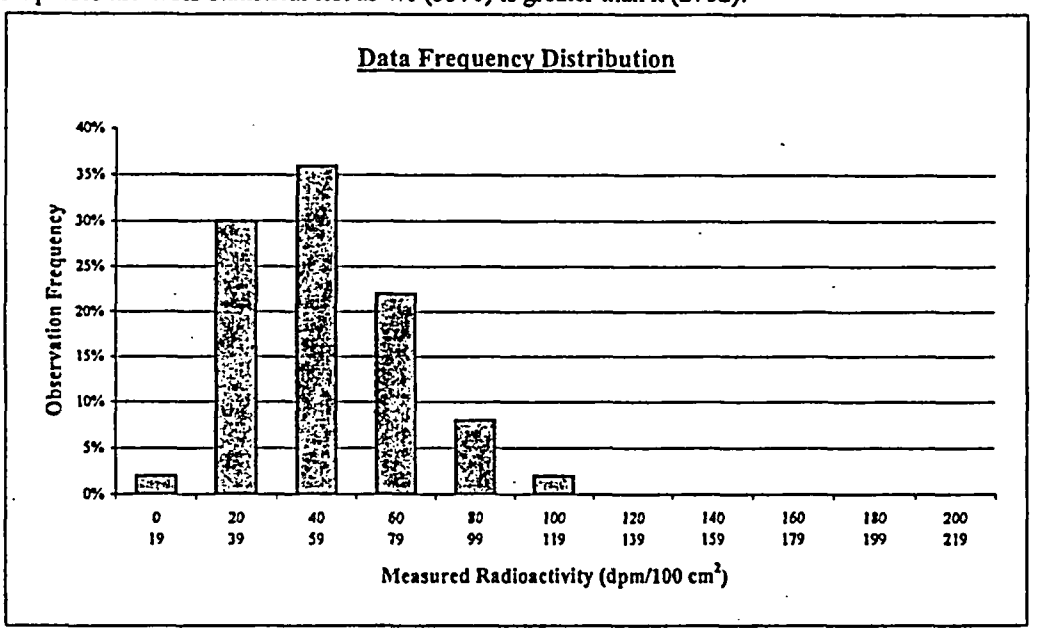
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	93	97	Pass
Median	0.130	0.500	Pass
Mean	49	28	See comment below
Std Dev	19	28	Pass
WRS	3376	2762	Pass

Data set passes the WRS statistical test as Wr (3376) is greater than k (2762).

Statistical Quantities

Range:	93
Median:	46
Mean:	49
Std Dev:	19
Minimum:	13
Maximum:	106
DCGL:	28



Plot Parameters	
# of measurements:	50
# of intervals:	11
Interval increment:	20
Minimum:	0
Maximum:	219

Interval	High End	Low End	Number of Observations	Observation Frequency
1	19	0	1	2%
2	39	20	15	30%
3	59	40	18	36%
4	79	60	11	22%
5	99	80	4	8%
6	119	100	1	2%
7	139	120	0	0%
8	159	140	0	0%
9	179	160	0	0%
10	199	180	0	0%
11	219	200	0	0%
		Total:	50	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Background Reference Area B04045X - Alpha

Statistical Quantities:

Range	: 6.820e+001
Median	: 4.340e+001
Mean	: 4.376e+001
Std. Deviation:	: 1.661e+001

# of Measurements: 51 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000001	3.720e+001	B
000002	5.580e+001	B
000003	5.580e+001	B
000004	3.100e+001	B
000005	2.480e+001	B
000006	3.100e+001	B
000007	6.200e+000	B
000008	1.860e+001	B
000009	5.580e+001	B
000010	3.100e+001	B
000011	7.440e+001	B
000012	5.580e+001	B
000013	6.200e+001	B
000014	4.340e+001	B
000015	4.340e+001	B
000016	3.100e+001	B
000017	3.100e+001	B
000018	1.240e+001	B
000019	6.820e+001	B
000020	2.480e+001	B
000021	6.820e+001	B
000022	3.100e+001	B
000023	3.720e+001	B
000024	6.820e+001	B
000025	6.200e+001	B
000026	2.480e+001	B
000027	5.580e+001	B
000028	4.960e+001	B
000029	1.860e+001	B
000030	3.100e+001	B
000031	6.820e+001	B
000032	3.100e+001	B
000033	3.720e+001	B
000034	3.720e+001	B
000035	3.720e+001	B
000036	5.580e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Background Reference Area B04045X – Alpha (Continued)

Statistical Quantities:

Range	: 6.820e+001
Median	: 4.340e+001
Mean	: 4.376e+001
Std. Deviation:	: 1.661e+001

# of Measurements: 51 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000037	4.340e+001	B
000038	1.860e+001	B
000039	6.200e+001	B
000040	3.720e+001	B
000041	4.960e+001	B
000042	5.580e+001	B
000043	4.960e+001	B
000044	6.820e+001	B
000045	3.720e+001	B
000046	4.960e+001	B
000047	6.200e+001	B
000048	4.340e+001	B
000049	6.200e+001	B
000050	3.720e+001	B
000051	4.960e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 877
Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 10,990

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 50
Investigation Level: 750
Maximum Value: 39

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 50
Investigation Level: MDC
Maximum Value: 5

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Nineteen beta scan measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	55,970
Size of Area Exceeding DCGL (m^2):	0.32
Size of Survey Unit (m^2):	282
Survey Unit Area >DCGL (%):	0.12
EMC Value:	37,500

Action Taken: Corrected measurement values for scan locations per guidance in memo FS-018-03. Deleted scan results for scan locations to be remediated. Replaced original scan results in SDMS with the corrected results for the others. Rescanned remediated areas. Applied EMC data processing to corrected results for scan locations that remain elevated.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Discussion of Anomalous Measurement Data (Continued)

Investigation #2 Summary

Reason for Investigation: Forty-one alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	106
Size of Area Exceeding DCGL (m^2):	0.53
Size of Survey Unit (m^2):	282
Survey Unit Area >DCGL (%):	0.19
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values*	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta	Alpha
S93T01	2,695	33	0.359	1.181	1.540	947	37
S93T02	2,355	46	0.314	1.654	1.968	1062	56
S93T03	2,170	66	0.289	2.362	2.651	985	56
S93T04	2,394	53	0.319	1.890	2.209	959	31
S93T05	2,829	53	0.377	1.890	2.267	955	25
S93T06	3,066	40	0.409	1.417	1.826	897	31
S93T07	2,375	66	0.317	2.362	2.679	947	6
S93T08	1,831	46	0.244	1.654	1.898	886	19
S93T09	1,440	60	0.192	2.126	2.318	1016	56
S93T10	1,229	13	0.164	0.473	0.636	840	31
S93T11	2,029	66	0.271	2.362	2.633	782	74
S93T12	2,087	33	0.278	1.181	1.459	970	56
S93T13	2,317	26	0.309	0.945	1.254	951	62
S93T14	2,144	73	0.286	2.598	2.884	982	43
S93T15	1,434	33	0.191	1.181	1.372	828	43
S93T16	1,946	46	0.259	1.654	1.913	859	31
S93T17	2,887	53	0.385	1.890	2.275	916	31
S93T18	3,514	46	0.469	1.654	2.122	767	12
S93T19	4,090	60	0.545	2.126	2.671	962	68
S93T20	4,371	53	0.583	1.890	2.472	859	25
S93T21	1,165	26	0.155	0.945	1.100	947	68
S93T22	2,010	26	0.268	0.945	1.213	863	31
S93T23	1,421	79	0.189	2.835	3.024	890	37
S93T24	1,299	33	0.173	1.181	1.354	855	68
S93T25	2,407	79	0.321	2.835	3.156	828	62
S93T26	2,176	46	0.290	1.654	1.944	1039	25
S93T27	2,496	53	0.333	1.890	2.222	993	56
S93T28	2,253	79	0.300	2.835	3.135	863	50
S93T29	2,515	60	0.335	2.126	2.461	878	19
S93T30	3,578	79	0.477	2.835	3.312	1043	31
S93T31	1,306	33	0.174	1.181	1.355	920	68
S93T32	1,299	20	0.173	0.709	0.882	863	31
S93T33	2,048	26	0.273	0.945	1.218	905	37
S93T34	1,671	53	0.223	1.890	2.112	909	37
S93T35	2,503	33	0.334	1.181	1.515	794	37
S93T36	2,765	106	0.369	3.779	4.147	1024	56
S93T37	1,312	26	0.175	0.945	1.120	1100	43
S93T38	2,586	40	0.345	1.417	1.762	1104	19
S93T39	2,061	53	0.275	1.890	2.164	1411	62
S93T40	1,843	73	0.246	2.598	2.844	1288	37
S93T41	1,632	60	0.218	2.126	2.343	920	50
S93T42	1,395	40	0.186	1.417	1.603	851	56
S93T43	1,114	46	0.149	1.654	1.802	1062	50
S93T44	1,920	40	0.256	1.417	1.673	920	68
S93T45	1,184	26	0.158	0.945	1.103	901	37
S93T46	1,286	33	0.171	1.181	1.353	1062	50
S93T47	1,267	26	0.169	0.945	1.114	932	62
S93T48	1,248	40	0.166	1.417	1.584	997	43
S93T49	1,395	66	0.186	2.362	2.548	886	62
S93T50	1,267	73	0.169	2.598	2.767	893	37
				mean:	2.020		
				maximum:	4.147		

*Values from B04045X, measurements # 1-50.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	1.329	1.455	2.455
0.142	1.993	2.134	3.134
0.131	1.993	2.124	3.124
0.128	1.107	1.235	2.235
0.127	0.886	1.013	2.013
0.120	1.107	1.227	2.227
0.126	0.221	0.348	1.348
0.118	0.664	0.782	1.782
0.135	1.993	2.128	3.128
0.112	1.107	1.219	2.219
0.104	2.657	2.761	3.761
0.129	1.993	2.122	3.122
0.127	2.214	2.341	3.341
0.131	1.550	1.681	2.681
0.110	1.550	1.660	2.660
0.115	1.107	1.222	2.222
0.122	1.107	1.229	2.229
0.102	0.443	0.545	1.545
0.128	2.436	2.564	3.564
0.115	0.886	1.000	2.000
0.126	2.436	2.562	3.562
0.115	1.107	1.222	2.222
0.119	1.329	1.447	2.447
0.114	2.436	2.550	3.550
0.110	2.214	2.325	3.325
0.139	0.886	1.024	2.024
0.132	1.993	2.125	3.125
0.115	1.771	1.886	2.886
0.117	0.664	0.781	1.781
0.139	1.107	1.246	2.246
0.123	2.436	2.558	3.558
0.115	1.107	1.222	2.222
0.121	1.329	1.449	2.449
0.121	1.329	1.450	2.450
0.106	1.329	1.434	2.434
0.137	1.993	2.129	3.129
0.147	1.550	1.697	2.697
0.147	0.664	0.811	1.811
0.188	2.214	2.402	3.402
0.172	1.329	1.500	2.500
0.123	1.771	1.894	2.894
0.113	1.993	2.106	3.106
0.142	1.771	1.913	2.913
0.123	2.436	2.558	3.558
0.120	1.329	1.449	2.449
0.142	1.771	1.913	2.913
0.124	2.214	2.339	3.339
0.133	1.550	1.683	2.683
0.118	2.214	2.332	3.332
0.119	1.329	1.448	2.448
	mean:	1.685	
	minimum:	0.348	

Y, Z POOL	RANK#	Z Rank #
0.636	1.0	10.0
0.882	2.0	18.0
1.100	3.0	23.0
1.103	4.0	24.0
1.114	5.0	26.0
1.120	6.0	32.0
1.213	7.0	33.0
1.218	8.0	34.0
1.254	9.0	39.0
1.348	10.0	41.5
1.353	11.0	41.5
1.354	12.0	41.5
1.355	13.0	44.0
1.372	14.0	45.0
1.459	15.0	46.0
1.515	16.0	47.0
1.540	17.0	52.0
1.545	18.0	53.0
1.584	19.0	54.0
1.603	20.0	55.5
1.673	21.0	55.5
1.762	22.0	57.0
1.781	23.0	58.0
1.782	24.0	61.0
1.802	25.0	65.0
1.811	26.0	68.0
1.826	27.0	69.0
1.898	28.0	70.0
1.913	29.0	74.0
1.944	30.0	75.0
1.968	31.0	76.0
2.000	32.0	77.0
2.013	33.0	79.0
2.024	34.0	80.0
2.112	35.0	81.0
2.122	36.0	82.0
2.164	37.0	83.0
2.209	38.0	84.0
2.219	39.0	85.0
2.222	41.5	89.0
2.222	41.5	90.0
2.222	41.5	91.0
2.222	41.5	92.0
2.227	44.0	93.0
2.229	45.0	94.0
2.235	46.0	95.0
2.246	47.0	96.0
2.267	48.0	97.0
2.275	49.0	98.0
2.318	50.0	99.0
2.343	51.0	3173.5
2.434	52.0	Z Rank Sum = Wr
2.447	53.0	

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Unity Rule Evaluation

Note: Highlighted background values to track for Wr

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean > Unity DCGL (2.02 > 1.0), go to means test.

Means test :
DM = (YMax - BMin)
DM = (4.147 - 0.348) = 3.8 > Unity DCGL
DA = (YMean - BMean)
DA = (2.02 - 1.685) = 0.335 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL,
go to WRS test for unity rule evaluation.

WRS Test:
k = MARSSIM equation I.1
$k = m(n + m + 1)/2 + z(P)^{1/2}$
where: n = 50
m = 50
P= nm(n+m+1)/12 = 21,042
z = 1.645, for 0.05 Type I error
$k = 50(50+50+1)/2 + 1.645(21042)^{1/2}$
k = 2525 + 1.645(145) = 2764

Conclusion:
Since Wr > k (3173 > 2764), survey unit passes the unity rule and, therefore, meets the release criteria.

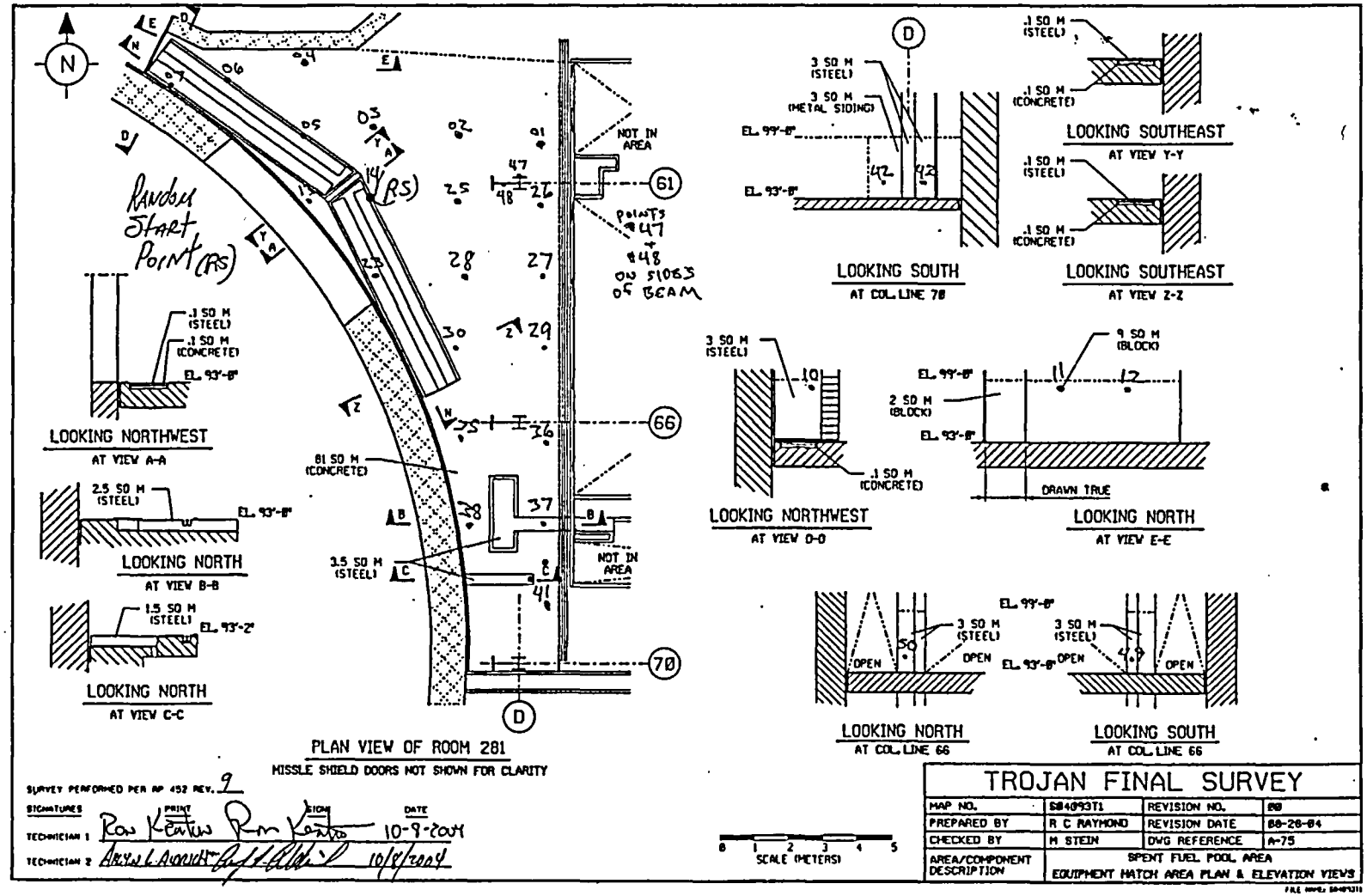
2.448	54.0
2.449	55.5
2.449	55.5
2.450	57.0
2.455	58.0
2.461	59.0
2.472	60.0
2.500	61.0
2.548	62.0
2.633	63.0
2.651	64.0
2.660	65.0
2.671	66.0
2.679	67.0
2.681	68.0
2.683	69.0
2.697	70.0
2.767	71.0
2.844	72.0
2.884	73.0
2.886	74.0
2.894	75.0
2.913	76.0
2.913	77.0
3.024	78.0
3.106	79.0
3.122	80.0
3.124	81.0
3.125	82.0
3.128	83.0
3.129	84.0
3.134	85.0
3.135	86.0
3.156	87.0
3.312	88.0
3.325	89.0
3.332	90.0
3.339	91.0
3.341	92.0
3.402	93.0
3.550	94.0
3.558	95.0
3.558	96.0
3.562	97.0
3.564	98.0
3.761	99.0
4.147	100.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Static Measurement Locations Map

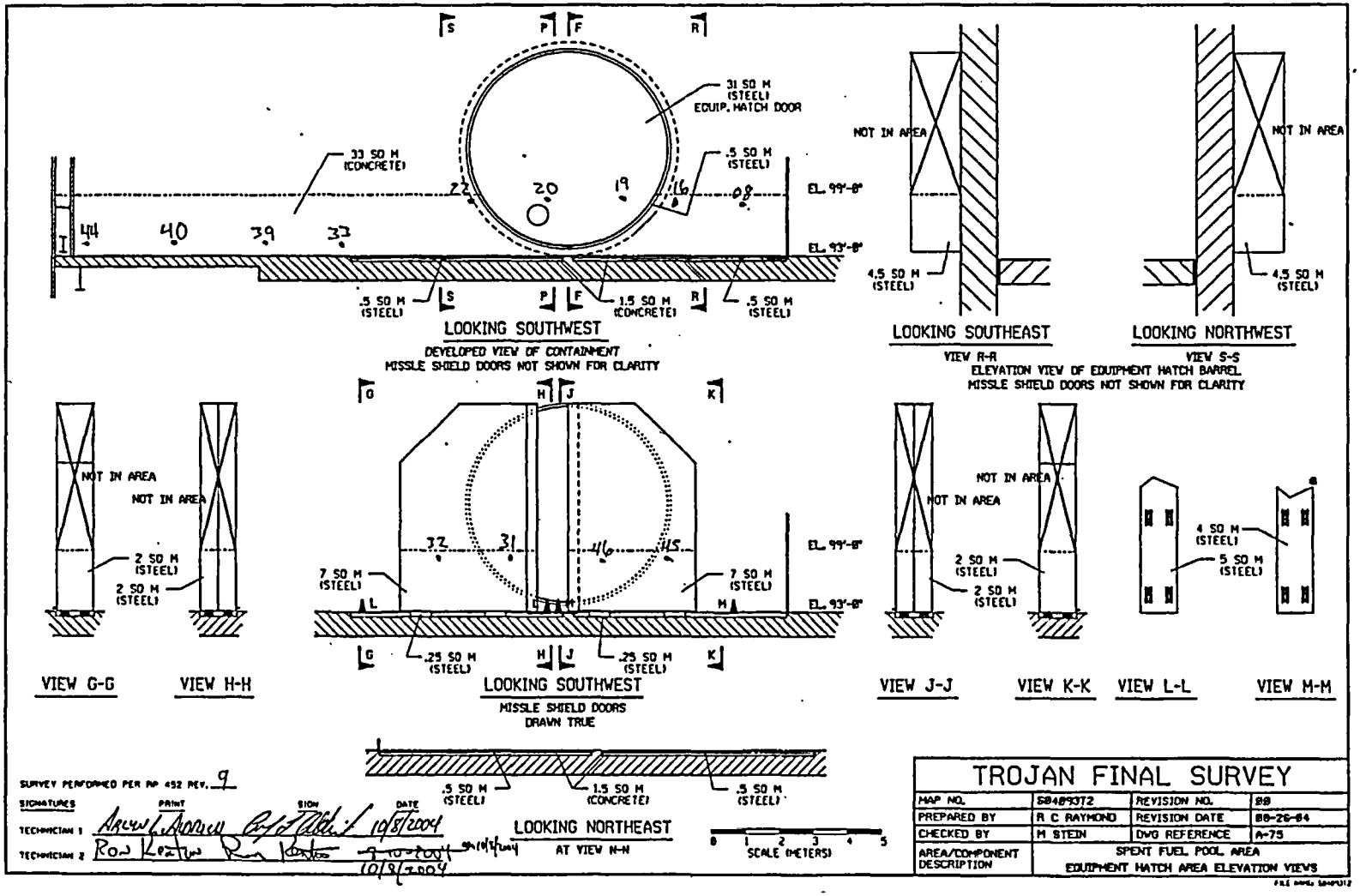


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Static Measurement Locations Map

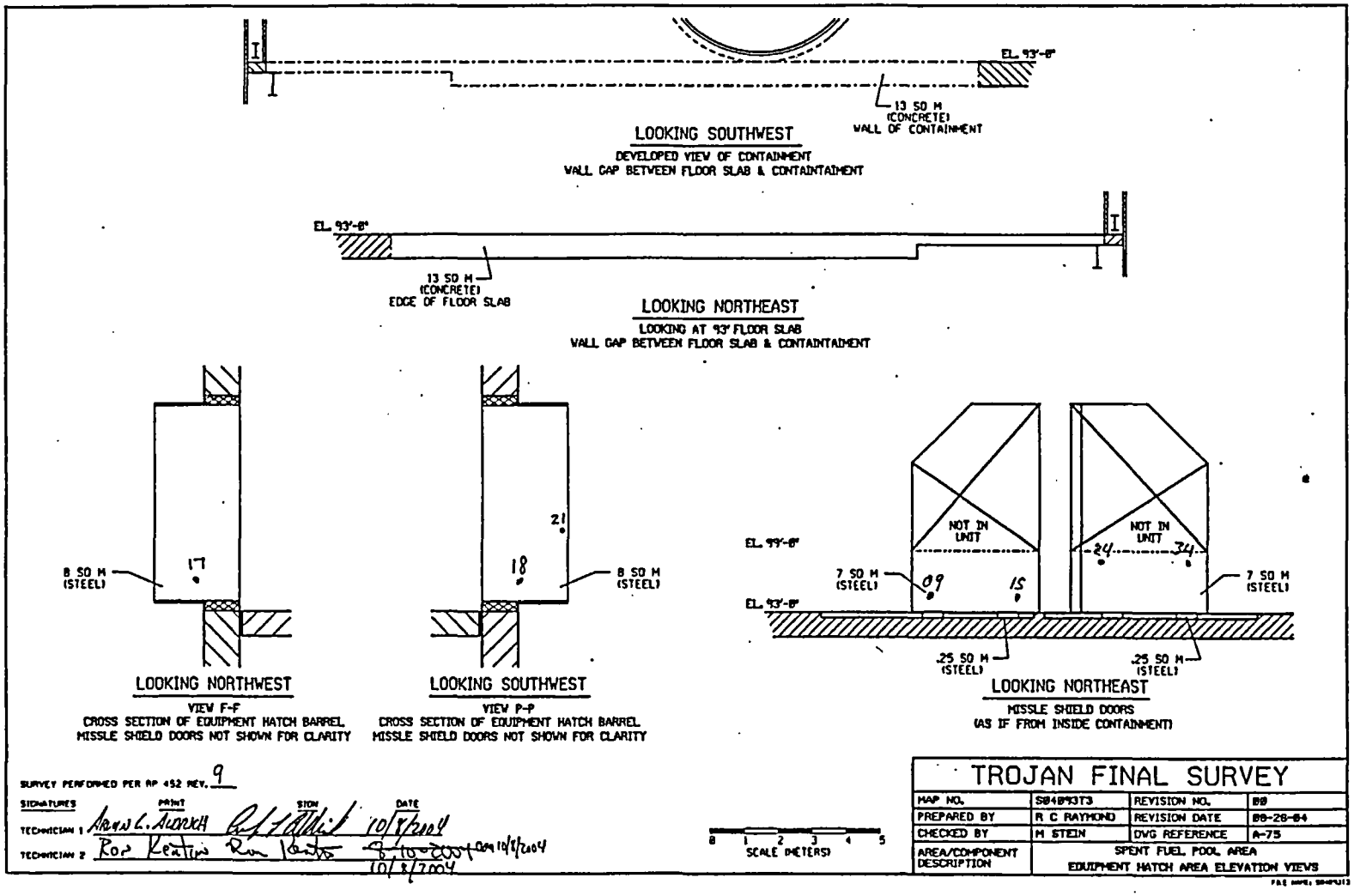


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	34	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	9.292e+002
Maximum Value	:	2.284e+003
Range	:	1.355e+003
Median	:	1.994e+003
Std. Deviation	:	4.121e+002
Mean	:	1.792e+003
95% UCL	:	1.912e+003

Measurement Values

Location	Value	Location	Value
000001	2.065e+003	000018	2.026e+003
000002	2.284e+003	000019	1.974e+003
000003	1.329e+003	000020	1.865e+003
000004	1.090e+003	000021	1.955e+003
000005	2.033e+003	000022	1.903e+003
000006	2.058e+003	000023	2.020e+003
000007	1.290e+003	000024	2.220e+003
000008	1.078e+003	000025	2.020e+003
000009	2.026e+003	000026	2.142e+003
000010	1.290e+003	000027	2.149e+003
000011	2.052e+003	000028	2.013e+003
000012	1.239e+003	000029	2.187e+003
000013	1.136e+003	000030	1.820e+003
000014	1.800e+003	000031	1.878e+003
000015	9.292e+002	000032	1.968e+003
000016	2.026e+003	000033	2.058e+003
000017	9.421e+002	000034	2.065e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Measurement Data Statistical Evaluation - Beta

Statistical Comparisons

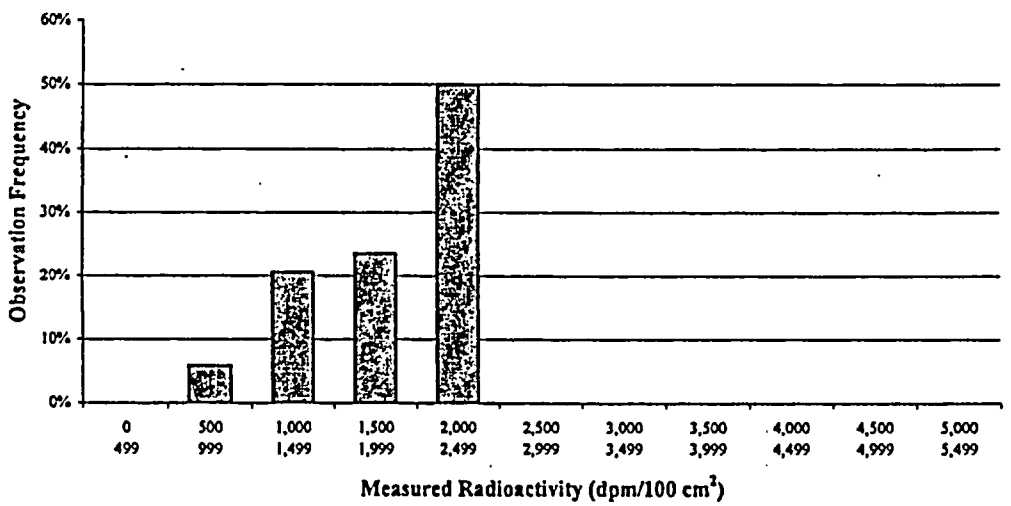
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	1,355	2,061	Pass
Median	0.489	0.500	Pass
Mean	1,792	6,000	Pass
Std Dev	412	1,500	Pass

All values are <DCGL, WRS statistical test not required for data set.

Statistical Quantities

Range:	1,355
Median:	1,994
Mean:	1,792
Std Dev:	412
Minimum:	929
Maximum:	2,284
DCGL:	7,500

Data Frequency Distribution



Plot Parameters	
# of measurements:	34
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	0	0%
2	999	500	2	6%
3	1,499	1,000	7	21%
4	1,999	1,500	8	24%
5	2,499	2,000	17	50%
6	2,999	2,500	0	0%
7	3,499	3,000	0	0%
8	3,999	3,500	0	0%
9	4,499	4,000	0	0%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	34	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Background Reference Area B02027B - Beta

Statistical Quantities:

Range	: 2.952e+002
Median	: 9.316e+002
Mean	: 9.189e+002
Std. Deviation:	: 7.670e+001

# of Measurements: 30 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	34	DPM/100 CM²	2.800e+001	-	1.329e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	0.000e+000
Maximum Value	:	7.937e+001
Range	:	7.937e+001
Median	:	3.307e+001
Std. Deviation	:	1.844e+001
Mean	:	3.618e+001
95% UCL	:	4.153e+001

Measurement Values

Location	Value	Location	Value
000001	3.968e+001	000018	5.291e+001
000002	5.952e+001	000019	5.952e+001
000003	6.614e+000	000020	4.630e+001
000004	2.646e+001	000021	1.323e+001
000005	3.968e+001	000022	2.646e+001
000006	3.307e+001	000023	2.646e+001
000007	3.307e+001	000024	3.307e+001
000008	1.323e+001	000025	3.307e+001
000009	3.968e+001	000026	5.952e+001
000010	3.307e+001	000027	1.323e+001
000011	5.952e+001	000028	5.291e+001
000012	1.984e+001	000029	5.952e+001
000013	6.614e+000	000030	3.968e+001
000014	1.984e+001	000031	3.968e+001
000015	0.000e+000	000032	7.937e+001
000016	4.630e+001	000033	3.307e+001
000017	3.307e+001	000034	5.291e+001

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Measurement Data Statistical Evaluation - Alpha

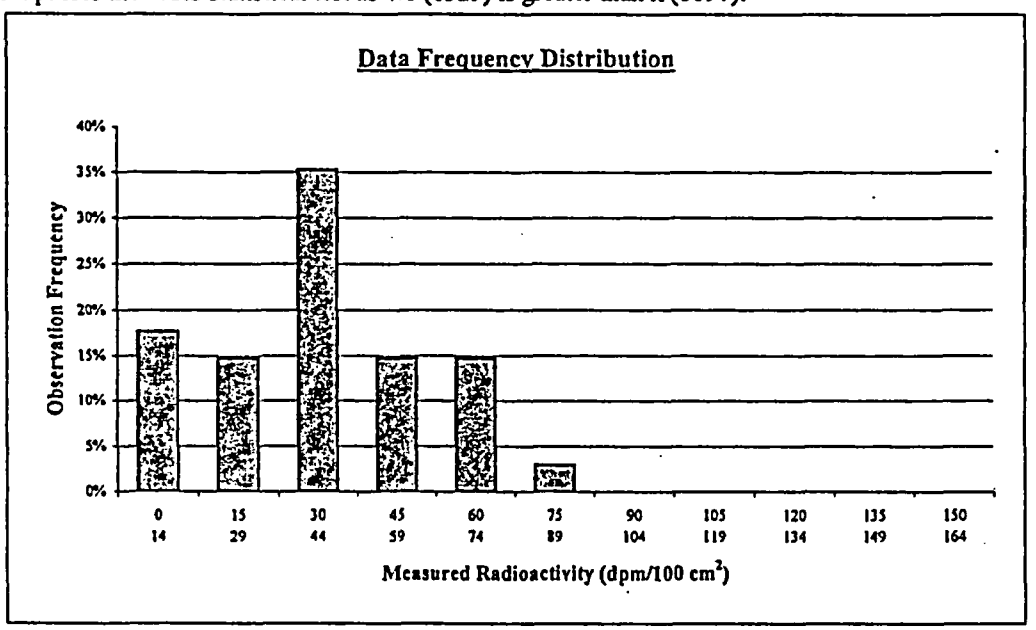
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	79	93	Pass
Median	0.175	0.500	Pass
Mean	36	28	See comment below
Std Dev	19	28	Pass
WRS	1329	1097	Pass

Data set passes the WRS statistical test as Wr (1329) is greater than k (1097).

Statistical Quantities

Range:	79
Median:	33
Mean:	36
Std Dev:	19
Minimum:	0
Maximum:	79
DCGL:	28



Plot Parameters	
# of measurements:	34
# of intervals:	11
Interval increment:	15
Minimum:	0
Maximum:	164

Interval	High End	Low End	Number of Observations	Observation Frequency
1	14	0	6	18%
2	29	15	5	15%
3	44	30	12	35%
4	59	45	5	15%
5	74	60	5	15%
6	89	75	1	3%
7	104	90	0	0%
8	119	105	0	0%
9	134	120	0	0%
10	149	135	0	0%
11	164	150	0	0%
		Total:	34	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool · South Center Floor Area

Classification: Class 1
Size (m^2): 113

Background Reference Area B02027B - Alpha

Statistical Quantities:

Range	: 8.895e+001
Median	: 2.737e+001
Mean	: 3.421e+001
Std. Deviation:	: 2.017e+001

# of Measurements: 30 Min Value: 6.842e+000 Max Value: 9.579e+001

Measurement Location	Value	Data Status Code
000001	2.737e+001	B
000002	2.053e+001	B
000003	5.473e+001	B
000004	6.842e+001	B
000005	9.579e+001	B
000006	4.105e+001	B
000007	6.842e+000	B
000008	4.105e+001	B
000009	2.053e+001	B
000010	4.105e+001	B
000011	1.368e+001	B
000012	2.737e+001	B
000013	5.473e+001	B
000014	6.842e+000	B
000015	2.737e+001	B
000016	4.105e+001	B
000017	3.421e+001	B
000018	4.105e+001	B
000019	2.737e+001	B
000020	2.737e+001	B
000021	2.737e+001	B
000022	1.368e+001	B
000023	3.421e+001	B
000024	2.053e+001	B
000025	5.473e+001	B
000026	2.737e+001	B
000027	6.842e+001	B
000028	2.053e+001	B
000029	3.421e+001	B
000030	6.842e+000	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 772

Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 7,063

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 34
Investigation Level: 750
Maximum Value: 26

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 34
Investigation Level: MDC
Maximum Value: 3

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Six beta scan measurement exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	34,070
Size of Area Exceeding DCGL (m^2):	0.05
Size of Survey Unit (m^2):	113
Survey Unit Area >DCGL (%):	0.05
EMC Value:	37,500

Action Taken: Corrected measurement values for scan locations per guidance in memo FS-018-03. Deleted scan results for scan locations to be remediated. Replaced original scan results in SDMS with the corrected results for the others. Rescanned remediated areas. Applied EMC data processing to corrected results for scan locations that remain elevated.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Discussion of Anomalous Measurement Data (Continued)

Investigation #2 Summary

Reason for Investigation: Twenty-three alpha static measurements exceeded investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	79
Size of Area Exceeding DCGL (m^2):	0.3
Size of Survey Unit (m^2):	113
Survey Unit Area >DCGL (%):	0.27
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
S93V01	2,065	40	0.275	1.429	1.704	947	27
S93V02	2,284	60	0.305	2.143	2.447	1,062	21
S93V03	1,329	7	0.177	0.250	0.427	985	55
S93V04	1,090	26	0.145	0.929	1.074	959	68
S93V05	2,033	40	0.271	1.429	1.700	955	96
S93V06	2,058	33	0.274	1.179	1.453	897	41
S93V07	1,290	33	0.172	1.179	1.351	947	7
S93V08	1,078	13	0.144	0.464	0.608	886	41
S93V09	2,026	40	0.270	1.429	1.699	1,016	21
S93V10	1,290	33	0.172	1.179	1.351	840	41
S93V11	2,052	60	0.274	2.143	2.416	782	14
S93V12	1,239	20	0.165	0.714	0.879	970	27
S93V13	1,136	7	0.151	0.250	0.401	951	55
S93V14	1,800	20	0.240	0.714	0.954	982	7
S93V15	929	0	0.124	0.000	0.124	828	27
S93V16	2,026	46	0.270	1.643	1.913	859	41
S93V17	942	33	0.126	1.179	1.304	916	34
S93V18	2,026	53	0.270	1.893	2.163	767	41
S93V19	1,974	60	0.263	2.143	2.406	962	27
S93V20	1,865	46	0.249	1.643	1.892	859	27
S93V21	1,955	13	0.261	0.464	0.725	947	27
S93V22	1,903	26	0.254	0.929	1.182	863	14
S93V23	2,020	26	0.269	0.929	1.198	890	34
S93V24	2,220	33	0.296	1.179	1.475	855	21
S93V25	2,020	33	0.269	1.179	1.448	828	55
S93V26	2,142	60	0.286	2.143	2.428	1,039	27
S93V27	2,149	13	0.287	0.464	0.751	993	68
S93V28	2,013	53	0.268	1.893	2.161	863	21
S93V29	2,187	60	0.292	2.143	2.434	878	34
S93V30	1,820	40	0.243	1.429	1.671	1,043	7
S93V31	1,878	40	0.250	1.429	1.679		
S93V32	1,968	79	0.262	2.821	3.084		
S93V33	2,058	33	0.274	1.179	1.453		
S93V34	2,065	53	0.275	1.893	2.168		
				mean:	1.533		
				maximum:	3.084		

*Values from B02027B01, which are measurements 1- 30 from background reference data set B04045Y01.
**Values from background reference area survey unit B02027B02.
Note: Highlighted background values to track for Wr

Since Y mean > Unity DCGL (1.533 > 1.0), go to means test.

Means test :
DM = (YMax - BMin) = (3.084 - 0.376) = 2.708 > Unity DCGL
DA = (YMean - BMean) = (1.533 - 1.344) = 0.19 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation (see last page).

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	0.964	1.091	2.091
0.142	0.750	0.892	1.892
0.131	1.964	2.096	3.096
0.128	2.429	2.556	3.556
0.127	3.429	3.556	4.556
0.120	1.464	1.584	2.584
0.126	0.250	0.376	1.376
0.118	1.464	1.582	2.582
0.135	0.750	0.885	1.885
0.112	1.464	1.576	2.576
0.104	0.500	0.604	1.604
0.129	0.964	1.094	2.094
0.127	1.964	2.091	3.091
0.131	0.250	0.381	1.381
0.110	0.964	1.075	2.075
0.115	1.464	1.579	2.579
0.122	1.214	1.336	2.336
0.102	1.464	1.567	2.567
0.128	0.964	1.093	2.093
0.115	0.964	1.079	2.079
0.126	0.964	1.091	2.091
0.115	0.500	0.615	1.615
0.119	1.214	1.333	2.333
0.114	0.750	0.864	1.864
0.110	1.964	2.075	3.075
0.139	0.964	1.103	2.103
0.132	2.429	2.561	3.561
0.115	0.750	0.865	1.865
0.117	1.214	1.331	2.331
0.139	0.250	0.389	1.389

mean:	1.344
minimum:	0.376

Y, Z POOL	RANK#	Z Rank #
0.124	1.0	15.0
0.401	2.0	16.0
0.427	3.0	17.0
0.608	4.0	22.0
0.725	5.0	23.0
0.751	6.0	29.0
0.879	7.0	30.0
0.954	8.0	31.0
1.074	9.0	33.0
1.182	10.0	35.0
1.198	11.0	36.0
1.304	12.0	37.5
1.351	13.0	37.5
1.351	14.0	39.0
1.376	15.0	40.0
1.381	16.0	41.0
1.389	17.0	45.0
1.448	18.0	46.0
1.453	19.0	47.0
1.453	20.0	53.0
1.475	21.0	54.0
1.604	22.0	55.0
1.615	23.0	56.0
1.671	24.0	57.0
1.679	25.0	58.0
1.699	26.0	60.0
1.700	27.0	61.0
1.704	28.0	62.0
1.864	29.0	63.0
1.865	30.0	64.0
1.885	31.0	1263.0
1.892	32.0	Z Rank Sum = Wr
1.892	33.0	
1.913	34.0	
2.075	35.0	
2.079	36.0	
2.091	37.5	
2.091	37.5	
2.093	39.0	
2.094	40.0	
2.103	41.0	
2.161	42.0	
2.163	43.0	
2.168	44.0	
2.331	45.0	
2.333	46.0	
2.336	47.0	
2.406	48.0	
2.416	49.0	

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Unity Rule Evaluation (Continued)

WRS Test:
k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + z(P)^{1/2}$

where: m = number of Z = 30
n = number of Y = 34
P = nm(n+m+1)/12 = 5,525
z = 1.645, for 0.05 Type I error

$k = 30(34+30+1)/2 + 1.645(5525)^{1/2}$
k = 975 + 1.645(74.2) = 1097

Conclusion:
Since Wr > k (1263 > 1097), survey unit passes the unity rule, and, therefore, meets the release criteria.

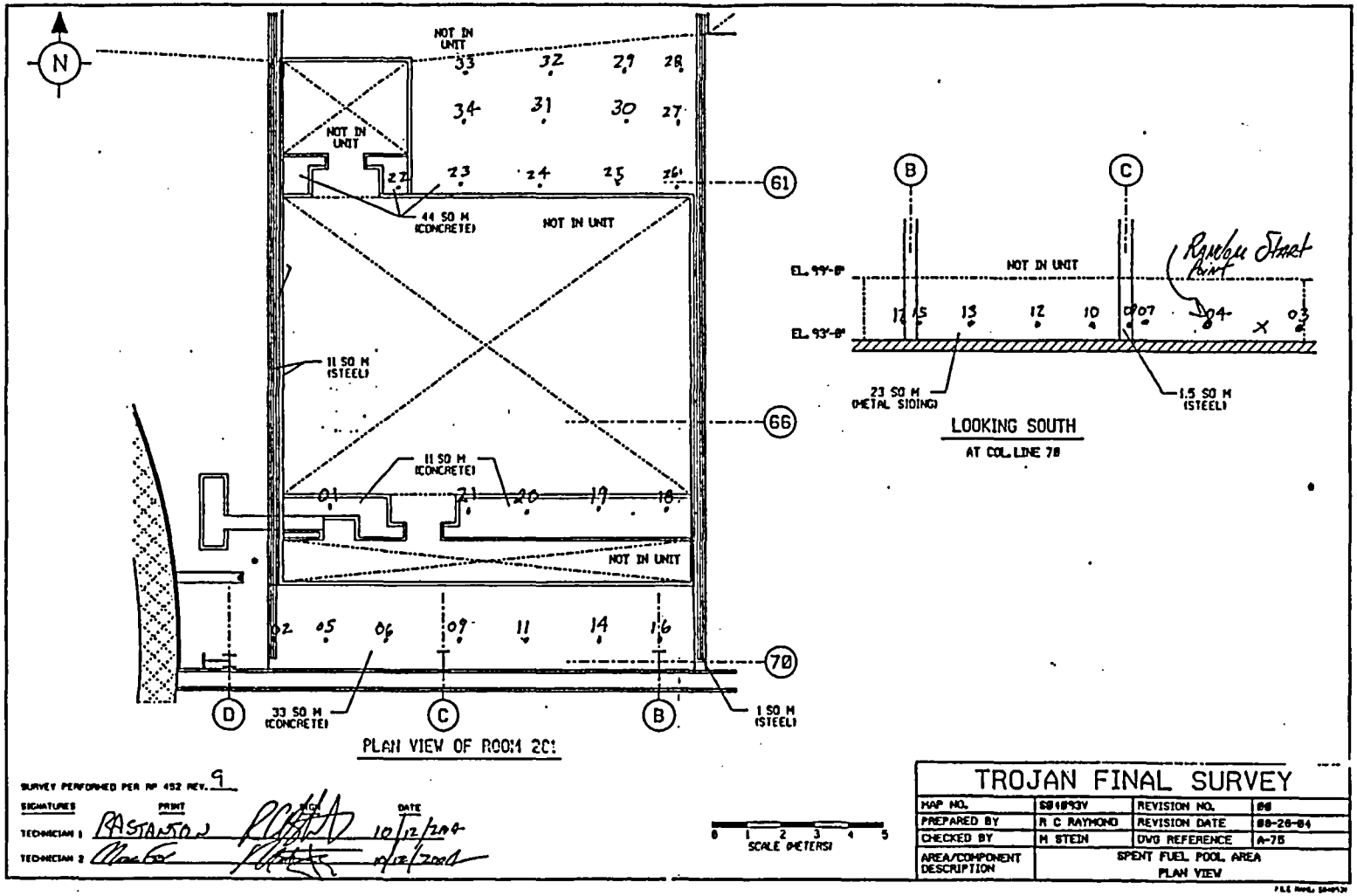
2.428	50.0
2.434	51.0
2.447	52.0
2.567	53.0
2.576	54.0
2.579	55.0
2.582	56.0
2.584	57.0
3.075	58.0
3.084	59.0
3.091	60.0
3.096	61.0
3.556	62.0
3.561	63.0
4.556	64.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	34	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value :	7.740e+002
Maximum Value :	2.066e+003
Range :	1.292e+003
Median :	1.653e+003
Std. Deviation :	4.295e+002
Mean :	1.486e+003
95% UCL :	1.611e+003

Measurement Values

Location	Value	Location	Value
000001	1.902e+003	000018	1.069e+003
000002	1.207e+003	000019	1.108e+003
000003	1.614e+003	000020	1.732e+003
000004	1.987e+003	000021	1.869e+003
000005	2.033e+003	000022	1.056e+003
000006	1.896e+003	000023	9.707e+002
000007	1.922e+003	000024	8.592e+002
000008	1.692e+003	000025	1.771e+003
000009	1.823e+003	000026	1.856e+003
000010	1.791e+003	000027	1.240e+003
000011	1.876e+003	000028	1.161e+003
000012	1.148e+003	000029	1.850e+003
000013	1.049e+003	000030	1.004e+003
000014	1.922e+003	000031	8.592e+002
000015	2.066e+003	000032	8.724e+002
000016	1.168e+003	000033	1.476e+003
000017	7.740e+002	000034	1.915e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Measurement Data Statistical Evaluation - Beta

Statistical Comparisons

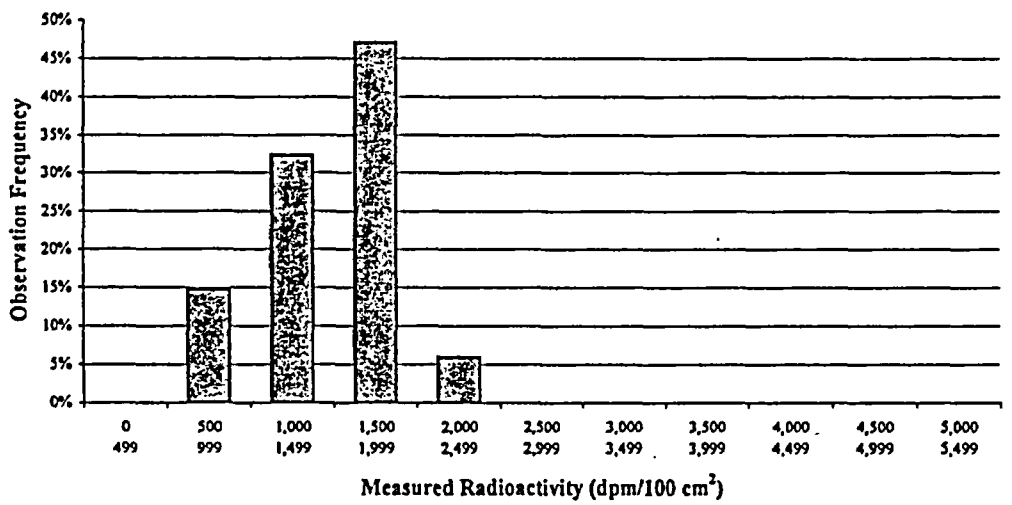
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	1,292	2,147	Pass
Median	0.388	0.500	Pass
Mean	1,486	6,000	Pass
Std Dev	429	1,500	Pass

All values are <DCGL, WRS statistical test not required for data set.

Statistical Quantities

Range:	1,292
Median:	1,653
Mean:	1,486
Std Dev:	429
Minimum:	774
Maximum:	2,066
DCGL:	7,500

Data Frequency Distribution



Plot Parameters

# of measurements:	34
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	0	0%
2	999	500	5	15%
3	1,499	1,000	11	32%
4	1,999	1,500	16	47%
5	2,499	2,000	2	6%
6	2,999	2,500	0	0%
7	3,499	3,000	0	0%
8	3,999	3,500	0	0%
9	4,499	4,000	0	0%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	34	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Background Reference Area B02027B - Beta

Statistical Quantities:

Range	: 2.952e+002
Median	: 9.316e+002
Mean	: 9.189e+002
Std. Deviation:	: 7.670e+001

# of Measurements: 30 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	34	DPM/100 CM²	2.800e+001	-	1.393e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	0.000e+000
Maximum Value	:	6.820e+001
Range	:	6.820e+001
Median	:	2.480e+001
Std. Deviation	:	1.652e+001
Mean	:	2.826e+001
95% UCL	:	3.306e+001

Measurement Values

Location	Value	Location	Value
000001	3.100e+001	000018	1.240e+001
000002	6.200e+000	000019	4.340e+001
000003	6.200e+000	000020	3.100e+001
000004	4.340e+001	000021	2.480e+001
000005	1.860e+001	000022	1.240e+001
000006	2.480e+001	000023	1.240e+001
000007	3.720e+001	000024	2.480e+001
000008	4.340e+001	000025	2.480e+001
000009	4.340e+001	000026	4.340e+001
000010	6.820e+001	000027	0.000e+000
000011	5.580e+001	000028	1.860e+001
000012	2.480e+001	000029	4.960e+001
000013	1.860e+001	000030	1.860e+001
000014	4.960e+001	000031	0.000e+000
000015	3.720e+001	000032	1.240e+001
000016	2.480e+001	000033	1.860e+001
000017	3.720e+001	000034	4.340e+001

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Measurement Data Statistical Evaluation - Alpha

Statistical Comparisons

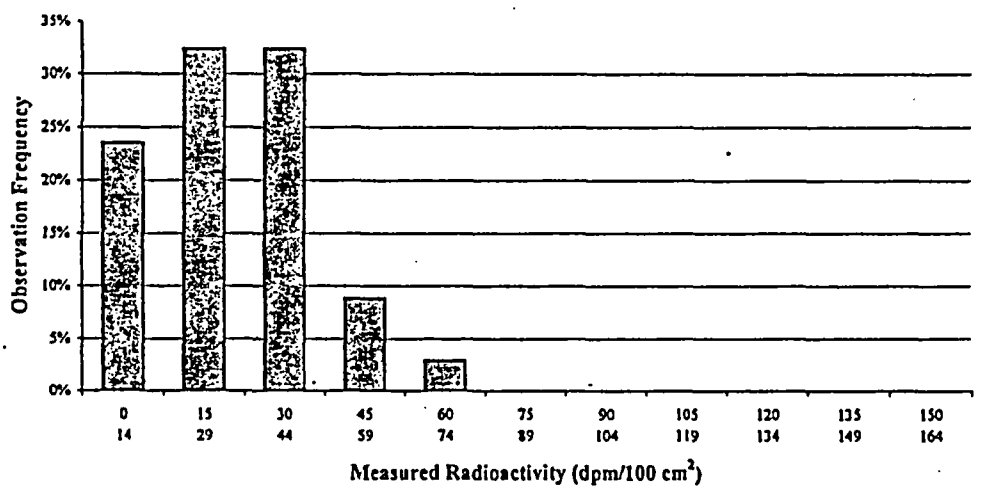
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	68	82	Pass
Median	0.196	0.500	Pass
Mean	28	28	See comment below
Std Dev	16	28	Pass
WRS	1393	1097	Pass

Data set passes the WRS statistical test as Wr (1393) is greater than k (1097).

Statistical Quantities

Range:	68
Median:	25
Mean:	28
Std Dev:	16
Minimum:	0
Maximum:	68
DCGL:	28

Data Frequency Distribution



Plot Parameters	
# of measurements:	34
# of intervals:	11
Interval increment:	15
Minimum:	0
Maximum:	164

Interval	High End	Low End	Number of Observations	Observation Frequency
1	14	0	8	24%
2	29	15	11	32%
3	44	30	11	32%
4	59	45	3	9%
5	74	60	1	3%
6	89	75	0	0%
7	104	90	0	0%
8	119	105	0	0%
9	134	120	0	0%
10	149	135	0	0%
11	164	150	0	0%
		Total:	34	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Background Reference Area B02027B - Alpha

Statistical Quantities:

Range	: 8.895e+001
Median	: 2.737e+001
Mean	: 3.421e+001
Std. Deviation:	: 2.017e+001

# of Measurements: 30 Min Value: 6.842e+000 Max Value: 9.579e+001

Measurement Location	Value	Data Status Code
000001	2.737e+001	B
000002	2.053e+001	B
000003	5.473e+001	B
000004	6.842e+001	B
000005	9.579e+001	B
000006	4.105e+001	B
000007	6.842e+000	B
000008	4.105e+001	B
000009	2.053e+001	B
000010	4.105e+001	B
000011	1.368e+001	B
000012	2.737e+001	B
000013	5.473e+001	B
000014	6.842e+000	B
000015	2.737e+001	B
000016	4.105e+001	B
000017	3.421e+001	B
000018	4.105e+001	B
000019	2.737e+001	B
000020	2.737e+001	B
000021	2.737e+001	B
000022	1.368e+001	B
000023	3.421e+001	B
000024	2.053e+001	B
000025	5.473e+001	B
000026	2.737e+001	B
000027	6.842e+001	B
000028	2.053e+001	B
000029	3.421e+001	B
000030	6.842e+000	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 799

Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 11,920

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 34
Investigation Level: 750
Maximum Value: 179

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 34
Investigation Level: MDC
Maximum Value: 3

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Nine beta scan measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	148,900
Size of Area Exceeding DCGL (m^2):	0.08
Size of Survey Unit (m^2):	120
Survey Unit Area >DCGL (%):	0.07
EMC Value:	37,500

Action Taken: Corrected measurement values for scan locations per guidance in memo FS-018-03. Deleted scan results for scan locations to be remediated. Replaced original scan results in SDMS with the corrected results for the others. Rescanned remediated areas. Applied EMC data processing to corrected results for scan locations that remain elevated.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Discussion of Anomalous Measurement Data (Continued)

Investigation #2 Summary

Reason for Investigation: Fifteen alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	68
Size of Area Exceeding DCGL (m^2):	0.2
Size of Survey Unit (m^2):	120
Survey Unit Area >DCGL (%):	0.17
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
S93X01	1,902	31	0.254	1.107	1.361	947	27
S93X02	1,207	6	0.161	0.214	0.375	1,062	21
S93X03	1,614	6	0.215	0.214	0.429	985	55
S93X04	1,987	43	0.265	1.536	1.801	959	68
S93X05	2,033	19	0.271	0.679	0.950	955	96
S93X06	1,896	25	0.253	0.893	1.146	897	41
S93X07	1,922	37	0.256	1.321	1.578	947	7
S93X08	1,692	43	0.226	1.536	1.761	886	41
S93X09	1,823	43	0.243	1.536	1.779	1,016	21
S93X10	1,791	68	0.239	2.429	2.667	840	41
S93X11	1,876	56	0.250	2.000	2.250	782	14
S93X12	1,148	25	0.153	0.893	1.046	970	27
S93X13	1,049	19	0.140	0.679	0.818	951	55
S93X14	1,922	50	0.256	1.786	2.042	982	7
S93X15	2,066	37	0.275	1.321	1.597	828	27
S93X16	1,168	25	0.156	0.893	1.049	859	41
S93X17	774	37	0.103	1.321	1.425	916	34
S93X18	1,069	12	0.143	0.429	0.571	767	41
S93X19	1,108	43	0.148	1.536	1.683	962	27
S93X20	1,732	31	0.231	1.107	1.338	859	27
S93X21	1,869	25	0.249	0.893	1.142	947	27
S93X22	1,056	12	0.141	0.429	0.569	863	14
S93X23	971	12	0.129	0.429	0.558	890	34
S93X24	859	25	0.115	0.893	1.007	855	21
S93X25	1,771	25	0.236	0.893	1.129	828	55
S93X26	1,856	43	0.247	1.536	1.783	1,039	27
S93X27	1,240	0	0.165	0.000	0.165	993	68
S93X28	1,161	19	0.155	0.679	0.833	863	21
S93X29	1,850	50	0.247	1.786	2.032	878	34
S93X30	1,004	19	0.134	0.679	0.812	1,043	7
S93X31	859	0	0.115	0.000	0.115		
S93X32	872	12	0.116	0.429	0.545		
S93X33	1,476	19	0.197	0.679	0.875		
S93X34	1,915	43	0.255	1.536	1.791		
				mean:	1.207		
				maximum:	2.667		

*Values from B02027B01, which are measurements 1- 30 from background reference data set B04045Y01.
**Values from background reference area survey unit B02027B02.
Note: Highlighted background values to track for Wr

Since Y mean > Unity DCGL (1.207 > 1.0), go to means test.

Means test :
DM = (YMax - BMin) = (2.667 - 0.376) = 2.291 > Unity DCGL
DA = (YMean - BMean) = (1.207 - 1.344) = -0.14 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation (see last page).

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	0.964	1.091	2.091
0.142	0.750	0.892	1.892
0.131	1.964	2.096	3.096
0.128	2.429	2.556	3.556
0.127	3.429	3.556	4.556
0.120	1.464	1.584	2.584
0.126	0.250	0.376	1.376
0.118	1.464	1.582	2.582
0.135	0.750	0.885	1.885
0.112	1.464	1.576	2.576
0.104	0.500	0.604	1.604
0.129	0.964	1.094	2.094
0.127	1.964	2.091	3.091
0.131	0.250	0.381	1.381
0.110	0.964	1.075	2.075
0.115	1.464	1.579	2.579
0.122	1.214	1.336	2.336
0.102	1.464	1.567	2.567
0.128	0.964	1.093	2.093
0.115	0.964	1.079	2.079
0.126	0.964	1.091	2.091
0.115	0.500	0.615	1.615
0.119	1.214	1.333	2.333
0.114	0.750	0.864	1.864
0.110	1.964	2.075	3.075
0.139	0.964	1.103	2.103
0.132	2.429	2.561	3.561
0.115	0.750	0.865	1.865
0.117	1.214	1.331	2.331
0.139	0.250	0.389	1.389
	mean:	1.344	
	minimum:	0.376	

Y, Z POOL	RANK#	Z Rank #
0.115	1.0	22.0
0.165	2.0	23.0
0.375	3.0	24.0
0.429	4.0	28.0
0.545	5.0	29.0
0.558	6.0	36.0
0.569	7.0	37.0
0.571	8.0	38.0
0.812	9.0	39.0
0.818	10.0	42.0
0.833	11.0	43.0
0.875	12.0	44.5
0.950	13.0	44.5
1.007	14.0	46.0
1.046	15.0	47.0
1.049	16.0	48.0
1.129	17.0	50.0
1.142	18.0	51.0
1.146	19.0	52.0
1.338	20.0	53.0
1.361	21.0	54.0
1.376	22.0	55.0
1.381	23.0	56.0
1.389	24.0	57.0
1.425	25.0	59.0
1.578	26.0	60.0
1.597	27.0	61.0
1.604	28.0	62.0
1.615	29.0	63.0
1.683	30.0	64.0
1.761	31.0	1388.0
1.779	32.0	Z Rank Sum = Wr
1.783	33.0	
1.791	34.0	
1.801	35.0	
1.864	36.0	
1.865	37.0	
1.885	38.0	
1.892	39.0	
2.032	40.0	
2.042	41.0	
2.075	42.0	
2.079	43.0	
2.091	44.5	
2.091	44.5	
2.093	46.0	
2.094	47.0	
2.103	48.0	
2.250	49.0	

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Unity Rule Evaluation (Continued)

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + z(P)^{1/2}$

where: m = number of Z = 30
n = number of Y = 34
P = nm(n+m+1)/12 = 5,525
z = 1.645, for 0.05 Type I error

$k = 30(34+30+1)/2 + 1.645(5525)^{1/2}$

k = 975 + 1.645(74.2) = 1097

Conclusion:

Since Wr > k (1388 > 1097), survey unit passes the unity rule, and, therefore, meets the release criteria.

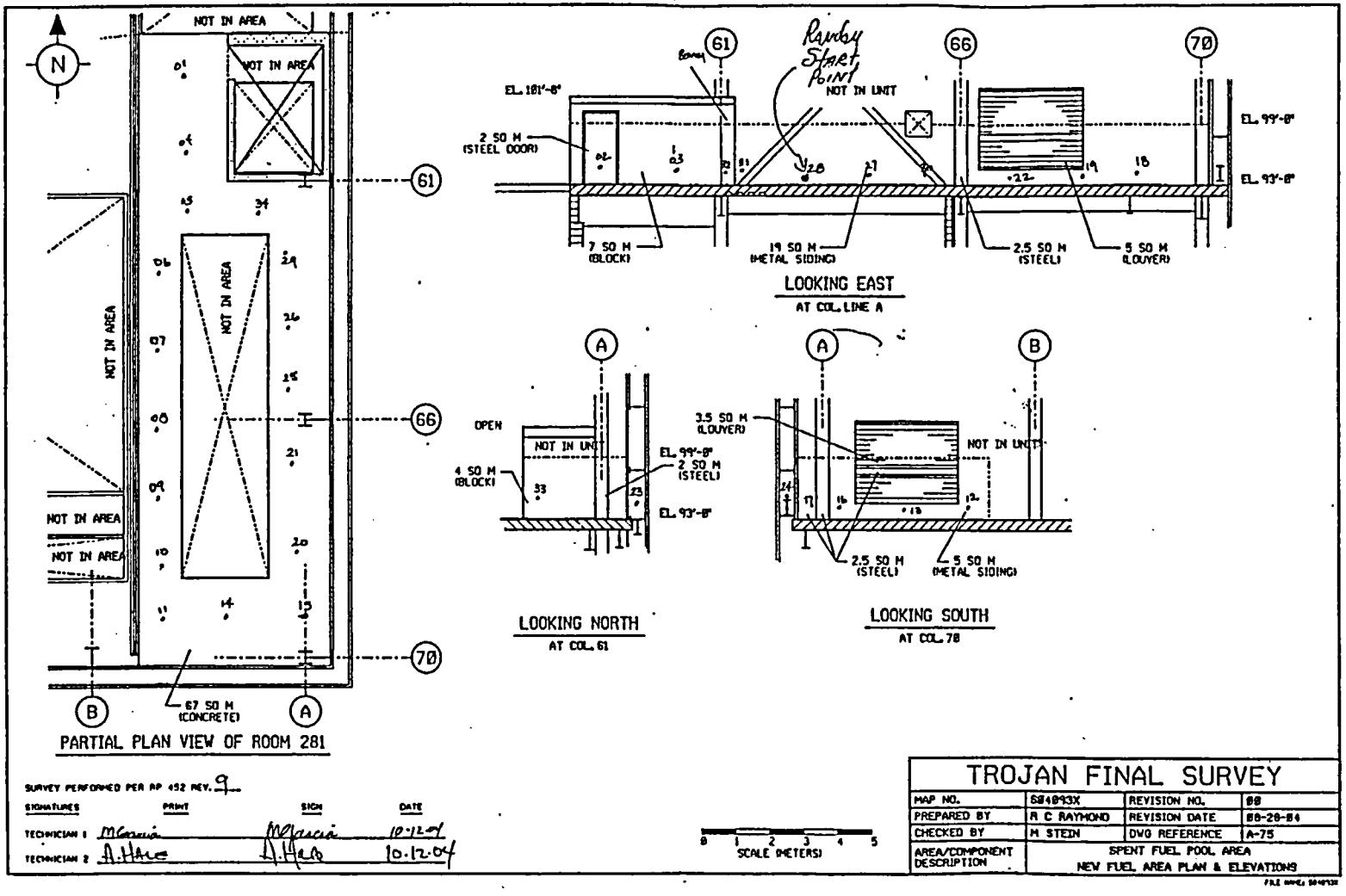
2.331	50.0
2.333	51.0
2.336	52.0
2.567	53.0
2.576	54.0
2.579	55.0
2.582	56.0
2.584	57.0
2.667	58.0
3.075	59.0
3.091	60.0
3.096	61.0
3.556	62.0
3.561	63.0
4.556	64.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	36	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	9.487e+002
Maximum Value	:	2.437e+003
Range	:	1.488e+003
Median	:	1.401e+003
Std. Deviation	:	4.405e+002
Mean	:	1.523e+003
95% UCL	:	1.647e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	1.321e+003	000018	1.097e+003	000035	2.400e+003
000002	1.500e+003	000019	1.407e+003	000036	2.375e+003
000003	1.414e+003	000020	9.549e+002		
000004	1.383e+003	000021	1.407e+003		
000005	1.376e+003	000022	1.445e+003		
000006	1.500e+003	000023	1.327e+003		
000007	9.487e+002	000024	1.352e+003		
000008	9.921e+002	000025	1.693e+003		
000009	1.389e+003	000026	1.389e+003		
000010	1.482e+003	000027	1.110e+003		
000011	1.618e+003	000028	1.066e+003		
000012	1.035e+003	000029	2.437e+003		
000013	1.395e+003	000030	2.307e+003		
000014	1.259e+003	000031	2.176e+003		
000015	1.221e+003	000032	2.108e+003		
000016	1.259e+003	000033	2.282e+003		
000017	1.407e+003	000034	2.009e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Measurement Data Statistical Evaluation - Beta

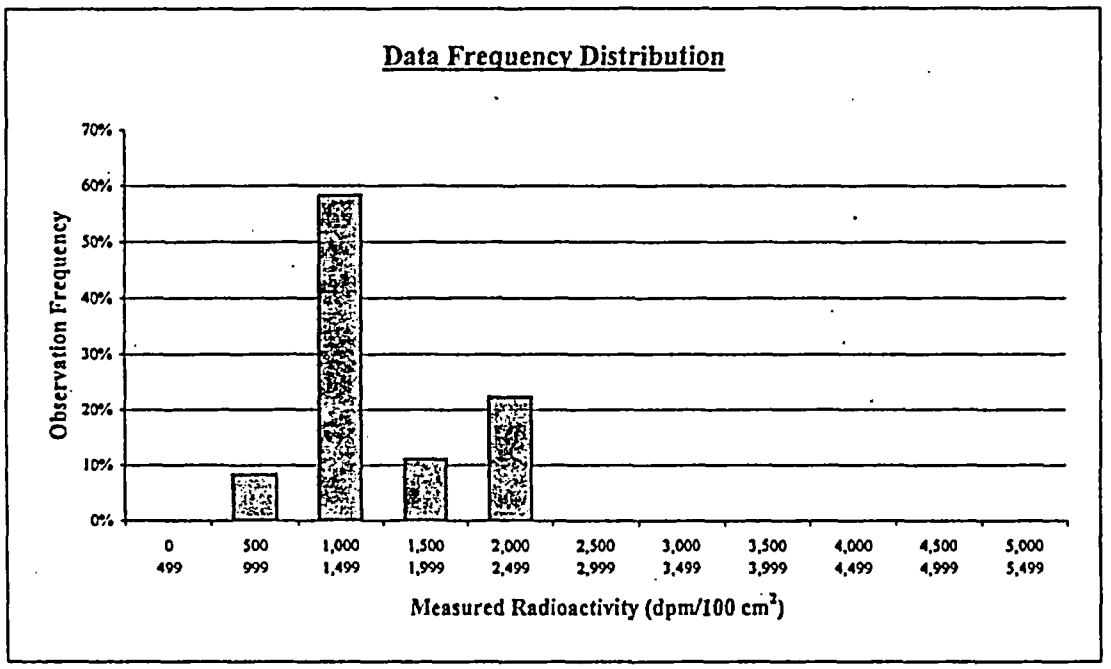
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	1,488	2,202	Pass
Median	0.278	0.500	Pass
Mean	1,523	6,000	Pass
Std Dev	440	1,500	Pass

All data less than DCGL; Sign statistical test not required.

Statistical Quantities

Range:	1,488
Median:	1,401
Mean:	1,523
Std Dev:	440
Minimum:	949
Maximum:	2,437
DCGL:	7,500



Plot Parameters	
# of measurements:	36
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	0	0%
2	999	500	3	8%
3	1,499	1,000	21	58%
4	1,999	1,500	4	11%
5	2,499	2,000	8	22%
6	2,999	2,500	0	0%
7	3,499	3,000	0	0%
8	3,999	3,500	0	0%
9	4,499	4,000	0	0%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	36	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Background Reference Area B02027B - Beta

Statistical Quantities:

Range	: 2.952e+002
Median	: 9.316e+002
Mean	: 9.189e+002
Std. Deviation:	: 7.670e+001

# of Measurements: 30 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	36	DPM/100 CM²	2.800e+001	-	1.525e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	6.614e+000
Maximum Value	:	5.291e+001
Range	:	4.630e+001
Median	:	1.984e+001
Std. Deviation	:	1.188e+001
Mean	:	2.297e+001
95% UCL	:	2.631e+001

Measurement Values

Location	Value	Location	Value	Location	Value
000001	3.307e+001	000018	1.323e+001	000035	3.307e+001
000002	1.984e+001	000019	3.307e+001	000036	3.307e+001
000003	1.323e+001	000020	1.323e+001		
000004	2.646e+001	000021	2.646e+001		
000005	1.984e+001	000022	6.614e+000		
000006	1.984e+001	000023	3.307e+001		
000007	3.968e+001	000024	1.323e+001		
000008	1.984e+001	000025	1.984e+001		
000009	2.646e+001	000026	2.646e+001		
000010	6.614e+000	000027	6.614e+000		
000011	1.323e+001	000028	1.323e+001		
000012	3.968e+001	000029	3.307e+001		
000013	1.323e+001	000030	4.630e+001		
000014	6.614e+000	000031	5.291e+001		
000015	2.646e+001	000032	3.307e+001		
000016	1.323e+001	000033	2.646e+001		
000017	6.614e+000	000034	1.984e+001		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Measurement Data Statistical Evaluation - Alpha

Statistical Comparisons

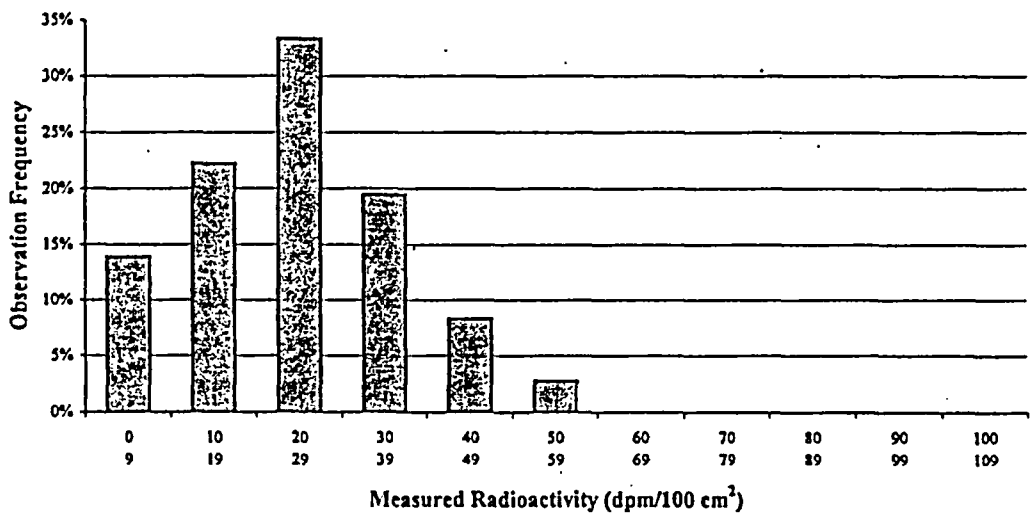
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	46	59	Pass
Median	0.247	0.500	Pass
Mean	23	28	Pass
Std Dev	12	28	Pass
WRS	1525	1131	Pass

Data set passes the WRS statistical test as Wr (1525) is greater than k (1131).

Statistical Quantities

Range:	46
Median:	20
Mean:	23
Std Dev:	12
Minimum:	7
Maximum:	53
DCGL:	28

Data Frequency Distribution



Plot Parameters	
# of measurements:	36
# of intervals:	11
Interval increment:	10
Minimum:	0
Maximum:	109

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	9	0	5	14%
2	19	10	8	22%
3	29	20	12	33%
4	39	30	7	19%
5	49	40	3	8%
6	59	50	1	3%
7	69	60	0	0%
8	79	70	0	0%
9	89	80	0	0%
10	99	90	0	0%
11	109	100	0	0%
		Total:	36	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Background Reference Area B02027B - Alpha

Statistical Quantities:

Range	: 8.895e+001
Median	: 2.737e+001
Mean	: 3.421e+001
Std. Deviation:	: 2.017e+001

# of Measurements: 30 Min Value: 6.842e+000 Max Value: 9.579e+001

Measurement Location	Value	Data Status Code
000001	2.737e+001	B
000002	2.053e+001	B
000003	5.473e+001	B
000004	6.842e+001	B
000005	9.579e+001	B
000006	4.105e+001	B
000007	6.842e+000	B
000008	4.105e+001	B
000009	2.053e+001	B
000010	4.105e+001	B
000011	1.368e+001	B
000012	2.737e+001	B
000013	5.473e+001	B
000014	6.842e+000	B
000015	2.737e+001	B
000016	4.105e+001	B
000017	3.421e+001	B
000018	4.105e+001	B
000019	2.737e+001	B
000020	2.737e+001	B
000021	2.737e+001	B
000022	1.368e+001	B
000023	3.421e+001	B
000024	2.053e+001	B
000025	5.473e+001	B
000026	2.737e+001	B
000027	6.842e+001	B
000028	2.053e+001	B
000029	3.421e+001	B
000030	6.842e+000	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 761
Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 7,454

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 36
Investigation Level: 750
Maximum Value: 5

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 36
Investigation Level: MDC
Maximum Value: 5

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Five beta scan measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	9,818
Size of Area Exceeding DCGL (m^2):	N/A
Size of Survey Unit (m^2):	N/A
Survey Unit Area >DCGL (%):	N/A
EMC Value:	N/A

Action Taken: Corrected measurement values for scan locations 005, 006, 008, 009, & 013 per guidance in memo FS-018-03. Replaced original scan results in SDMS with these results, which corrected to less than the investigation level.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Discussion of Anomalous Measurement Data (Continued)

Investigation #2 Summary

Reason for Investigation: Eleven alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	53
Size of Area Exceeding DCGL (m^2):	0.14
Size of Survey Unit (m^2):	155
Survey Unit Area >DCGL (%):	0.09
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
S61G01	1321	33	0.176	1.179	1.355	947	27
S61G02	1500	20	0.200	0.714	0.914	1062	21
S61G03	1414	13	0.189	0.464	0.653	985	55
S61G04	1383	26	0.184	0.929	1.113	959	68
S61G05	1376	20	0.183	0.714	0.898	955	96
S61G06	1500	20	0.200	0.714	0.914	897	41
S61G07	949	40	0.127	1.429	1.555	947	7
S61G08	992	20	0.132	0.714	0.847	886	41
S61G09	1389	26	0.185	0.929	1.114	1016	21
S61G10	1482	7	0.198	0.250	0.448	840	41
S61G11	1618	13	0.216	0.464	0.680	782	14
S61G12	1035	40	0.138	1.429	1.567	970	27
S61G13	1395	13	0.186	0.464	0.650	951	55
S61G14	1259	7	0.168	0.250	0.418	982	7
S61G15	1221	26	0.163	0.929	1.091	828	27
S61G16	1259	13	0.168	0.464	0.632	859	41
S61G17	1407	7	0.188	0.250	0.438	916	34
S61G18	1097	13	0.146	0.464	0.611	767	41
S61G19	1407	33	0.188	1.179	1.366	962	27
S61G20	955	13	0.127	0.464	0.592	859	27
S61G21	1407	26	0.188	0.929	1.116	947	27
S61G22	1445	7	0.193	0.250	0.443	863	14
S61G23	1327	33	0.177	1.179	1.356	890	34
S61G24	1352	13	0.180	0.464	0.645	855	21
S61G25	1693	20	0.226	0.714	0.940	828	55
S61G26	1389	26	0.185	0.929	1.114	1039	27
S61G27	1110	7	0.148	0.250	0.398	993	68
S61G28	1066	13	0.142	0.464	0.606	863	21
S61G29	2437	33	0.325	1.179	1.504	878	34
S61G30	2307	46	0.308	1.643	1.950	1043	7
S61G31	2176	53	0.290	1.893	2.183		
S61G32	2108	33	0.281	1.179	1.460		
S61G33	2282	26	0.304	0.929	1.233		
S61G34	2009	20	0.268	0.714	0.982		
S61G35	2400	33	0.320	1.179	1.499		
S61G36	2375	33	0.317	1.179	1.495		
				mean:	1.022		

*Values from B02027B which are measurement values 1- 30 from background reference data set B04045Y01.
**Values from background reference area survey unit B02027B.
Note: Highlighted background values to track for Wr

Since Y mean > Unity DCGL (1.022 > 1.0), go to means test.

Means test :
DM = (YMax - BMin) = (2.183 - 0.376) = 1.807 > Unity DCGL
DA = (YMean - BMean) = (1.022 - 1.344) = -0.322 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	0.964	1.091	2.091
0.142	0.750	0.892	1.892
0.131	1.964	2.096	3.096
0.128	2.429	2.556	3.556
0.127	3.429	3.556	4.556
0.120	1.464	1.584	2.584
0.126	0.250	0.376	1.376
0.118	1.464	1.582	2.582
0.135	0.750	0.885	1.885
0.112	1.464	1.576	2.576
0.104	0.500	0.604	1.604
0.129	0.964	1.094	2.094
0.127	1.964	2.091	3.091
0.131	0.250	0.381	1.381
0.110	0.964	1.075	2.075
0.115	1.464	1.579	2.579
0.122	1.214	1.336	2.336
0.102	1.464	1.567	2.567
0.128	0.964	1.093	2.093
0.115	0.964	1.079	2.079
0.126	0.964	1.091	2.091
0.115	0.500	0.615	1.615
0.119	1.214	1.333	2.333
0.114	0.750	0.864	1.864
0.110	1.964	2.075	3.075
0.139	0.964	1.103	2.103
0.132	2.429	2.561	3.561
0.115	0.750	0.865	1.865
0.117	1.214	1.331	2.331
0.139	0.250	0.389	1.389
	mean:	1.344	

Y. Z POOL	RANK#	Z Rank #
0.398	1.0	29.0
0.418	2.0	30.0
0.438	3.0	31.0
0.443	4.0	38.0
0.448	5.0	39.0
0.592	6.0	40.0
0.606	7.0	41.0
0.611	8.0	42.0
0.632	9.0	43.0
0.645	10.0	45.0
0.650	11.0	46.0
0.653	12.0	47.5
0.680	13.0	47.5
0.847	14.0	49.0
0.898	15.0	50.0
0.914	16.5	51.0
0.914	16.5	53.0
0.940	18.0	54.0
0.982	19.0	55.0
1.091	20.0	56.0
1.113	21.0	57.0
1.114	22.5	58.0
1.114	22.5	59.0
1.116	24.0	60.0
1.233	25.0	61.0
1.355	26.0	62.0
1.356	27.0	63.0
1.366	28.0	64.0
1.376	29.0	65.0
1.381	30.0	66.0
1.389	31.0	1502.0
1.460	32.0	Z Rank Sum = Wr
1.495	33.0	
1.499	34.0	
1.504	35.0	
1.555	36.0	
1.567	37.0	
1.604	38.0	
1.615	39.0	
1.864	40.0	
1.865	41.0	
1.885	42.0	
1.892	43.0	
1.950	44.0	
2.075	45.0	
2.079	46.0	
2.091	47.5	
2.091	47.5	

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + z(P)^{1/2}$

where: n = 36

m = 30

P= nm(n+m+1)/12 = 6,030

z = 1.645, for 0.05 Type I error

$k = 30(36+30+1)/2 + 1.645(6{,}030)^{1/2}$

k = 1005 + 1.645(77.7) = 1020

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room

Classification: Class 1
Size (m^2): 155

Unity Rule Evaluation (Continued)

Conclusion:
Since Wr > k (1502 > 1020), survey unit passes the unity rule, and, therefore, meets the release criteria.

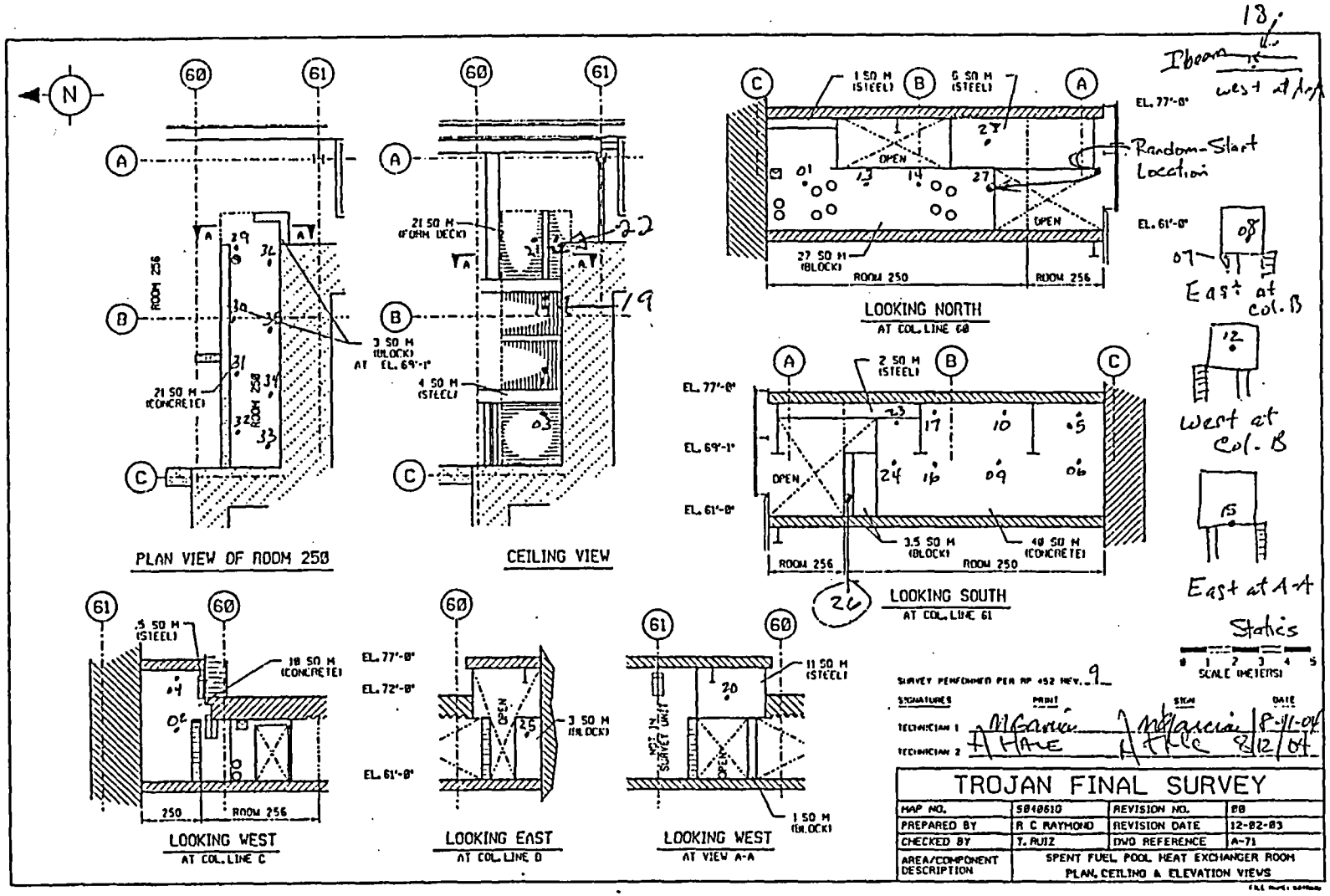
2.093	49.0
2.094	50.0
2.103	51.0
2.183	52.0
2.331	53.0
2.333	54.0
2.336	55.0
2.567	56.0
2.576	57.0
2.579	58.0
2.582	59.0
2.584	60.0
3.075	61.0
3.091	62.0
3.096	63.0
3.556	64.0
3.561	65.0
4.556	66.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room

Classification: Class 1
Size (m^2): 155

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	30	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	3.987e+002
Maximum Value	:	2.703e+003
Range	:	2.304e+003
Median	:	7.343e+002
Std. Deviation	:	7.735e+002
Mean	:	1.121e+003
95% UCL	:	1.361e+003

Measurement Values

Location	Value	Location	Value
000001	1.271e+003	000018	3.987e+002
000002	2.139e+003	000019	9.125e+002
000003	2.381e+003	000020	9.585e+002
000004	2.164e+003	000021	8.550e+002
000005	2.282e+003	000022	7.515e+002
000006	2.319e+003	000023	4.486e+002
000007	2.400e+003	000024	5.789e+002
000008	2.282e+003	000025	7.170e+002
000009	2.703e+003	000026	7.898e+002
000010	1.127e+003	000027	6.863e+002
000011	4.678e+002	000028	6.748e+002
000012	5.713e+002	000029	4.946e+002
000013	5.329e+002	000030	5.904e+002
000014	5.559e+002		
000015	5.789e+002		
000016	5.368e+002		
000017	4.601e+002		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Measurement Data Statistical Evaluation - Beta

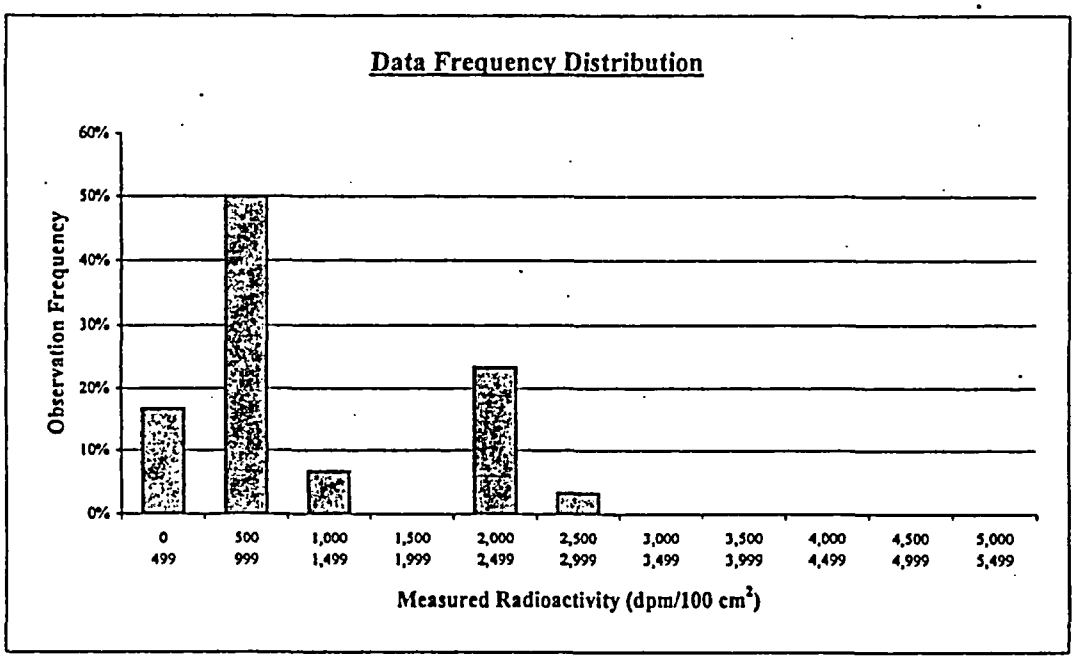
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	2,304	3,867	Pass
Median	0.500	0.500	Pass
Mean	1,121	6,000	Pass
Std Dev	773	1,500	Pass

All data less than DCGL; Sign statistical test not required.

Statistical Quantities

Range:	2,304
Median:	735
Mean:	1,121
Std Dev:	773
Minimum:	399
Maximum:	2,703
DCGL:	7,500



Plot Parameters	
# of measurements:	30
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	5	17%
2	999	500	15	50%
3	1,499	1,000	2	7%
4	1,999	1,500	0	0%
5	2,499	2,000	7	23%
6	2,999	2,500	1	3%
7	3,499	3,000	0	0%
8	3,999	3,500	0	0%
9	4,499	4,000	0	0%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	30	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Background Reference Area B02027B - Beta

Statistical Quantities:

Range	: 2.952e+002
Median	: 9.316e+002
Mean	: 9.189e+002
Std. Deviation:	: 7.670e+001

# of Measurements: 30 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	30	DPM/100 CM²	2.800e+001	-	1.337e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	0.000e+000
Maximum Value	:	6.842e+001
Range	:	6.842e+001
Median	:	2.053e+001
Std. Deviation	:	1.397e+001
Mean	:	2.303e+001
95% UCL	:	2.736e+001

Measurement Values

Location	Value	Location	Value
000001	1.368e+001	000018	6.842e+000
000002	2.737e+001	000019	3.421e+001
000003	6.842e+000	000020	2.737e+001
000004	2.737e+001	000021	2.053e+001
000005	2.737e+001	000022	2.053e+001
000006	2.737e+001	000023	1.368e+001
000007	1.368e+001	000024	2.737e+001
000008	3.421e+001	000025	4.105e+001
000009	1.368e+001	000026	0.000e+000
000010	4.105e+001	000027	4.105e+001
000011	1.368e+001	000028	3.421e+001
000012	2.053e+001	000029	2.737e+001
000013	1.368e+001	000030	1.368e+001
000014	1.368e+001		
000015	6.842e+000		
000016	1.368e+001		
000017	6.842e+001		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Measurement Data Statistical Evaluation - Alpha

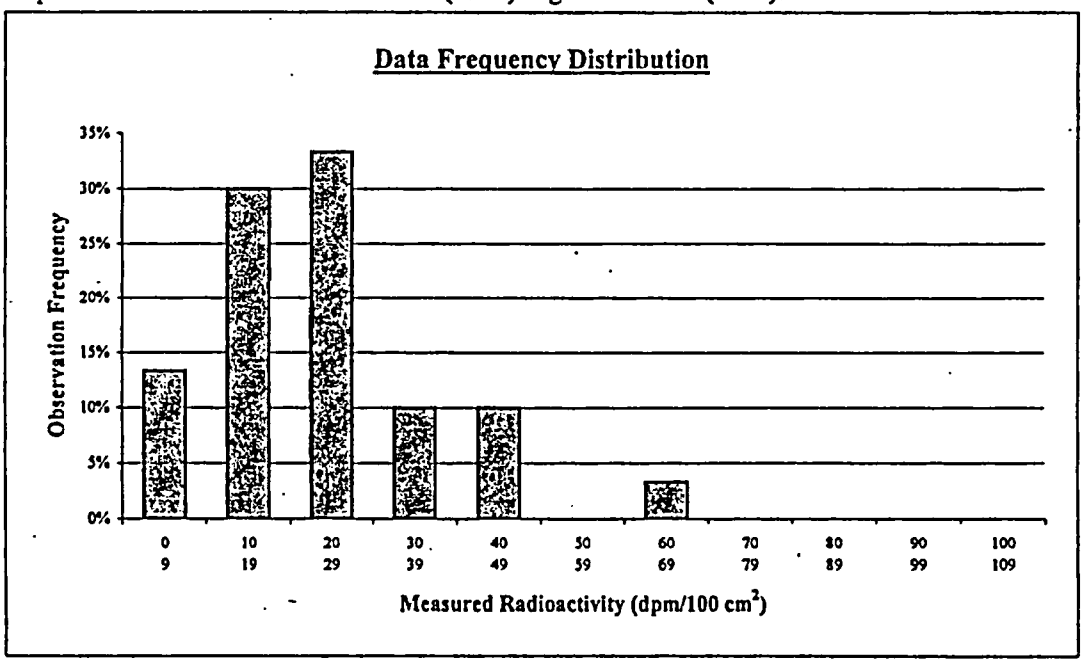
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	68	69	Pass
Median	0.150	0.500	Pass
Mean	23	28	Pass
Std Dev	14	28	Pass
WRS	1337	1026	Pass

Data set passes the WRS statistical test as Wr (1337) is greater than k (1026).

Statistical Quantities

Range:	68
Median:	21
Mean:	23
Std Dev:	14
Minimum:	0
Maximum:	68
DCGL:	28



Plot Parameters	
# of measurements:	30
# of intervals:	11
Interval increment:	10
Minimum:	0
Maximum:	109

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	9	0	4	13%
2	19	10	9	30%
3	29	20	10	33%
4	39	30	3	10%
5	49	40	3	10%
6	59	50	0	0%
7	69	60	1	3%
8	79	70	0	0%
9	89	80	0	0%
10	99	90	0	0%
11	109	100	0	0%
		Total:	30	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Background Reference Area B02027B - Alpha

Statistical Quantities:

Range	: 8.895e+001
Median	: 2.737e+001
Mean	: 3.421e+001
Std. Deviation:	: 2.017e+001

# of Measurements: 30 Min Value: 6.842e+000 Max Value: 9.579e+00.

Measurement Location	Value	Data Status Code
000001	2.737e+001	B
000002	2.053e+001	B
000003	5.473e+001	B
000004	6.842e+001	B
000005	9.579e+001	B
000006	4.105e+001	B
000007	6.842e+000	B
000008	4.105e+001	B
000009	2.053e+001	B
000010	4.105e+001	B
000011	1.368e+001	B
000012	2.737e+001	B
000013	5.473e+001	B
000014	6.842e+000	B
000015	2.737e+001	B
000016	4.105e+001	B
000017	3.421e+001	B
000018	4.105e+001	B
000019	2.737e+001	B
000020	2.737e+001	B
000021	2.737e+001	B
000022	1.368e+001	B
000023	3.421e+001	B
000024	2.053e+001	B
000025	5.473e+001	B
000026	2.737e+001	B
000027	6.842e+001	B
000028	2.053e+001	B
000029	3.421e+001	B
000030	6.842e+000	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 604

Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 6,848

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 30
Investigation Level: 750
Maximum Value: 2

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 30
Investigation Level: MDC
Maximum Value: 3

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: One beta scan measurement exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	7,753
Size of Area Exceeding DCGL (m^2):	N/A
Size of Survey Unit (m^2):	N/A
Survey Unit Area >DCGL (%):	N/A
EMC Value:	N/A

Action Taken: Corrected measurement values for scan location per guidance in memo FS-018-03; used similar method for elevated scan measurements obtained with a 43-68 gas flow proportional detector. Replaced original scan result in SDMS with this result, which corrected to less than the investigation level.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Discussion of Anomalous Measurement Data (Continued)

Investigation #2 Summary

Reason for Investigation: Seven alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	68
Size of Area Exceeding DCGL (m^2):	0.1
Size of Survey Unit (m^2):	131
Survey Unit Area >DCGL (%):	<0.1
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
S45M01	1,271	14	0.169	0.500	0.669	947	27
S45M02	2139	27	0.285	0.964	1.249	1062	21
S45M03	2381	7	0.317	0.250	0.567	985	55
S45M04	2164	27	0.289	0.964	1.253	959	68
S45M05	2282	27	0.304	0.964	1.269	955	96
S45M06	2319	27	0.309	0.964	1.273	897	41
S45M07	2400	14	0.320	0.500	0.820	947	7
S45M08	2282	34	0.304	1.214	1.519	886	41
S45M09	2703	14	0.360	0.500	0.860	1016	21
S45M10	1127	41	0.150	1.464	1.615	840	41
S45M11	468	14	0.062	0.500	0.562	782	14
S45M12	571	21	0.076	0.750	0.826	970	27
S45M13	533	14	0.071	0.500	0.571	951	55
S45M14	556	14	0.074	0.500	0.574	982	7
S45M15	579	7	0.077	0.250	0.327	828	27
S45M16	537	14	0.072	0.500	0.572	859	41
S45M17	460	68	0.061	2.429	2.490	916	34
S45M18	399	7	0.053	0.250	0.303	767	41
S45M19	913	34	0.122	1.214	1.336	962	27
S45M20	959	27	0.128	0.964	1.092	859	27
S45M21	855	21	0.114	0.750	0.864	947	27
S45M22	752	21	0.100	0.750	0.850	863	14
S45M23	449	14	0.060	0.500	0.560	890	34
S45M24	580	27	0.077	0.964	1.042	855	21
S45M25	717	41	0.096	1.464	1.560	828	55
S45M26	790	0	0.105	0.000	0.105	1039	27
S45M27	686	41	0.091	1.464	1.556	993	68
S45M28	675	34	0.090	1.214	1.304	863	21
S45M29	495	27	0.066	0.964	1.030	878	34
S45M30	590	14	0.079	0.500	0.579	1043	7
				mean:	0.973		

*Values from B02027B which are measurement values 1- 30 from background reference data set B04045Y01.
**Values from background reference area survey unit B02027B.

Note: Highlighted background values to track for Wr

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean < Unity DCGL (0.973 < 1.0), means test not required.

Since at least one unity value >DCGL (1.0), WRS test required.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	0.964	1.091	2.091
0.142	0.750	0.892	1.892
0.131	1.964	2.096	3.096
0.128	2.429	2.556	3.556
0.127	3.429	3.556	4.556
0.120	1.464	1.584	2.584
0.126	0.250	0.376	1.376
0.118	1.464	1.582	2.582
0.135	0.750	0.885	1.885
0.112	1.464	1.576	2.576
0.104	0.500	0.604	1.604
0.129	0.964	1.094	2.094
0.127	1.964	2.091	3.091
0.131	0.250	0.381	1.381
0.110	0.964	1.075	2.075
0.115	1.464	1.579	2.579
0.122	1.214	1.336	2.336
0.102	1.464	1.567	2.567
0.128	0.964	1.093	2.093
0.115	0.964	1.079	2.079
0.126	0.964	1.091	2.091
0.115	0.500	0.615	1.615
0.119	1.214	1.333	2.333
0.114	0.750	0.864	1.864
0.110	1.964	2.075	3.075
0.139	0.964	1.103	2.103
0.132	2.429	2.561	3.561
0.115	0.750	0.865	1.865
0.117	1.214	1.331	2.331
0.139	0.250	0.389	1.389
	mean:	1.344	

Y, Z POOL	RANK#	Z Rank #
0.105	1.0	26.0
0.303	2.0	27.0
0.327	3.0	28.0
0.560	4.0	32.0
0.562	5.0	33.5
0.567	6.0	35.0
0.571	7.0	36.0
0.572	8.0	37.0
0.574	9.0	38.0
0.579	10.0	39.0
0.669	11.0	40.0
0.820	12.0	41.5
0.826	13.0	41.5
0.850	14.0	43.0
0.860	15.0	44.0
0.864	16.0	45.0
1.030	17.0	46.0
1.042	18.0	47.0
1.092	19.0	48.0
1.249	20.0	50.0
1.253	21.0	51.0
1.269	22.0	52.0
1.273	23.0	53.0
1.304	24.0	54.0
1.336	25.0	55.0
1.376	26.0	56.0
1.381	27.0	57.0
1.389	28.0	58.0
1.519	29.0	59.0
1.556	30.0	60.0
1.560	31.0	1333
1.604	32.0	Z Rank Sum = Wr
1.615	33.5	
1.615	33.5	
1.864	35.0	
1.865	36.0	
1.885	37.0	
1.892	38.0	
2.075	39.0	
2.079	40.0	
2.091	41.5	
2.091	41.5	
2.093	43.0	
2.094	44.0	
2.103	45.0	
2.331	46.0	
2.333	47.0	
2.336	48.0	

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + z(P)^{1/2}$

where: n = 30

m = 30

P = nm(n+m+1)/12 = 4,575

z = 1.645, for 0.05 Type I error

$k = 30(30+30+1)/2 + 1.645(4,575)^{1/2}$

k = 915 + 1.645(67.6) = 1026

Conclusion:

Since Wr > k (1333 > 1026), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Unity Rule Evaluation (Continued)

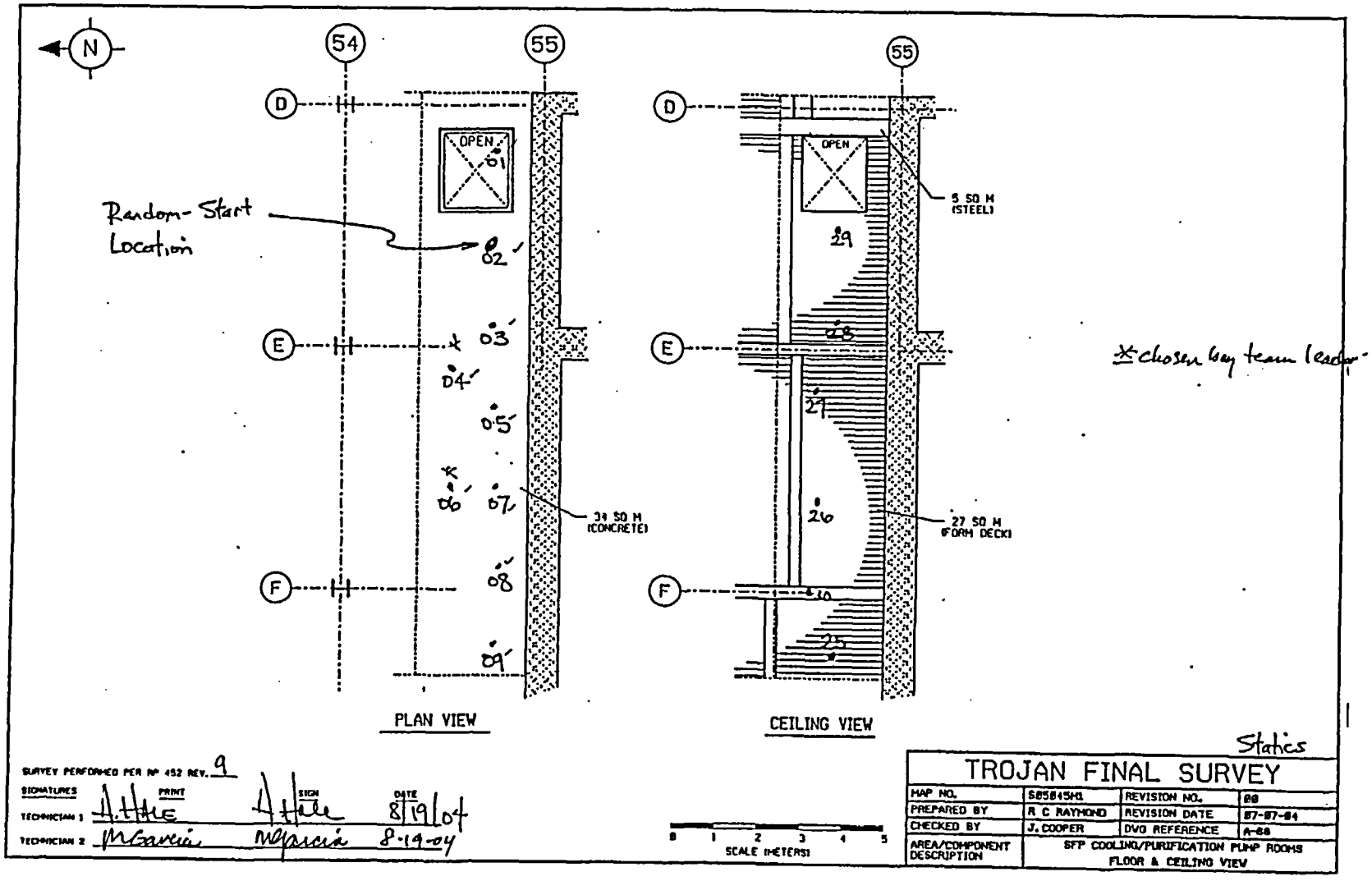
2.490	49.0
2.567	50.0
2.576	51.0
2.579	52.0
2.582	53.0
2.584	54.0
3.075	55.0
3.091	56.0
3.096	57.0
3.556	58.0
3.561	59.0
4.556	60.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Static Measurement Locations Map

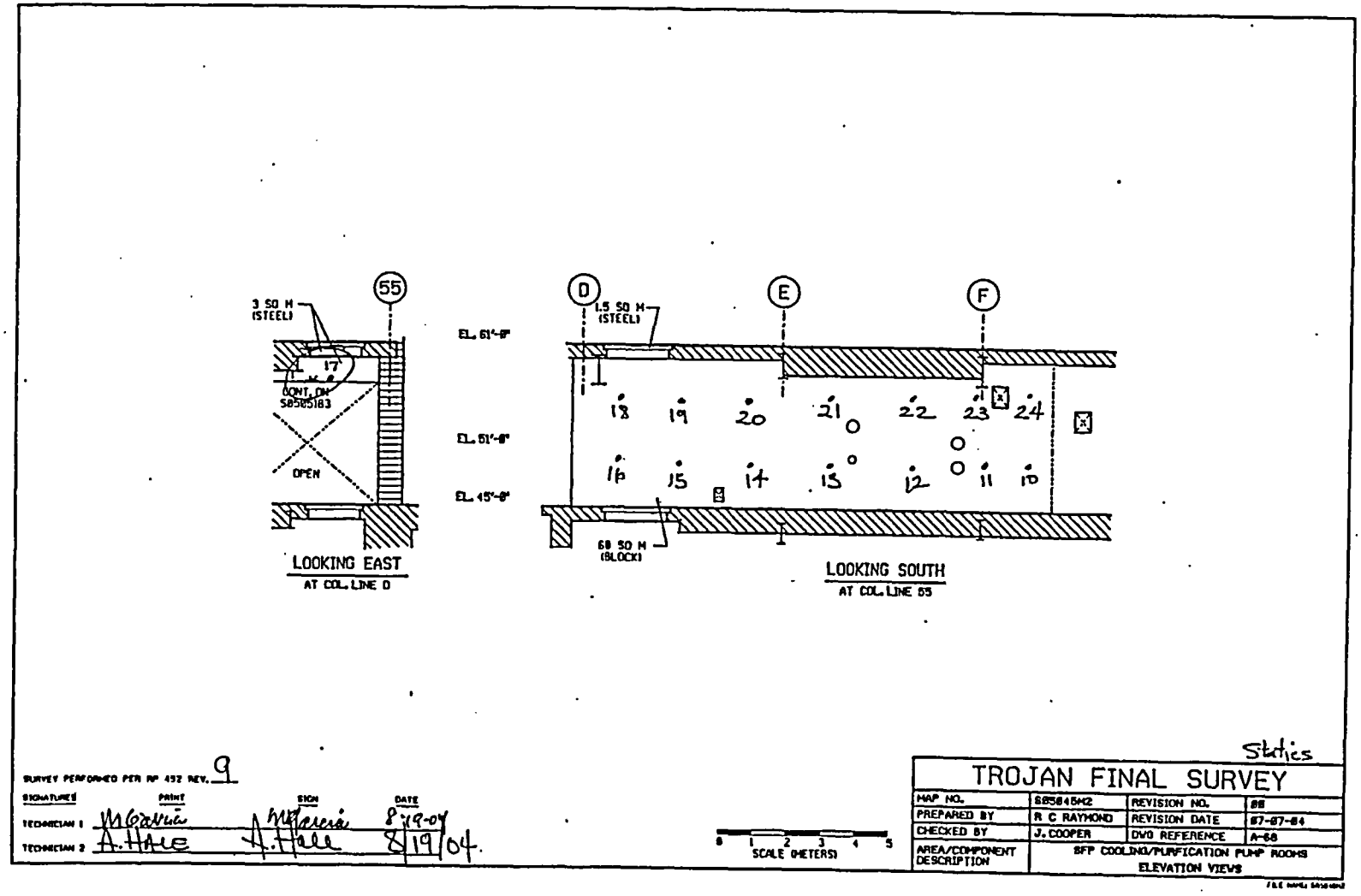


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	31	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	4.507e+002
Maximum Value	:	2.388e+003
Range	:	1.937e+003
Median	:	1.287e+003
Std. Deviation	:	5.775e+002
Mean	:	1.231e+003
95% UCL	:	1.407e+003

Measurement Values

Location	Value	Location	Value
000001	2.308e+003	000018	5.424e+002
000002	2.181e+003	000019	6.581e+002
000003	2.388e+003	000020	5.025e+002
000004	2.041e+003	000021	6.381e+002
000005	1.461e+003	000022	4.507e+002
000006	1.907e+003	000023	8.615e+002
000007	1.287e+003	000024	5.145e+002
000008	1.601e+003	000025	7.498e+002
000009	1.594e+003	000026	8.415e+002
000010	1.321e+003	000027	6.979e+002
000011	1.487e+003	000028	1.181e+003
000012	1.367e+003	000029	1.061e+003
000013	1.474e+003	000030	1.081e+003
000014	1.827e+003	000031	6.102e+002
000015	1.461e+003		
000016	1.521e+003		
000017	5.424e+002		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Measurement Data Statistical Evaluation - Beta

Statistical Comparisons

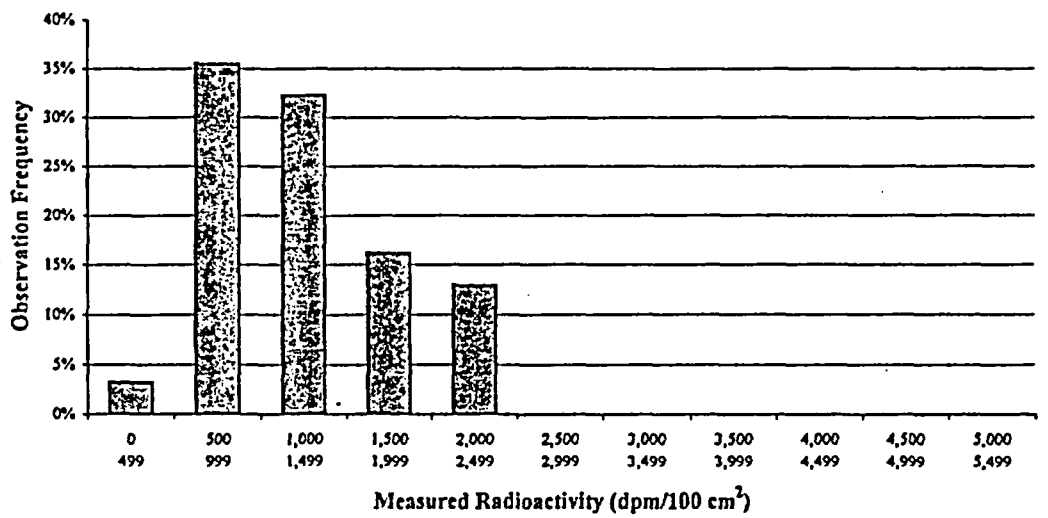
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	1,937	2,888	Pass
Median	0.097	0.500	Pass
Mean	1,231	6,000	Pass
Std Dev	578	1,500	Pass

All data less than DCGL; Sign statistical test not required.

Statistical Quantities

Range:	1,937
Median:	1,287
Mean:	1,231
Std Dev:	578
Minimum:	451
Maximum:	2,388
DCGL:	7,500

Data Frequency Distribution



Plot Parameters	
# of measurements:	31
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	1	3%
2	999	500	11	35%
3	1,499	1,000	10	32%
4	1,999	1,500	5	16%
5	2,499	2,000	4	13%
6	2,999	2,500	0	0%
7	3,499	3,000	0	0%
8	3,999	3,500	0	0%
9	4,499	4,000	0	0%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	31	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Background Reference Area B04045N - Beta

Statistical Quantities:

Range	: 2.950e+002
Median	: 9.200e+002
Mean	: 9.190e+002
Std. Deviation:	: 7.539e+001

# of Measurements: 31 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B
000031	9.202e+002	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	31	DPM/100 CM²	2.800e+001	-	1.409e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	6.614e+000
Maximum Value	:	7.937e+001
Range	:	7.276e+001
Median	:	2.646e+001
Std. Deviation	:	1.687e+001
Mean	:	2.880e+001
95% UCL	:	3.394e+001

Measurement Values

Location	Value	Location	Value
000001	3.968e+001	000018	1.984e+001
000002	2.646e+001	000019	6.614e+000
000003	3.968e+001	000020	1.323e+001
000004	6.614e+000	000021	3.968e+001
000005	2.646e+001	000022	1.323e+001
000006	4.630e+001	000023	2.646e+001
000007	3.307e+001	000024	1.984e+001
000008	1.323e+001	000025	1.984e+001
000009	3.307e+001	000026	2.646e+001
000010	6.614e+000	000027	4.630e+001
000011	2.646e+001	000028	3.307e+001
000012	3.307e+001	000029	7.937e+001
000013	3.968e+001	000030	5.291e+001
000014	5.952e+001	000031	1.323e+001
000015	1.984e+001		
000016	2.646e+001		
000017	6.614e+000		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Measurement Data Statistical Evaluation - Alpha

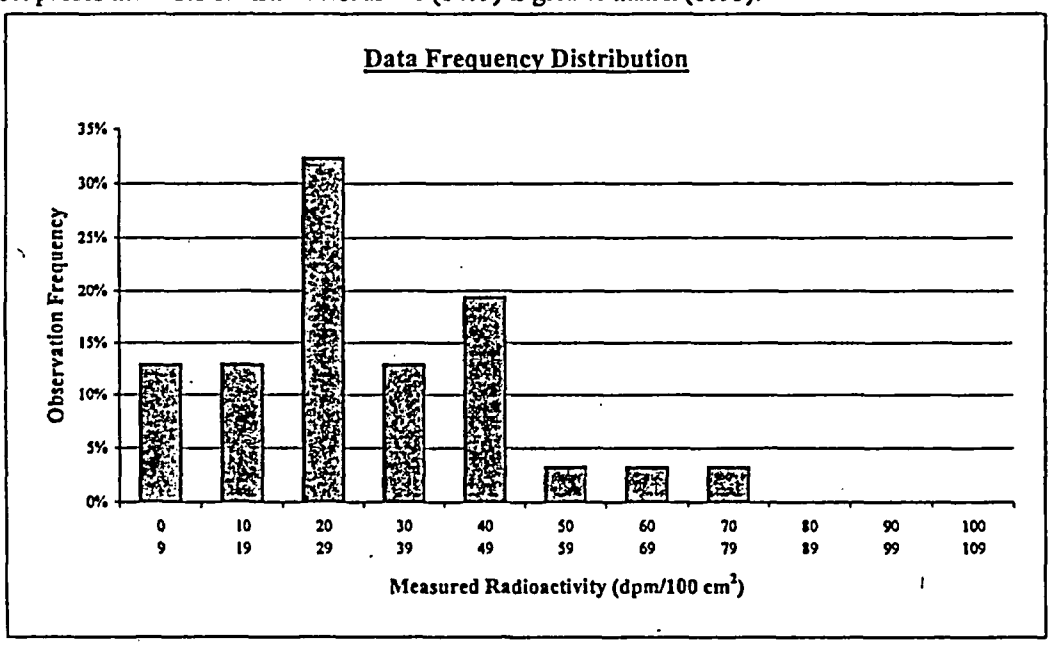
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	72	84	Pass
Median	0.165	0.500	Pass
Mean	29	28	See comment below
Std Dev	17	28	Pass
WRS	1409	1093	Pass

Data set passes the WRS statistical test as Wr (1409) is greater than k (1093).

Statistical Quantities

Range:	72
Median:	26
Mean:	29
Std Dev:	17
Minimum:	7
Maximum:	79
DCGL:	28



Plot Parameters

# of measurements:	31
# of intervals:	11
Interval increment:	10
Minimum:	0
Maximum:	109

Interval	High End	Low End	Number of Observations	Observation Frequency
1	9	0	4	13%
2	19	10	4	13%
3	29	20	10	32%
4	39	30	4	13%
5	49	40	6	19%
6	59	50	1	3%
7	69	60	1	3%
8	79	70	1	3%
9	89	80	0	0%
10	99	90	0	0%
11	109	100	0	0%
		Total:	31	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Background Reference Area B04045N - Alpha

Statistical Quantities:

Range	: 6.820e+001
Median	: 3.720e+001
Mean	: 4.220e+001
Std. Deviation:	: 1.883e+001

# of Measurements: 31 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000001	3.720e+001	B
000002	5.580e+001	B
000003	5.580e+001	B
000004	3.100e+001	B
000005	2.480e+001	B
000006	3.100e+001	B
000007	6.200e+000	B
000008	1.860e+001	B
000009	5.580e+001	B
000010	3.100e+001	B
000011	7.440e+001	B
000012	5.580e+001	B
000013	6.200e+001	B
000014	4.340e+001	B
000015	4.340e+001	B
000016	3.100e+001	B
000017	3.100e+001	B
000018	1.240e+001	B
000019	6.820e+001	B
000020	2.480e+001	B
000021	6.820e+001	B
000022	3.100e+001	B
000023	3.720e+001	B
000024	6.820e+001	B
000025	6.200e+001	B
000026	2.480e+001	B
000027	5.580e+001	B
000028	4.960e+001	B
000029	1.860e+001	B
000030	3.100e+001	B
000031	6.820e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 869

Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 7,417

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 31
Investigation Level: 750
Maximum Value: 9

Smears not evaluated for Alpha activity and not available for recount.

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Two beta scan measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	8,641
Size of Area Exceeding DCGL (m^2):	N/A
Size of Survey Unit (m^2):	N/A
Survey Unit Area >DCGL (%):	N/A
EMC Value:	N/A

Action Taken: Corrected measurement values for scan location per guidance in memo FS-018-03. Replaced original scan results in SDMS with these results, which corrected to less than the investigation level.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Discussion of Anomalous Measurement Data (Continued)

Investigation #2 Summary

Reason for Investigation: Twelve alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	79
Size of Area Exceeding DCGL (m^2):	0.2
Size of Survey Unit (m^2):	36
Survey Unit Area >DCGL (%):	0.6
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
P01	2,308	40	0.308	1.429	1.736	947	37
P02	2,181	26	0.291	0.929	1.219	1,062	56
P03	2,388	40	0.318	1.429	1.747	985	56
P04	2,041	7	0.272	0.250	0.522	959	31
P05	1,461	26	0.195	0.929	1.123	955	25
P06	1,907	46	0.254	1.643	1.897	897	31
P07	1,287	33	0.172	1.179	1.350	947	6
P08	1,601	13	0.213	0.464	0.678	886	19
P09	1,594	33	0.213	1.179	1.391	1,016	56
P10	1,321	7	0.176	0.250	0.426	840	31
P11	1,487	26	0.198	0.929	1.127	782	74
P12	1,367	33	0.182	1.179	1.361	970	56
P13	1,474	40	0.197	1.429	1.625	951	62
P14	1,827	60	0.244	2.143	2.386	982	43
P15	1,461	20	0.195	0.714	0.909	828	43
P16	1,521	26	0.203	0.929	1.131	859	31
P17	542	7	0.072	0.250	0.322	916	31
P18	542	20	0.072	0.714	0.787	767	12
P19	658	7	0.088	0.250	0.338	962	68
P20	503	13	0.067	0.464	0.531	859	25
P21	638	40	0.085	1.429	1.514	947	68
P22	451	13	0.060	0.464	0.524	863	31
P23	862	26	0.115	0.929	1.044	890	37
P24	515	20	0.069	0.714	0.783	855	68
P25	750	20	0.100	0.714	0.814	828	62
P26	842	26	0.112	0.929	1.041	1,039	25
P27	698	46	0.093	1.643	1.736	993	56
P28	1,181	33	0.157	1.179	1.336	863	50
P29	1,061	79	0.141	2.821	2.963	878	19
P30	1,081	53	0.144	1.893	2.037	1,043	31
P31	610	13	0.081	0.464	0.546	920	68
				mean:	1.192		

*First 31 measurement values from background reference data set B04045Y01.
**Values from B04045N02, which are first 31 values from background reference data set B04045Y02.
Note: Highlighted background values to track for Wr

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean > Unity DCGL (1.2 > 1.0), go to means test.

Means test :
DM = (YMax - BMin) = (2.963 - 0.348) = 1.268 > Unity DCGL
DA = (YMean - BMean) = (1.192 - 1.630) = -0.438 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 (Z)
0.126	1.329	1.455	2.455
0.142	1.993	2.134	3.134
0.131	1.993	2.124	3.124
0.128	1.107	1.235	2.235
0.127	0.886	1.013	2.013
0.120	1.107	1.227	2.227
0.126	0.221	0.348	1.348
0.118	0.664	0.782	1.782
0.135	1.993	2.128	3.128
0.112	1.107	1.219	2.219
0.104	2.657	2.761	3.761
0.129	1.993	2.122	3.122
0.127	2.214	2.341	3.341
0.131	1.550	1.681	2.681
0.110	1.550	1.660	2.660
0.115	1.107	1.222	2.222
0.122	1.107	1.229	2.229
0.102	0.443	0.545	1.545
0.128	2.436	2.564	3.564
0.115	0.886	1.000	2.000
0.126	2.436	2.562	3.562
0.115	1.107	1.222	2.222
0.119	1.329	1.447	2.447
0.114	2.436	2.550	3.550
0.110	2.214	2.325	3.325
0.139	0.886	1.024	2.024
0.132	1.993	2.125	3.125
0.115	1.771	1.886	2.886
0.117	0.664	0.781	1.781
0.139	1.107	1.246	2.246
0.123	2.436	2.558	3.558
	mean:	1.630	

Y, Z POOL	RANK#	Z Rank #
0.322	1.0	20.0
0.338	2.0	25.0
0.426	3.0	30.0
0.522	4.0	31.0
0.524	5.0	33.0
0.531	6.0	34.0
0.546	7.0	35.0
0.678	8.0	37.0
0.783	9.0	38.5
0.787	10.0	38.5
0.814	11.0	40.0
0.909	12.0	41.0
1.041	13.0	42.0
1.044	14.0	43.0
1.123	15.0	45.0
1.127	16.0	46.0
1.131	17.0	47.0
1.219	18.0	48.0
1.336	19.0	49.0
1.348	20.0	51.0
1.350	21.0	52.0
1.361	22.0	53.0
1.391	23.0	54.0
1.514	24.0	55.0
1.545	25.0	56.0
1.625	26.0	57.0
1.736	27.5	58.0
1.736	27.5	59.0
1.747	29.0	60.0
1.781	30.0	61.0
1.782	31.0	62.0
1.897	32.0	1401
2.000	33.0	Z Rank Sum = Wr
2.013	34.0	
2.024	35.0	
2.037	36.0	
2.219	37.0	
2.222	38.5	
2.222	38.5	
2.227	40.0	
2.229	41.0	
2.235	42.0	
2.246	43.0	
2.386	44.0	
2.447	45.0	
2.455	46.0	
2.660	47.0	
2.681	48.0	

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + z(P)^{1/2}$

where: n = 31

m = 31

P = nm(n+m+1)/12 = 5,045

z = 1.645, for 0.05 Type I error

$k = 31(31+31+1)/2 + 1.645(5{,}045)^{1/2}$

k = 977 + 1.645(71) = 1094

Conclusion:

Since Wr > k (1401 > 1094), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Unity Rule Evaluation (Continued)

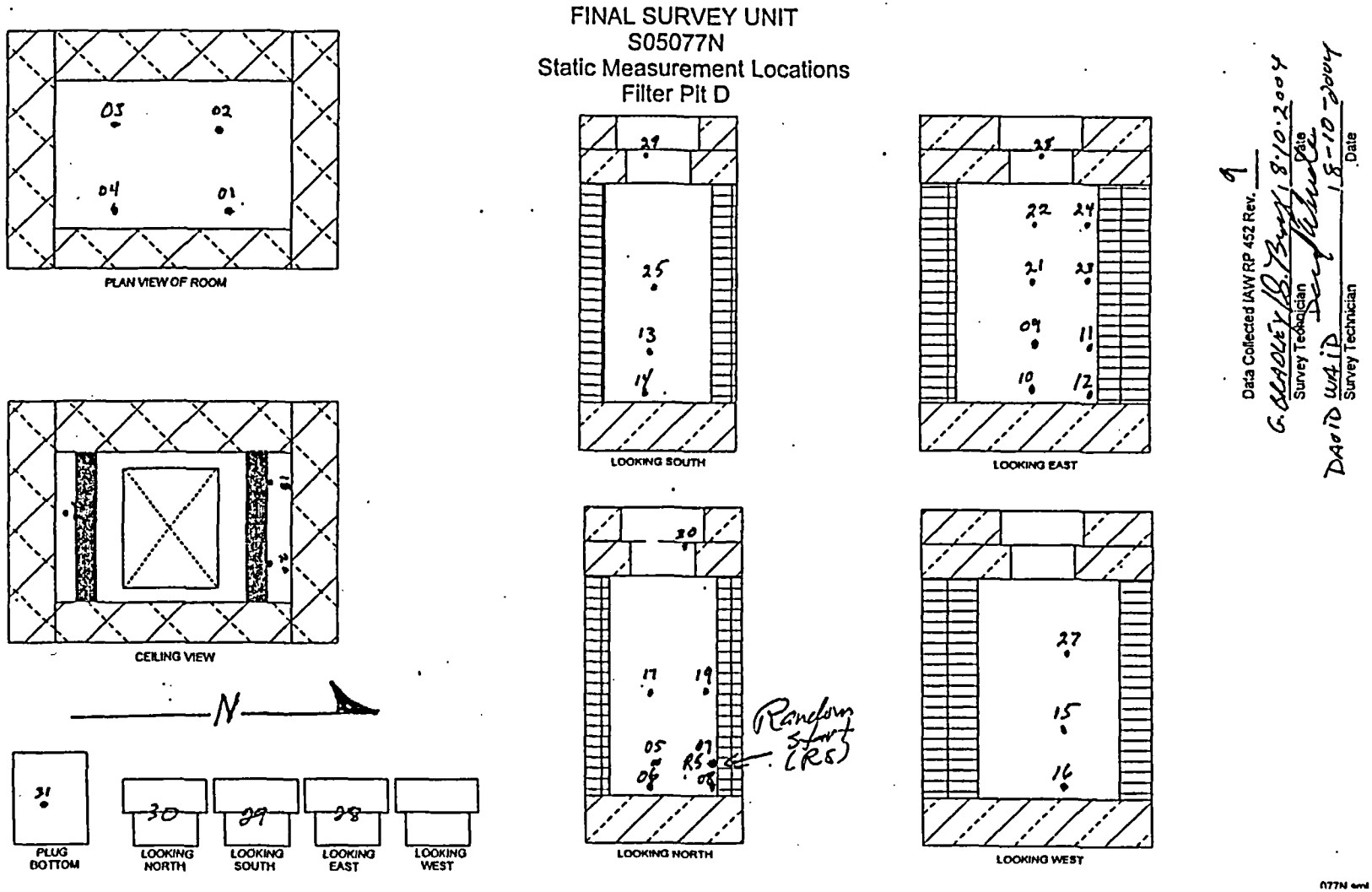
2.886	49.0
2.963	50.0
3.122	51.0
3.124	52.0
3.125	53.0
3.128	54.0
3.134	55.0
3.325	56.0
3.341	57.0
3.550	58.0
3.558	59.0
3.562	60.0
3.564	61.0
3.761	62.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	32	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	6.581e+002
Maximum Value	:	2.814e+003
Range	:	2.156e+003
Median	:	1.316e+003
Std. Deviation	:	6.252e+002
Mean	:	1.454e+003
95% UCL	:	1.641e+003

Measurement Values

Location	Value	Location	Value
000001	1.974e+003	000018	8.375e+002
000002	1.854e+003	000019	9.651e+002
000003	1.634e+003	000020	7.259e+002
000004	2.181e+003	000021	8.335e+002
000005	2.067e+003	000022	9.372e+002
000006	1.534e+003	000023	7.617e+002
000007	2.188e+003	000024	9.213e+002
000008	1.807e+003	000025	1.125e+003
000009	2.408e+003	000026	9.253e+002
000010	1.634e+003	000027	8.654e+002
000011	2.154e+003	000028	1.292e+003
000012	2.101e+003	000029	1.340e+003
000013	2.361e+003	000030	2.002e+003
000014	2.814e+003	000031	1.105e+003
000015	9.332e+002	000032	7.219e+002
000016	8.575e+002		
000017	6.581e+002		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Measurement Data Statistical Evaluation - Beta

Statistical Comparisons

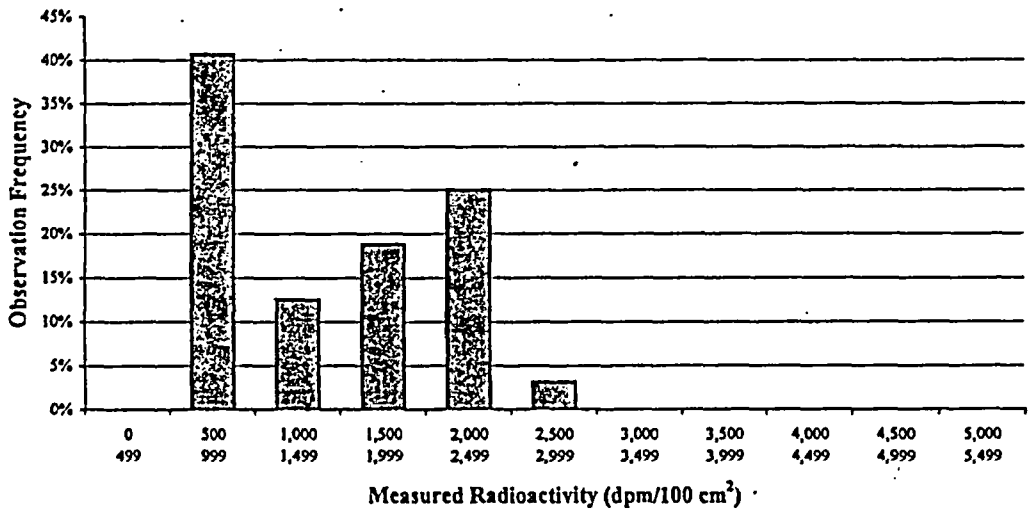
Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	2,156	3,126	Pass
Median	0.220	0.500	Pass
Mean	1,454	6,000	Pass
Std Dev	625	1,500	Pass

All data less than DCGL; WRS statistical test not required.

Statistical Quantities

Range:	2,156
Median:	1,316
Mean:	1,454
Std Dev:	625
Minimum:	658
Maximum:	2,814
DCGL:	7,500

Data Frequency Distribution



Plot Parameters	
# of measurements:	32
# of intervals:	11
Interval increment:	500
Minimum:	0
Maximum:	5,499

Comment:
None.

Interval	High End	Low End	Number of Observations	Observation Frequency
1	499	0	0	0%
2	999	500	13	41%
3	1,499	1,000	4	13%
4	1,999	1,500	6	19%
5	2,499	2,000	8	25%
6	2,999	2,500	1	3%
7	3,499	3,000	0	0%
8	3,999	3,500	0	0%
9	4,499	4,000	0	0%
10	4,999	4,500	0	0%
11	5,499	5,000	0	0%
		Total:	32	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Background Reference Area B04045N - Beta

Statistical Quantities:

Range	: 2.950e+002
Median	: 9.200e+002
Mean	: 9.190e+002
Std. Deviation:	: 7.539e+001

# of Measurements: 31 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B
000031	9.202e+002	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	32	DPM/100 CM²	2.800e+001	-	1.298e+00

Statistical Quantities

Measurement Name:

Minimum Value	:	1.323e+001
Maximum Value	:	1.058e+002
Range	:	9.257e+001
Median	:	3.968e+001
Std. Deviation	:	2.153e+001
Mean	:	4.568e+001
95% UCL	:	5.213e+001

Measurement Values

Location	Value	Location	Value
000001	1.323e+001	000018	3.307e+001
000002	4.630e+001	000019	1.058e+002
000003	3.307e+001	000020	5.952e+001
000004	7.275e+001	000021	3.307e+001
000005	3.307e+001	000022	3.968e+001
000006	2.646e+001	000023	3.968e+001
000007	4.630e+001	000024	5.952e+001
000008	7.937e+001	000025	4.630e+001
000009	5.952e+001	000026	7.275e+001
000010	3.968e+001	000027	4.630e+001
000011	4.630e+001	000028	5.952e+001
000012	5.291e+001	000029	3.307e+001
000013	3.968e+001	000030	9.260e+001
000014	2.646e+001	000031	1.984e+001
000015	2.646e+001	000032	1.984e+001
000016	3.968e+001		
000017	1.984e+001		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Measurement Data Statistical Evaluation - Alpha

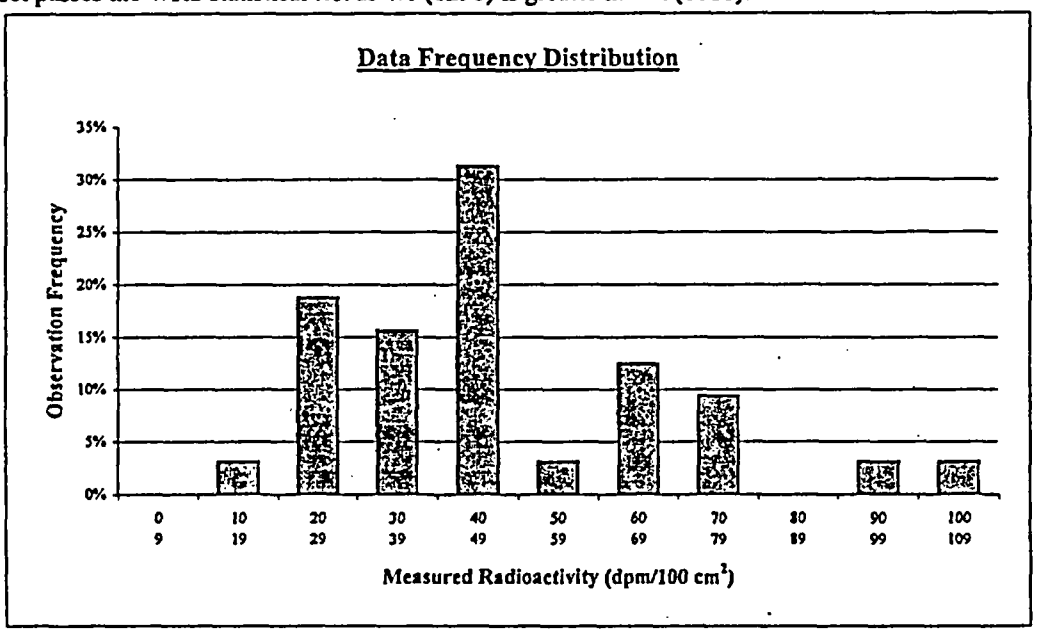
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	93	108	Pass
Median	0.264	0.500	Pass
Mean	46	28	See comment below
Std Dev	22	28	Pass
WRS	1298	1111	Pass

Data set passes the WRS statistical test as Wr (1298) is greater than k (1111).

Statistical Quantities

Range:	93
Median:	40
Mean:	46
Std Dev:	22
Minimum:	13
Maximum:	106
DCGL:	28



Plot Parameters	
# of measurements:	32
# of intervals:	11
Interval increment:	10
Minimum:	0
Maximum:	109

Interval	High End	Low End	Number of Observations	Observation Frequency
1	9	0	0	0%
2	19	10	1	3%
3	29	20	6	19%
4	39	30	5	16%
5	49	40	10	31%
6	59	50	1	3%
7	69	60	4	13%
8	79	70	3	9%
9	89	80	0	0%
10	99	90	1	3%
11	109	100	1	3%
		Total:	32	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Background Reference Area B04045N - Alpha

Statistical Quantities:

Range	: 6.820e+001
Median	: 3.720e+001
Mean	: 4.220e+001
Std. Deviation:	: 1.883e+001

# of Measurements: 31 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000001	3.720e+001	B
000002	5.580e+001	B
000003	5.580e+001	B
000004	3.100e+001	B
000005	2.480e+001	B
000006	3.100e+001	B
000007	6.200e+000	B
000008	1.860e+001	B
000009	5.580e+001	B
000010	3.100e+001	B
000011	7.440e+001	B
000012	5.580e+001	B
000013	6.200e+001	B
000014	4.340e+001	B
000015	4.340e+001	B
000016	3.100e+001	B
000017	3.100e+001	B
000018	1.240e+001	B
000019	6.820e+001	B
000020	2.480e+001	B
000021	6.820e+001	B
000022	3.100e+001	B
000023	3.720e+001	B
000024	6.820e+001	B
000025	6.200e+001	B
000026	2.480e+001	B
000027	5.580e+001	B
000028	4.960e+001	B
000029	1.860e+001	B
000030	3.100e+001	B
000031	6.820e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 952

Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 7,209

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 32
Investigation Level: 750
Maximum Value: 24

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0

Number of Measurements: 32
Investigation Level: MDC
Maximum Value: 2

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Three beta scan measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	9,620
Size of Area Exceeding DCGL (m^2):	N/A
Size of Survey Unit (m^2):	N/A
Survey Unit Area >DCGL (%):	N/A
EMC Value:	N/A

Action Taken: Corrected measurement values for scan location per guidance in memo FS-018-03; used similar method for elevated scan measurements obtained with a 43-68 gas flow proportional detector. Replaced original scan results in SDMS with these results, which corrected to less than the investigation level.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Discussion of Anomalous Measurement Data (Continued)

Investigation #2 Summary

Reason for Investigation: Thirty-one alpha static measurements exceeded investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	106
Size of Area Exceeding DCGL (m^2):	0.4
Size of Survey Unit (m^2):	36
Survey Unit Area >DCGL (%):	1.1
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
P01	1,974	13	0.263	0.464	0.727	947	37
P02	1,854	46	0.247	1.643	1.890	1062	56
P03	1,634	33	0.218	1.179	1.396	985	56
P04	2,181	73	0.291	2.607	2.898	959	31
P05	2,067	33	0.276	1.179	1.454	955	25
P06	1,534	26	0.205	0.929	1.133	897	31
P07	2,188	46	0.292	1.643	1.935	947	6
P08	1,807	79	0.241	2.821	3.062	886	19
P09	2,408	60	0.321	2.143	2.464	1016	56
P10	1,634	40	0.218	1.429	1.646	840	31
P11	2,154	46	0.287	1.643	1.930	782	74
P12	2,101	53	0.280	1.893	2.173	970	56
P13	2,361	40	0.315	1.429	1.743	951	62
P14	2,814	26	0.375	0.929	1.304	982	43
P15	933	26	0.124	0.929	1.053	828	43
P16	858	40	0.114	1.429	1.543	859	31
P17	658	20	0.088	0.714	0.802	916	31
P18	838	33	0.112	1.179	1.290	767	12
P19	965	106	0.129	3.786	3.914	962	68
P20	726	60	0.097	2.143	2.240	859	25
P21	834	33	0.111	1.179	1.290	947	68
P22	937	40	0.125	1.429	1.554	863	31
P23	762	40	0.102	1.429	1.530	890	37
P24	921	60	0.123	2.143	2.266	855	68
P25	1,125	46	0.150	1.643	1.793	828	62
P26	925	73	0.123	2.607	2.730	1039	25
P27	865	46	0.115	1.643	1.758	993	56
P28	1,292	60	0.172	2.143	2.315	863	50
P29	1,340	33	0.179	1.179	1.357	878	19
P30	2,002	93	0.267	3.321	3.588	1043	31
P31	1,105	20	0.147	0.714	0.862	920	68
P32	722	20	0.096	0.714	0.811		
				mean:	1.827		

*First 31 measurement values from background reference data set B04045Y01.
**Values from B04045N02, which are first 31 values from background reference data set B04045Y02.
Note: Highlighted background values to track for Wr

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean > Unity DCGL (1.8 > 1.0), go to means test.

<u>Means test :</u>
DM = (PMax - BMin) = (3.914 - 0.348) = 3.566 > Unity DCGL
DA = (PMean - BMean) = (1.827 - 1.630) = 0.197 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum	Sum + 1 (Z)
0.126	1.329	1.455	2.455
0.142	1.993	2.134	3.134
0.131	1.993	2.124	3.124
0.128	1.107	1.235	2.235
0.127	0.886	1.013	2.013
0.120	1.107	1.227	2.227
0.126	0.221	0.348	1.348
0.118	0.664	0.782	1.782
0.135	1.993	2.128	3.128
0.112	1.107	1.219	2.219
0.104	2.657	2.761	3.761
0.129	1.993	2.122	3.122
0.127	2.214	2.341	3.341
0.131	1.550	1.681	2.681
0.110	1.550	1.660	2.660
0.115	1.107	1.222	2.222
0.122	1.107	1.229	2.229
0.102	0.443	0.545	1.545
0.128	2.436	2.564	3.564
0.115	0.886	1.000	2.000
0.126	2.436	2.562	3.562
0.115	1.107	1.222	2.222
0.119	1.329	1.447	2.447
0.114	2.436	2.550	3.550
0.110	2.214	2.325	3.325
0.139	0.886	1.024	2.024
0.132	1.993	2.125	3.125
0.115	1.771	1.886	2.886
0.117	0.664	0.781	1.781
0.139	1.107	1.246	2.246
0.123	2.436	2.558	3.558
	mean:	1.630	

Y, Z POOL	RANK#	Z Rank #
0.727	1.0	10.0
0.802	2.0	16.0
0.811	3.0	21.0
0.862	4.0	22.0
1.053	5.0	27.0
1.133	6.0	28.0
1.290	7.5	29.0
1.290	7.5	31.0
1.304	9.0	32.5
1.348	10.0	32.5
1.357	11.0	34.0
1.396	12.0	35.0
1.454	13.0	36.0
1.530	14.0	38.0
1.543	15.0	41.0
1.545	16.0	42.0
1.554	17.0	44.0
1.646	18.0	45.0
1.743	19.0	47.0
1.758	20.0	50.0
1.781	21.0	51.0
1.782	22.0	52.0
1.793	23.0	53.0
1.890	24.0	54.0
1.930	25.0	55.0
1.935	26.0	56.0
2.000	27.0	57.0
2.013	28.0	58.0
2.024	29.0	59.0
2.173	30.0	60.0
2.219	31.0	62.0
2.222	32.5	1278.0
2.222	32.5	Z Rank Sum = Wr
2.227	34.0	
2.229	35.0	
2.235	36.0	
2.240	37.0	
2.246	38.0	
2.266	39.0	
2.315	40.0	
2.447	41.0	
2.455	42.0	
2.464	43.0	
2.660	44.0	
2.681	45.0	
2.730	46.0	
2.886	47.0	
2.898	48.0	

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + z(P)^{1/2}$

where: n = 31

m = 32

P = nm(n+m+1)/12 = 5,291

z = 1.645, for 0.05 Type I error

$k = 32(31+32+1)/2 + 1.645(5,291)^{1/2}$

k = 1024 + 1.645(72.7) = 1144

Conclusion:

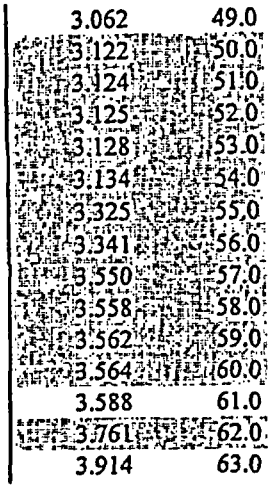
Since Wr > k (1278> 1144), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Unity Rule Evaluation (Continued)

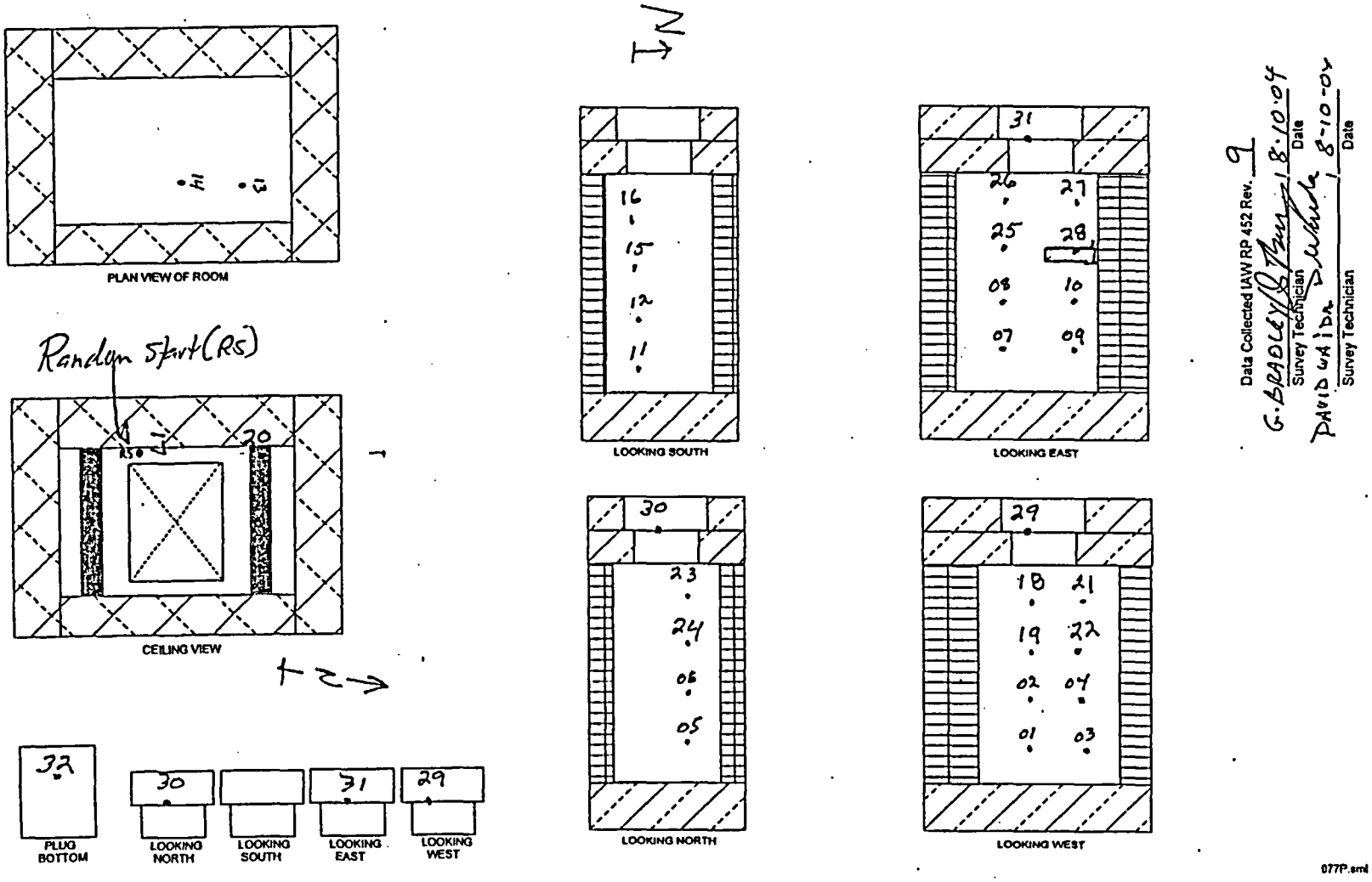


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	36	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	4.179e+002
Maximum Value	:	6.772e+003
Range	:	6.354e+003
Median	:	1.455e+003
Std. Deviation	:	1.339e+003
Mean	:	1.682e+003
95% UCL	:	2.059e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	2.189e+003	000018	8.257e+002	000035	2.707e+003
000002	1.392e+003	000019	8.001e+002	000036	2.643e+003
000003	8.550e+002	000020	1.575e+003		
000004	5.828e+002	000021	2.407e+003		
000005	5.253e+002	000022	2.394e+003		
000006	5.291e+002	000023	2.061e+003		
000007	5.253e+002	000024	2.387e+003		
000008	4.754e+002	000025	1.517e+003		
000009	4.563e+002	000026	2.887e+003		
000010	8.282e+002	000027	2.887e+003		
000011	9.240e+002	000028	2.592e+003		
000012	5.636e+002	000029	2.048e+003		
000013	4.179e+002	000030	3.066e+003		
000014	4.754e+002	000031	2.003e+003		
000015	5.406e+002	000032	2.714e+003		
000016	4.294e+002	000033	6.772e+003		
000017	5.061e+002	000034	4.051e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Measurement Data Statistical Evaluation - Beta

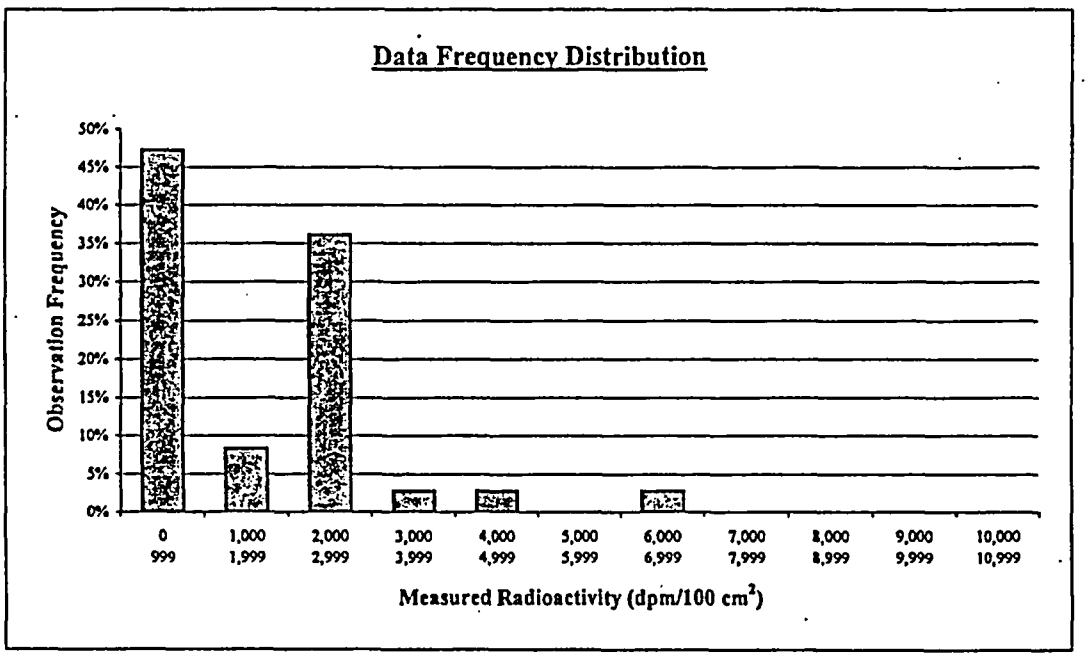
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	6,354	6,694	Pass
Median	0.170	0.500	Pass
Mean	1,682	7,500	Pass
Std Dev	1,339	1,500	Pass

All data less than DCGL; WRS statistical test not required.

Statistical Quantities

Range:	6,354
Median:	1,455
Mean:	1,682
Std Dev:	1,339
Minimum:	418
Maximum:	6,772
DCGL:	7,500



Plot Parameters	
# of measurements:	36
# of intervals:	11
Interval increment:	1,000
Minimum:	0
Maximum:	10,999

Interval	High End	Low End	Number of Observations	Observation Frequency
1	999	0	17	47%
2	1,999	1,000	3	8%
3	2,999	2,000	13	36%
4	3,999	3,000	1	3%
5	4,999	4,000	1	3%
6	5,999	5,000	0	0%
7	6,999	6,000	1	3%
8	7,999	7,000	0	0%
9	8,999	8,000	0	0%
10	9,999	9,000	0	0%
11	10,999	10,000	0	0%
		Total:	36	100%

Comment:
The measurement value 6,772 dpm at location 33 is in beta scan grid 072, and is consistent with the scan measurement value of 6,488 dpm.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Background Reference Area B04045Z - Beta

Statistical Quantities:

Range	: 2.952e+002
Median	: 9.125e+002
Mean	: 9.161e+002
Std. Deviation:	: 7.569e+001

# of Measurements: 36 Min Value: 7.668e+002 Max Value: 1.062e+003

Measurement Location	Value	Data Status Code
000001	9.470e+002	B
000002	1.062e+003	B
000003	9.854e+002	B
000004	9.585e+002	B
000005	9.547e+002	B
000006	8.972e+002	B
000007	9.470e+002	B
000008	8.857e+002	B
000009	1.016e+003	B
000010	8.397e+002	B
000011	7.821e+002	B
000012	9.700e+002	B
000013	9.508e+002	B
000014	9.815e+002	B
000015	8.282e+002	B
000016	8.588e+002	B
000017	9.163e+002	B
000018	7.668e+002	B
000019	9.623e+002	B
000020	8.588e+002	B
000021	9.470e+002	B
000022	8.627e+002	B
000023	8.895e+002	B
000024	8.550e+002	B
000025	8.282e+002	B
000026	1.039e+003	B
000027	9.930e+002	B
000028	8.627e+002	B
000029	8.780e+002	B
000030	1.043e+003	B
000031	9.202e+002	B
000032	8.627e+002	B
000033	9.048e+002	B
000034	9.087e+002	B
000035	7.937e+002	B
000036	1.024e+003	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	36	DPM/100 CM²	2.800e+001	-	1.611e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	0.000e+000
Maximum Value	:	9.921e+001
Range	:	9.921e+001
Median	:	4.299e+001
Std. Deviation	:	2.848e+001
Mean	:	4.611e+001
95% UCL	:	5.413e+001

Measurement Values

Location	Value	Location	Value	Location	Value
000001	6.614e+001	000018	3.968e+001	000035	9.921e+001
000002	2.646e+001	000019	3.307e+001	000036	6.614e+001
000003	6.614e+000	000020	5.952e+001		
000004	1.323e+001	000021	4.630e+001		
000005	1.984e+001	000022	8.598e+001		
000006	1.323e+001	000023	2.646e+001		
000007	1.984e+001	000024	5.291e+001		
000008	0.000e+000	000025	5.952e+001		
000009	2.646e+001	000026	7.937e+001		
000010	5.291e+001	000027	8.598e+001		
000011	1.323e+001	000028	5.952e+001		
000012	2.646e+001	000029	6.614e+001		
000013	6.614e+000	000030	8.598e+001		
000014	1.984e+001	000031	5.952e+001		
000015	9.921e+001	000032	3.307e+001		
000016	3.307e+001	000033	3.968e+001		
000017	9.259e+001	000034	4.630e+001		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Measurement Data Statistical Evaluation - Alpha

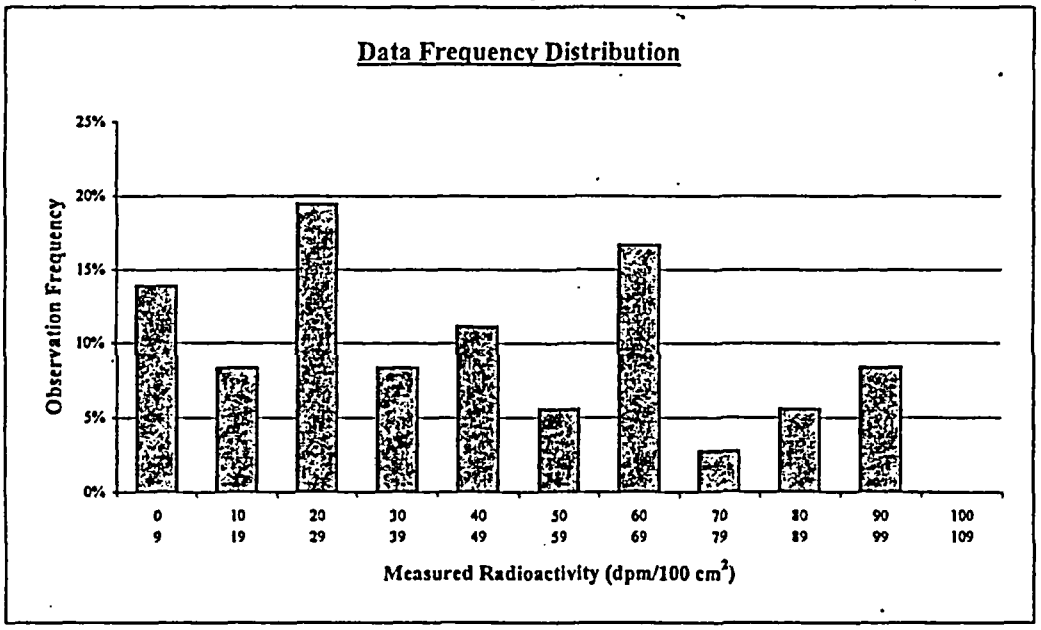
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	99	143	Pass
Median	0.109	0.500	Pass
Mean	46	28	See comment below
Std Dev	29	31	Pass
WRS	1611	1457	Pass

Data set passes the WRS statistical test as Wr (1611) is greater than k (1457).

Statistical Quantities

Range:	99
Median:	43
Mean:	46
Std Dev:	29
Minimum:	0
Maximum:	99
DCGL:	28



Plot Parameters

# of measurements:	36
# of intervals:	11
Interval increment:	10
Minimum:	0
Maximum:	109

Interval	High End	Low End	Number of Observations	Observation Frequency
1	9	0	5	14%
2	19	10	3	8%
3	29	20	7	19%
4	39	30	3	8%
5	49	40	4	11%
6	59	50	2	6%
7	69	60	6	17%
8	79	70	1	3%
9	89	80	2	6%
10	99	90	3	8%
11	109	100	0	0%
		Total:	36	100%

Comment:
Data set fails initial means statistical quantities test, which then requires a means test with a background reference area data set. Since the Survey Unit mean minus Reference Area mean is less than the DCGL, the survey unit data set passes that means test, and its acceptability is determined by the WRS test. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Background Reference Area B04045Z - Alpha

Statistical Quantities:

Range	: 6.820e+001
Median	: 3.720e+001
Mean	: 4.185e+001
Std. Deviation:	: 1.775e+001

# of Measurements: 36 Min Value: 6.200e+000 Max Value: 7.440e+001

Measurement Location	Value	Data Status Code
000001	3.720e+001	B
000002	5.580e+001	B
000003	5.580e+001	B
000004	3.100e+001	B
000005	2.480e+001	B
000006	3.100e+001	B
000007	6.200e+000	B
000008	1.860e+001	B
000009	5.580e+001	B
000010	3.100e+001	B
000011	7.440e+001	B
000012	5.580e+001	B
000013	6.200e+001	B
000014	4.340e+001	B
000015	4.340e+001	B
000016	3.100e+001	B
000017	3.100e+001	B
000018	1.240e+001	B
000019	6.820e+001	B
000020	2.480e+001	B
000021	6.820e+001	B
000022	3.100e+001	B
000023	3.720e+001	B
000024	6.820e+001	B
000025	6.200e+001	B
000026	2.480e+001	B
000027	5.580e+001	B
000028	4.960e+001	B
000029	1.860e+001	B
000030	3.100e+001	B
000031	6.820e+001	B
000032	3.100e+001	B
000033	3.720e+001	B
000034	3.720e+001	B
000035	3.720e+001	B
000036	5.580e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 597
Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 8,944

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 36
Investigation Level: 750
Maximum Value: 18

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 36
Investigation Level: MDC
Maximum Value: 3

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Seven beta scan measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	7,500
Measurement Units:	dpm/100cm^2
Maximum Value:	10,570
Size of Area Exceeding DCGL (m^2):	1.35
Size of Survey Unit (m^2):	209
Survey Unit Area >DCGL (%):	0.65
EMC Value:	9,000

Action Taken: Corrected measurement values for scan location per guidance in memo FS-018-03. Replaced original scan results in SDMS with these results. Applied EMC data processing to beta scan measurements that remain elevated.

Basis for Action Taken: Technical basis memorandum FS-018-03 provides guidance for correcting SDMS determined scan results for locations that exceed the investigation level by subtracting instrument background from the field results. Sum of small, localized areas of

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Discussion of Anomalous Measurement Data (Continued)

elevated alpha radioactivity identified during static surveys is between 1 m^2 and 4 m^2 in size, which allowed an interpolated EMC DCGL of 1.2 x DCGL to be applied.

Investigation #2 Summary

Reason for Investigation: Twenty-three alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	291
Size of Area Exceeding DCGL (m^2):	0.3
Size of Survey Unit (m^2):	209
Survey Unit Area >DCGL (%):	0.1
EMC Value:	140

Action Taken: Remediated static measurement locations 18-20, 25, 29, & 31 and resurveyed. Replaced original results in SDMS with post-remediation results. Applied EMC data processing to alpha static measurements that remain elevated.

Basis for Action Taken: Static measurement locations that approached or exceeded EMC DCGL were remediated. Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta*	Alpha**
P01	2,189	66	0.292	2.357	2.649	947	37
P02	1,392	26	0.186	0.929	1.114	1,062	56
P03	855	7	0.114	0.250	0.364	985	56
P04	583	13	0.078	0.464	0.542	959	31
P05	525	20	0.070	0.714	0.784	955	25
P06	529	13	0.071	0.464	0.535	897	31
P07	525	20	0.070	0.714	0.784	947	6
P08	475	0	0.063	0.000	0.063	886	19
P09	456	26	0.061	0.929	0.989	1,016	56
P10	828	53	0.110	1.893	2.003	840	31
P11	924	13	0.123	0.464	0.587	782	74
P12	564	26	0.075	0.929	1.004	970	56
P13	418	7	0.056	0.250	0.306	951	62
P14	475	20	0.063	0.714	0.778	982	43
P15	541	99	0.072	3.536	3.608	828	43
P16	429	33	0.057	1.179	1.236	859	31
P17	506	93	0.067	3.321	3.389	916	31
P18	826	40	0.110	1.429	1.539	767	12
P19	800	33	0.107	1.179	1.285	962	68
P20	1,575	60	0.210	2.143	2.353	859	25
P21	2,407	46	0.321	1.643	1.964	947	68
P22	2,394	86	0.319	3.071	3.391	863	31
P23	2,061	26	0.275	0.929	1.203	890	37
P24	2,387	53	0.318	1.893	2.211	855	68
P25	1,517	60	0.202	2.143	2.345	828	62
P26	2,887	79	0.385	2.821	3.206	1,039	25
P27	2,887	86	0.385	3.071	3.456	993	56
P28	2,592	60	0.346	2.143	2.488	863	50
P29	2,048	66	0.273	2.357	2.630	878	19
P30	3,066	86	0.409	3.071	3.480	1,043	31
P31	2,003	60	0.267	2.143	2.410	920	68
P32	2,714	33	0.362	1.179	1.540	863	31
P33	6,772	40	0.903	1.429	2.332	905	37
P34	4,051	46	0.540	1.643	2.183	909	37
P35	2,707	99	0.361	3.536	3.897	794	37
P36	2,643	66	0.352	2.357	2.710	1,024	56
				mean	1.871		

*First 36 measurement values from background reference data set B04045Y01.
**Values from B04045Z02, which are first 36 values from background reference data set B04045Y02.
Note: Highlighted background values to track for Wr

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean > Unity DCGL (1.9 > 1.0), go to means test.

Means test :
DM = (YMax - BMin) = (3.897 - 0.348) = 3.549 > DCGL
DA = (YMean - BMean) = (1.871 - 1.617) = 0.254 < DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity rule evaluation.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 Z
0.126	1.329	1.455	2.455
0.142	1.993	2.134	3.134
0.131	1.993	2.124	3.124
0.128	1.107	1.235	2.235
0.127	0.886	1.013	2.013
0.120	1.107	1.227	2.227
0.126	0.221	0.348	1.348
0.118	0.664	0.782	1.782
0.135	1.993	2.128	3.128
0.112	1.107	1.219	2.219
0.104	2.657	2.761	3.761
0.129	1.993	2.122	3.122
0.127	2.214	2.341	3.341
0.131	1.550	1.681	2.681
0.110	1.550	1.660	2.660
0.115	1.107	1.222	2.222
0.122	1.107	1.229	2.229
0.102	0.443	0.545	1.545
0.128	2.436	2.564	3.564
0.115	0.886	1.000	2.000
0.126	2.436	2.562	3.562
0.115	1.107	1.222	2.222
0.119	1.329	1.447	2.447
0.114	2.436	2.550	3.550
0.110	2.214	2.325	3.325
0.139	0.886	1.024	2.024
0.132	1.993	2.125	3.125
0.115	1.771	1.886	2.886
0.117	0.664	0.781	1.781
0.139	1.107	1.246	2.246
0.123	2.436	2.558	3.558
0.115	1.107	1.222	2.222
0.121	1.329	1.449	2.449
0.121	1.329	1.450	2.450
0.106	1.329	1.434	2.434
0.137	1.993	2.129	3.129
	mean	1.617	

Y, Z POOL	RANK#	Z Rank #
0.063	1.0	16.0
0.306	2.0	19.0
0.364	3.0	20.0
0.535	4.0	21.0
0.542	5.0	23.0
0.587	6.0	25.0
0.778	7.0	26.0
0.784	8.5	29.0
0.784	8.5	31.0
0.989	10.0	31.0
1.004	11.0	31.0
1.114	12.0	33.0
1.203	13.0	34.0
1.236	14.0	35.0
1.285	15.0	36.0
1.348	16.0	41.0
1.539	17.0	42.0
1.540	18.0	43.0
1.545	19.0	44.0
1.781	20.0	45.0
1.782	21.0	49.0
1.964	22.0	50.0
2.000	23.0	52.0
2.003	24.0	53.0
2.013	25.0	54.0
2.024	26.0	55.0
2.183	27.0	56.0
2.211	28.0	57.0
2.219	29.0	58.0
2.222	31.0	60.0
2.222	31.0	61.0
2.222	31.0	66.0
2.227	33.0	67.0
2.229	34.0	68.0
2.235	35.0	69.0
2.246	36.0	71.0
2.332	37.0	1571
2.345	38.0	Z Rank Sum = Wr
2.353	39.0	
2.410	40.0	
2.434	41.0	
2.447	42.0	
2.450	44.0	
2.455	45.0	
2.488	46.0	
2.630	47.0	
2.649	48.0	
2.660	49.0	
2.681	50.0	
2.710	51.0	
2.886	52.0	
3.122	53.0	

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + Z(P)^{1/2}$

where: n = 36
m = 36
P = nm(n+m+1)/12 = 7,884
Z = 1.645, for 0.05 Type I error

$k = 36(36+36+1)/2 + 1.645(7,884)^{1/2}$

k = 1314 + 1.645(88.8) = 1460

Conclusion:

Since Wr > k (1571 > 1460), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Unity Rule Evaluation (Continued)

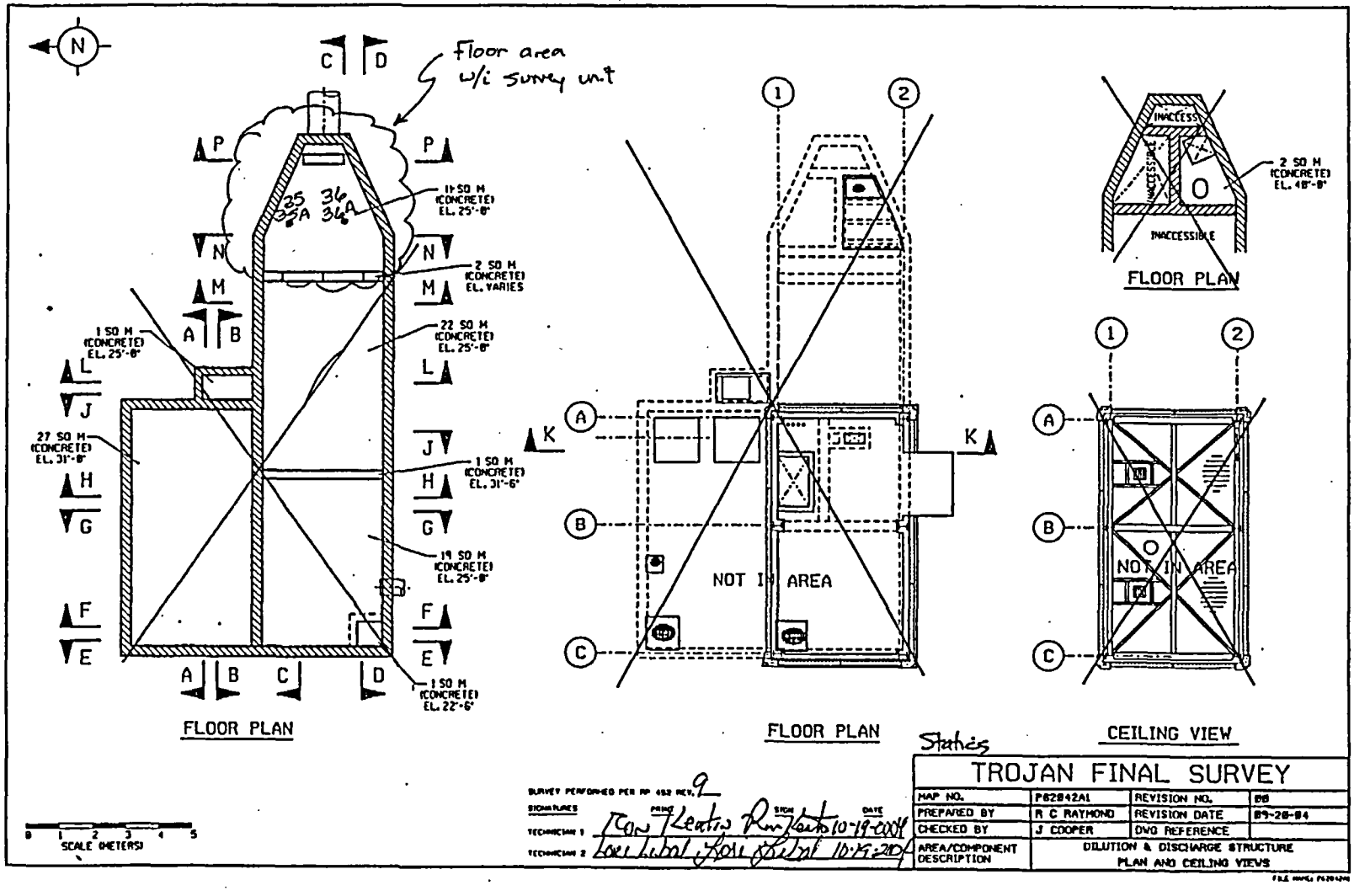
3.124	54.0
3.125	55.0
3.128	56.0
3.129	57.0
3.134	58.0
3.206	59.0
3.325	60.0
3.341	61.0
3.389	62.0
3.391	63.0
3.456	64.0
3.480	65.0
3.550	66.0
3.558	67.0
3.562	68.0
3.564	69.0
3.608	70.0
3.761	71.0
3.897	72.0

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Static Measurement Locations Map

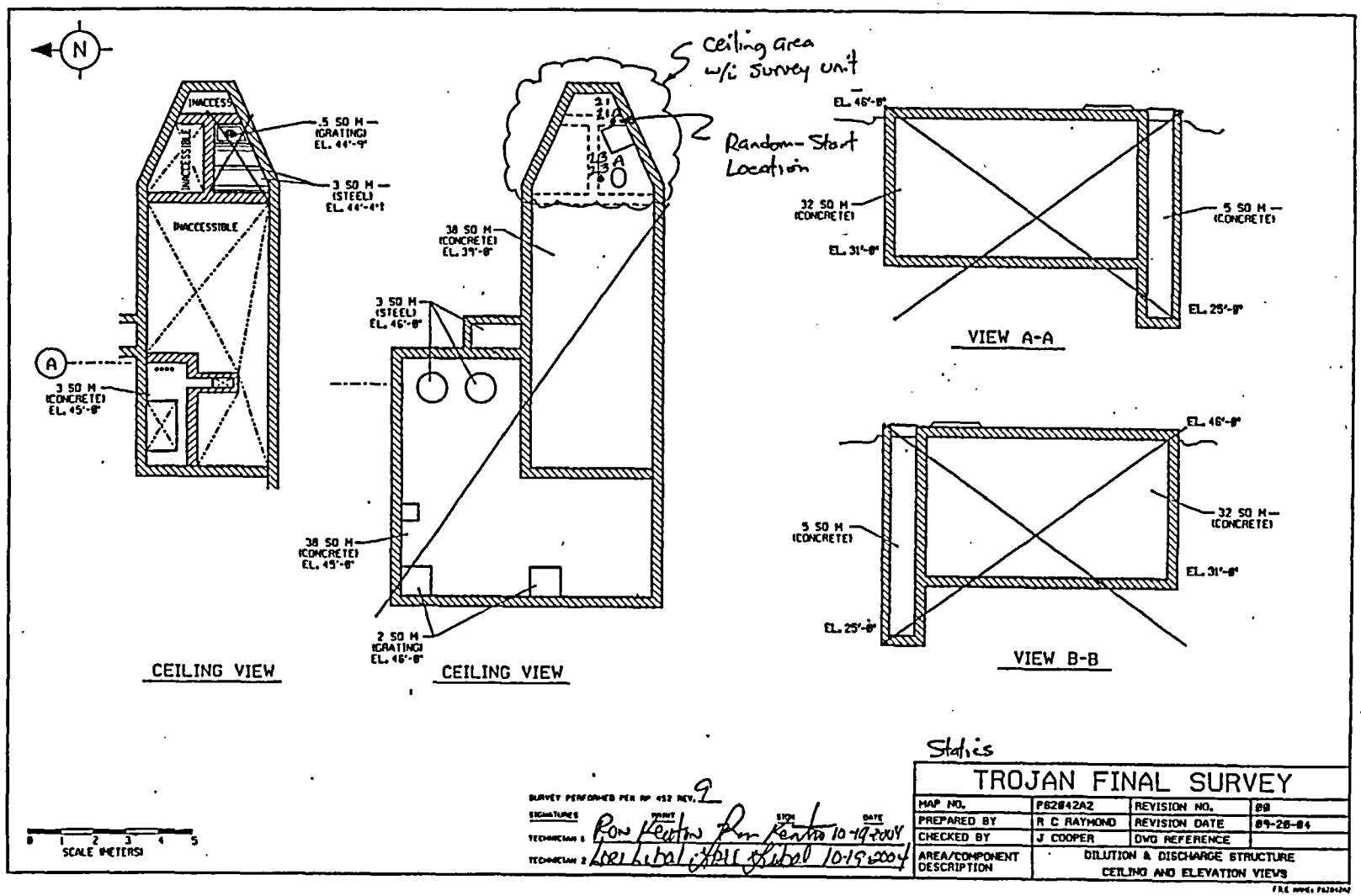


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Static Measurement Locations Map

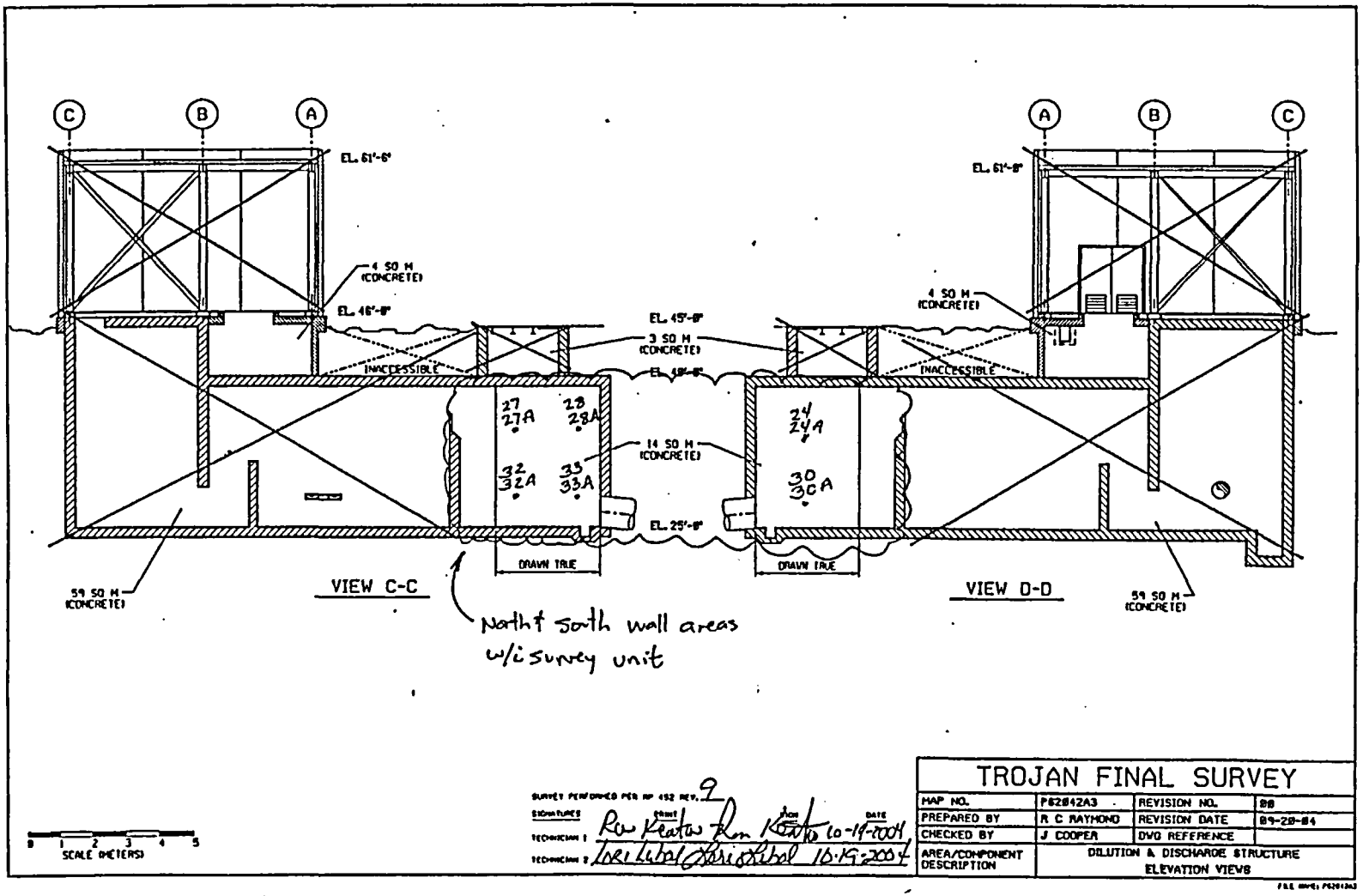


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Static Measurement Locations Map

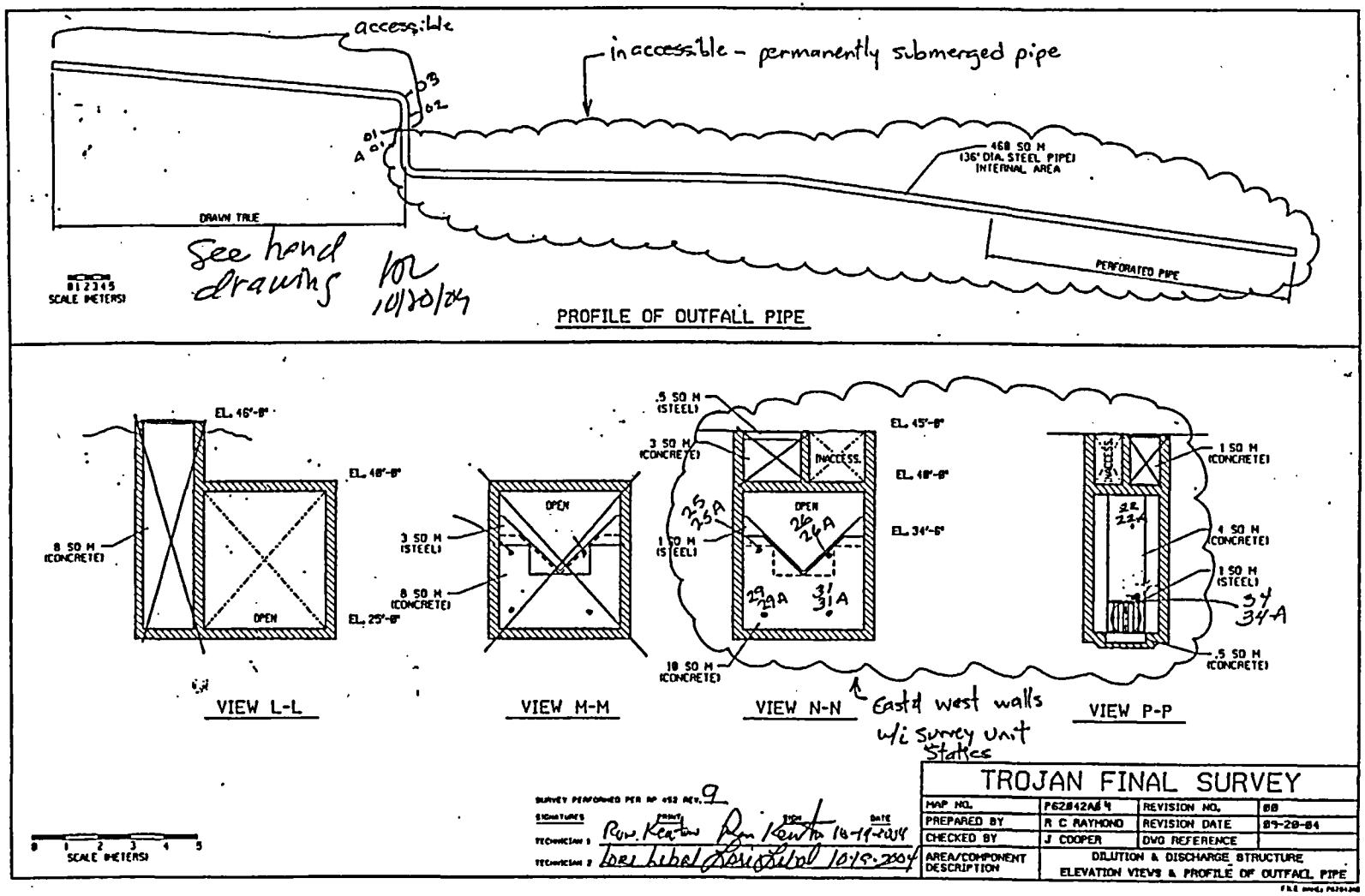


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Static Measurement Locations Map

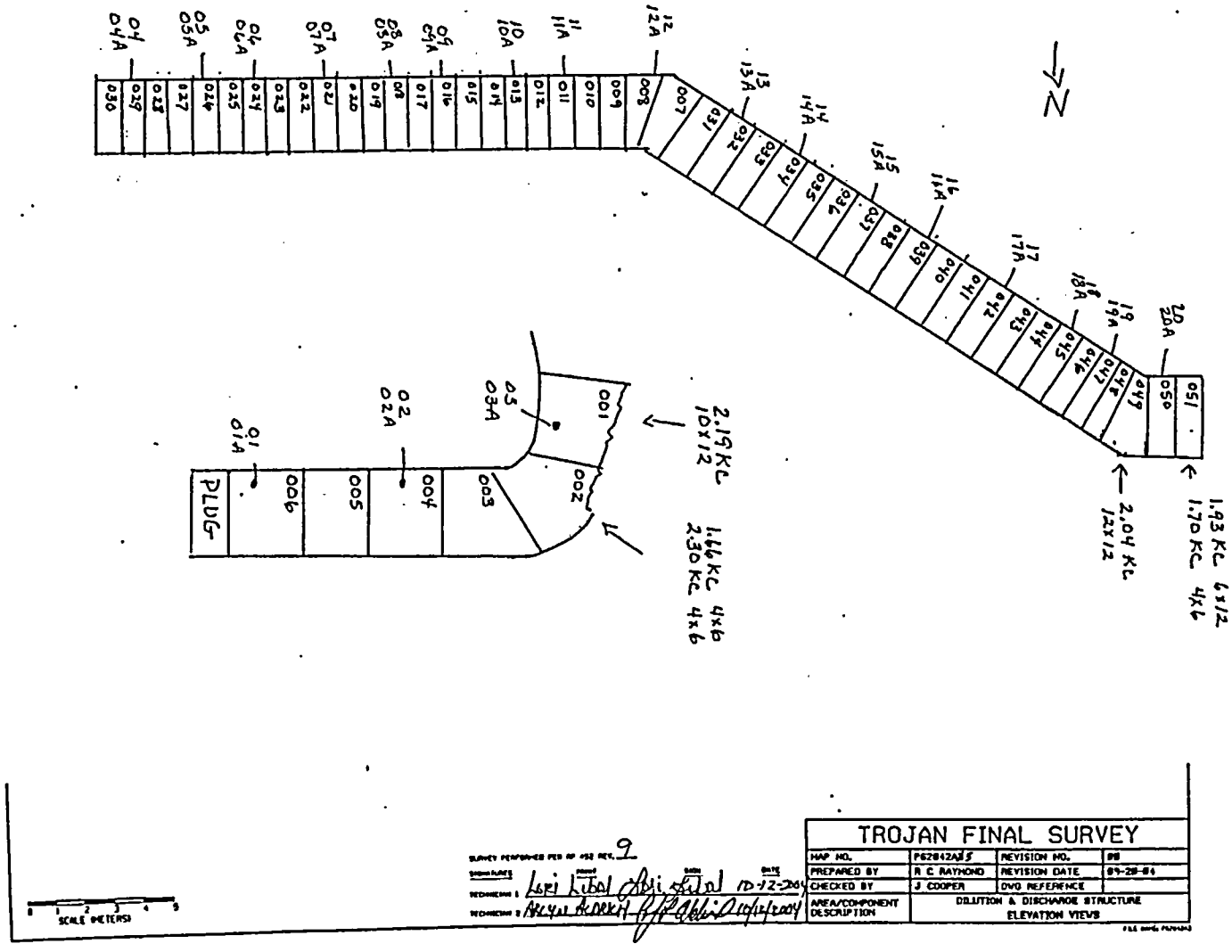


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Static Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Data Quality Values - Beta

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
1	30	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	5.228e+002
Maximum Value	:	2.106e+003
Range	:	1.583e+003
Median	:	7.184e+002
Std. Deviation	:	4.518e+002
Mean	:	9.153e+002
95% UCL	:	1.055e+003

Measurement Values

Location	Value	Location	Value
000001	1.031e+003	000018	6.733e+002
000002	7.259e+002	000019	5.755e+002
000003	2.020e+003	000020	6.093e+002
000004	1.610e+003	000021	1.177e+003
000005	6.921e+002	000022	7.109e+002
000006	8.049e+002	000023	7.786e+002
000007	6.770e+002	000024	7.034e+002
000008	5.717e+002	000025	1.313e+003
000009	1.960e+003	000026	1.083e+003
000010	5.228e+002	000027	6.206e+002
000011	6.733e+002	000028	5.341e+002
000012	9.366e+002	000029	5.943e+002
000013	6.319e+002	000030	5.567e+002
000014	7.259e+002		
000015	9.065e+002		
000016	9.328e+002		
000017	2.106e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Measurement Data Statistical Evaluation - Beta

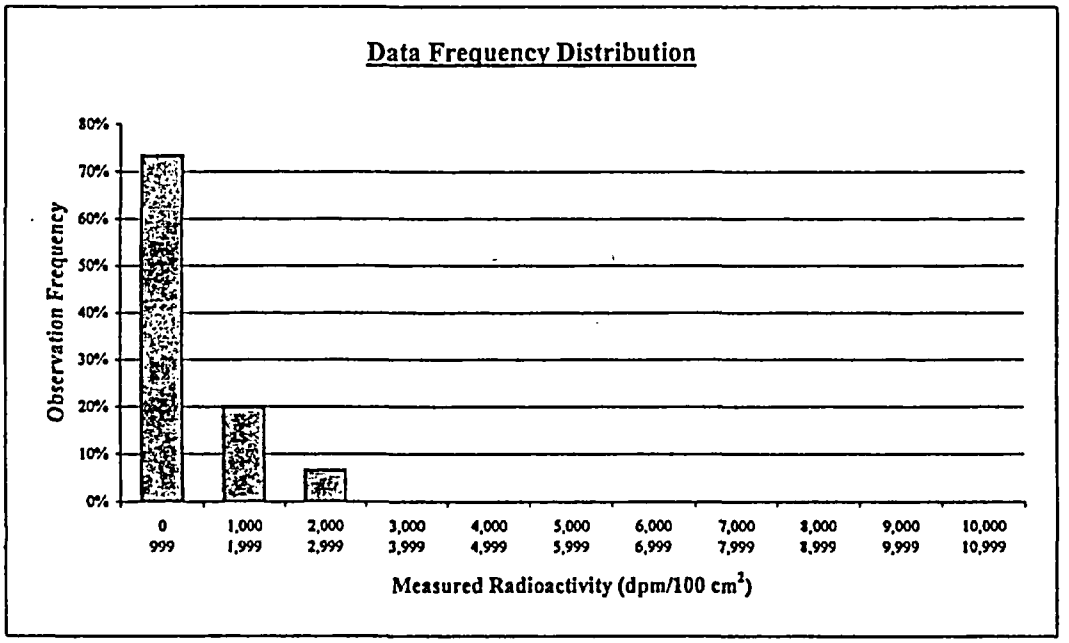
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	1,583	2,259	Pass
Median	0.436	0.500	Pass
Mean	915	7,500	Pass
Std Dev	452	1,500	Pass

All data less than DCGL; WRS statistical test not required.

Statistical Quantities

Range:	1,583
Median:	719
Mean:	915
Std Dev:	452
Minimum:	523
Maximum:	2,106
DCGL:	7,500



Plot Parameters

# of measurements:	30
# of intervals:	11
Interval increment:	1,000
Minimum:	0
Maximum:	10,999

Comment:
NONE

Interval	High End	Low End	Number of Observations	Observation Frequency
1	999	0	22	73%
2	1,999	1,000	6	20%
3	2,999	2,000	2	7%
4	3,999	3,000	0	0%
5	4,999	4,000	0	0%
6	5,999	5,000	0	0%
7	6,999	6,000	0	0%
8	7,999	7,000	0	0%
9	8,999	8,000	0	0%
10	9,999	9,000	0	0%
11	10,999	10,000	0	0%
		Total:	30	100%

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Background Reference Area B04208B - Beta

Statistical Quantities:

Range	: 2.454e+002
Median	: 5.751e+002
Mean	: 5.715e+002
Std. Deviation:	: 5.454e+001

# of Measurements: 30 Min Value: 4.984e+002 Max Value: 7.438e+002

Measurement Location	Value	Data Status Code
000001	7.438e+002	B
000002	5.598e+002	B
000003	5.368e+002	B
000004	5.138e+002	B
000005	4.984e+002	B
000006	5.828e+002	B
000007	5.789e+002	B
000008	6.365e+002	B
000009	5.866e+002	B
000010	6.173e+002	B
000011	6.096e+002	B
000012	5.253e+002	B
000013	5.291e+002	B
000014	6.480e+002	B
000015	5.713e+002	B
000016	5.866e+002	B
000017	5.789e+002	B
000018	5.176e+002	B
000019	5.176e+002	B
000020	5.789e+002	B
000021	5.138e+002	B
000022	5.406e+002	B
000023	5.329e+002	B
000024	5.713e+002	B
000025	5.214e+002	B
000026	5.023e+002	B
000027	5.828e+002	B
000028	6.556e+002	B
000029	6.096e+002	B
000030	5.981e+002	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Data Quality Values - Alpha

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
2	30	DPM/100 CM²	2.800e+001	-	1.234e+003

Statistical Quantities

Measurement Name:

Minimum Value	:	0.000e+000
Maximum Value	:	7.440e+001
Range	:	7.440e+001
Median	:	2.480e+001
Std. Deviation	:	1.606e+001
Mean	:	2.542e+001
95% UCL	:	3.040e+001

Measurement Values

Location	Value	Location	Value
000001	4.960e+001	000018	6.200e+000
000002	4.340e+001	000019	6.200e+000
000003	3.100e+001	000020	0.000e+000
000004	3.100e+001	000021	4.960e+001
000005	1.860e+001	000022	0.000e+000
000006	3.100e+001	000023	1.860e+001
000007	2.480e+001	000024	3.100e+001
000008	2.480e+001	000025	1.240e+001
000009	3.100e+001	000026	1.240e+001
000010	4.960e+001	000027	1.860e+001
000011	1.240e+001	000028	2.480e+001
000012	3.100e+001	000029	1.860e+001
000013	2.480e+001	000030	1.860e+001
000014	2.480e+001		
000015	1.860e+001		
000016	7.440e+001		
000017	2.480e+001		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Measurement Data Statistical Evaluation - Alpha

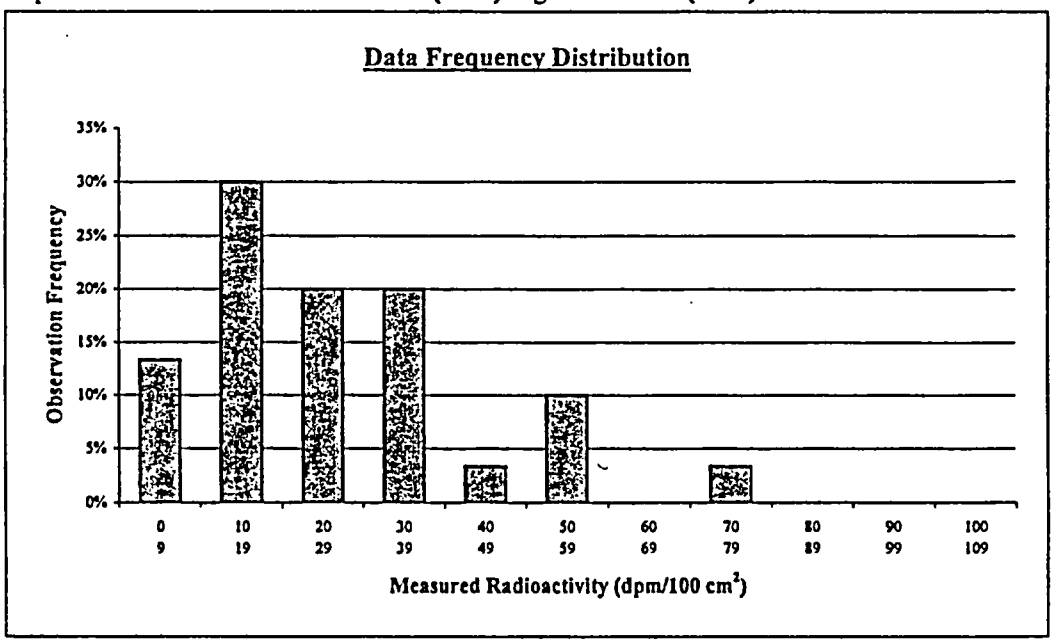
Statistical Comparisons

Test	Calculated Value	Acceptance Criteria	Acceptable?
Range	74	80	Pass
Median	0.031	0.500	Pass
Mean	26	28	Pass
Std Dev	16	28	Pass
WRS	1234	1026	Pass

Data set passes the WRS statistical test as Wr (1234) is greater than k (1026).

Statistical Quantities

Range:	74
Median:	25
Mean:	26
Std Dev:	16
Minimum:	0
Maximum:	74
DCGL:	28



Plot Parameters	
# of measurements:	30
# of intervals:	11
Interval increment:	10
Minimum:	0
Maximum:	109

Interval	High End	Low End	Number of Observations	Observation Frequency
1	9	0	4	13%
2	19	10	9	30%
3	29	20	6	20%
4	39	30	6	20%
5	49	40	1	3%
6	59	50	3	10%
7	69	60	0	0%
8	79	70	1	3%
9	89	80	0	0%
10	99	90	0	0%
11	109	100	0	0%
		Total:	30	100%

Comment:
Due to very small DCGL for alpha activity, the standard deviation test criterion changed to 1.0(DCGL) from default value of 0.2(DCGL), to allow the data set to enter the WRS statistical test, which is the final test to determine if the data set meets the site release criterion. Since the data set passes the WRS statistical test, all measurement values are valid and accepted.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Background Reference Area B04208B - Alpha

Statistical Quantities:

Range	: 3.720e+001
Median	: 1.860e+001
Mean	: 1.591e+001
Std. Deviation:	: 1.026e+001

# of Measurements: 30 Min Value: 0.000e+000 Max Value: 3.720e+001

Measurement Location	Value	Data Status Code
000001	6.200e+000	B
000002	0.000e+000	B
000003	0.000e+000	B
000004	1.240e+001	B
000005	6.200e+000	B
000006	1.860e+001	B
000007	3.100e+001	B
000008	6.200e+000	B
000009	0.000e+000	B
000010	1.860e+001	B
000011	2.480e+001	B
000012	1.240e+001	B
000013	1.860e+001	B
000014	3.720e+001	B
000015	6.200e+000	B
000016	1.860e+001	B
000017	1.240e+001	B
000018	1.860e+001	B
000019	6.200e+000	B
000020	2.480e+001	B
000021	6.200e+000	B
000022	1.240e+001	B
000023	1.860e+001	B
000024	1.860e+001	B
000025	1.240e+001	B
000026	1.860e+001	B
000027	2.480e+001	B
000028	3.100e+001	B
000029	1.860e+001	B
000030	3.720e+001	B

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Judgmental and Miscellaneous Measurement Data

Measurement Type: Surface Scanning Beta
Measurement Units: dpm/100cm^2
Minimum Value: 684
Scan Coverage (%): 100
Investigation Level: 7,500
Maximum Value: 4,830

Measurement Type: Removable Beta
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 30
Investigation Level: 750
Maximum Value: 16

Measurement Type: Removable Alpha
Measurement Units: dpm/100cm^2
Minimum Value: 0
Number of Measurements: 30
Investigation Level: MDC
Maximum Value: 0

Discussion of Anomalous Measurement Data

Investigation #1 Summary

Reason for Investigation: Eleven alpha static measurements exceeded the investigation level.

Elevated Measurement Comparison (EMC):

DCGL (Investigation Level):	28
Measurement Units:	dpm/100cm^2
Maximum Value:	74
Size of Area Exceeding DCGL (m^2):	0.14
Size of Survey Unit (m^2):	192
Survey Unit Area >DCGL (%):	<0.1
EMC Value:	140

Action Taken: Applied EMC data processing to elevated alpha static measurement results.

Basis for Action Taken: Sum of small, localized areas of elevated alpha radioactivity identified during static surveys is less than 1 m^2 and allowed the EMC DCGL of 5.0 x DCGL to be applied.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Unity Rule Evaluation

	Survey Unit Values		Value / DCGL Ratios		Ratio	Bkg Ref Area Values*	
Location #	Beta	Alpha	Beta	Alpha	Sum (Y)	Beta	Alpha
P01	1,031	50	0.137	1.786	1.923	744	6
P02	726	43	0.097	1.536	1.633	560	0
P03	2,020	31	0.269	1.107	1.376	537	0
P04	1,610	31	0.215	1.107	1.322	514	12
P05	692	19	0.092	0.679	0.771	498	6
P06	805	31	0.107	1.107	1.214	583	19
P07	677	25	0.090	0.893	0.983	579	31
P08	572	25	0.076	0.893	0.969	637	6
P09	1,960	31	0.261	1.107	1.368	587	0
P10	523	50	0.070	1.786	1.855	617	19
P11	673	12	0.090	0.429	0.518	610	25
P12	937	31	0.125	1.107	1.232	525	12
P13	632	25	0.084	0.893	0.977	529	19
P14	726	25	0.097	0.893	0.990	648	37
P15	907	19	0.121	0.679	0.800	571	6
P16	933	74	0.124	2.643	2.767	587	19
P17	2,106	25	0.281	0.893	1.174	579	12
P18	673	6	0.090	0.214	0.304	518	19
P19	576	6	0.077	0.214	0.291	518	6
P20	609	0	0.081	0.000	0.081	579	25
P21	1,177	50	0.157	1.786	1.943	514	6
P22	711	0	0.095	0.000	0.095	541	12
P23	779	19	0.104	0.679	0.782	533	19
P24	703	31	0.094	1.107	1.201	571	19
P25	1,313	12	0.175	0.429	0.604	521	12
P26	1,083	12	0.144	0.429	0.573	502	19
P27	621	19	0.083	0.679	0.761	583	25
P28	534	25	0.071	0.893	0.964	656	31
P29	594	19	0.079	0.679	0.758	610	19
P30	557	19	0.074	0.679	0.753	598	37
				maximum	2.767		
				mean	1.033		

*Background Reference Area Survey Unit is B04208B

Beta DCGL = 7,500
Alpha DCGL = 28
Unity "DCGL" = 1

Since Y mean > DCGL (1.033 > 1.0), go to means test.

<u>Means test :</u>
DM = (YMax - BMin) = (2.767 - 0.072) = 2.695 > Unity DCGL
DA = (YMean - BMean) = (1.033 - 0.645) = 0.688 < Unity DCGL
Passes means test
Since DM >DCGL & DA < DCGL, go to WRS test for unity evaluation.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Unity Rule Evaluation (Continued)

Value / DCGL Ratios Beta	Alpha	Ratio Sum (B)	Sum + 1 Z
0.099	0.214	0.313	1.313
0.075	0.000	0.075	1.075
0.072	0.000	0.072	1.072
0.069	0.429	0.497	1.497
0.066	0.214	0.281	1.281
0.078	0.679	0.756	1.756
0.077	1.107	1.184	2.184
0.085	0.214	0.299	1.299
0.078	0.000	0.078	1.078
0.082	0.679	0.761	1.761
0.081	0.893	0.974	1.974
0.070	0.429	0.499	1.499
0.071	0.679	0.749	1.749
0.086	1.321	1.408	2.408
0.076	0.214	0.290	1.290
0.078	0.679	0.757	1.757
0.077	0.429	0.506	1.506
0.069	0.679	0.748	1.748
0.069	0.214	0.283	1.283
0.077	0.893	0.970	1.970
0.069	0.214	0.283	1.283
0.072	0.429	0.501	1.501
0.071	0.679	0.750	1.750
0.076	0.679	0.755	1.755
0.070	0.429	0.498	1.498
0.067	0.679	0.746	1.746
0.078	0.893	0.971	1.971
0.087	1.107	1.195	2.195
0.081	0.679	0.760	1.760
0.080	1.321	1.401	2.401
	minimum	0.072	
	mean	0.645	

Y, Z POOL	RANK#	Z Rank #
0.081	1	19
0.095	2	20
0.291	3	21
0.304	4	26
0.518	5	27
0.573	6	28
0.604	7	29
0.753	8	30
0.758	9	31
0.761	10	35
0.771	11	36
0.782	12	37
0.800	13	38
0.964	14	39
0.969	15	41
0.977	16	42
0.983	17	43
0.990	18	44
1.072	19	45
1.075	20	46
1.078	21	47
1.174	22	48
1.201	23	49
1.214	24	53
1.232	25	54
1.281	26	55
1.283	27	56
1.283	28	57
1.290	29	58
1.299	30	59
1.313	31	1213
1.322	32	Z Rank Sum = Wr
1.368	33	
1.376	34	
1.497	35	
1.498	36	
1.499	37	
1.501	38	
1.506	39	
1.633	40	
1.746	41	
1.748	42	
1.749	43	
1.750	44	
1.755	45	
1.756	46	
1.757	47	
1.760	48	

WRS Test:

k = MARSSIM equation I.1

$k = m(n + m + 1)/2 + Z(P)^{1/2}$

where: m = 30
n = 30
P = nm(n+m+1)/12 = 4,575
z = 1.645, for 0.05 Type I error

$k = 30(30+30+1)/2 + 1.645(4,575)^{1/2}$
k = 915 + 1.645(67.6) = 1026
k = 1026

Conclusion:

Since Wr > k, (1213 > 1026), survey unit passes the unity rule, and, therefore, meets the release criteria.

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Unity Rule Evaluation (Continued)

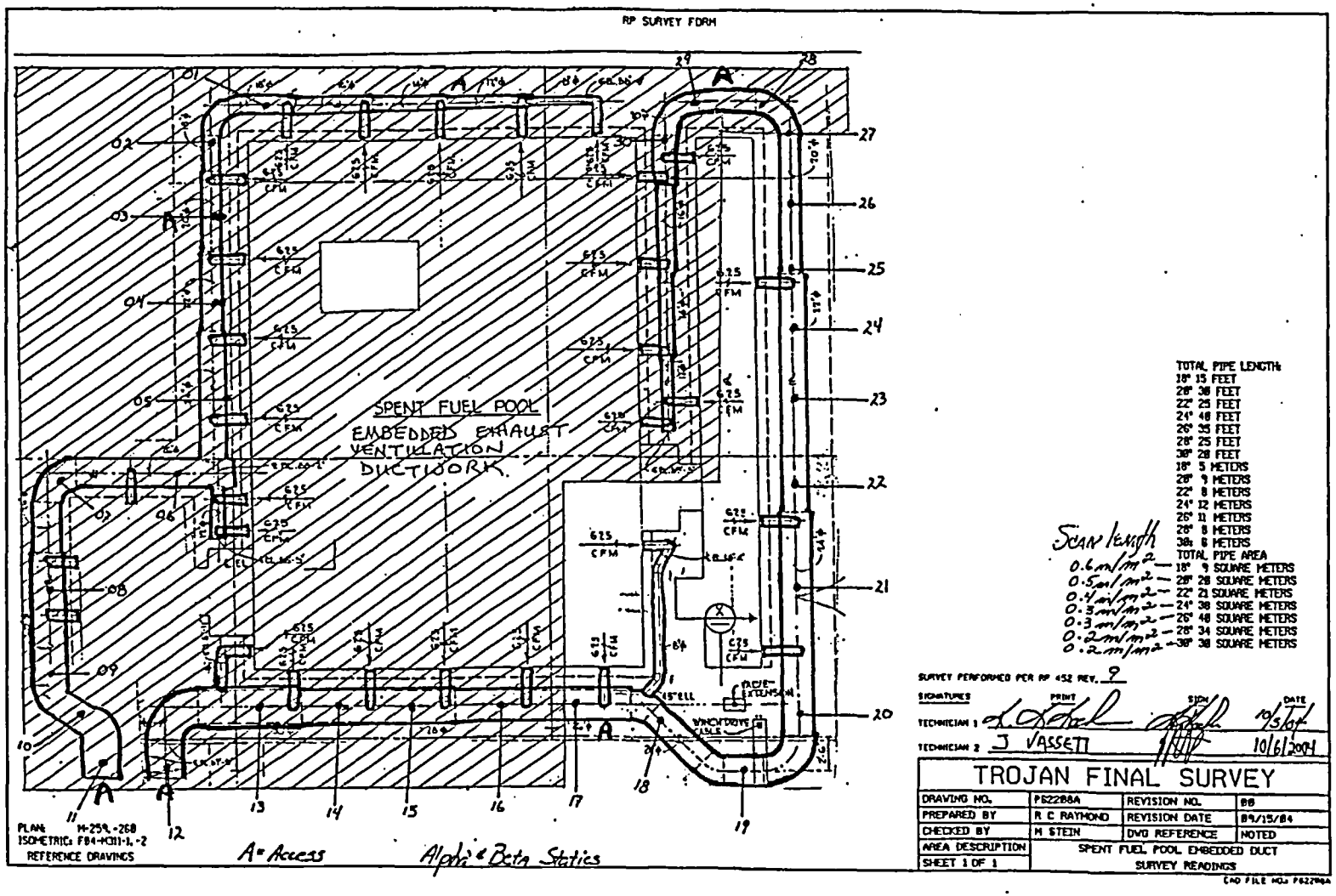
1.761	49
1.855	50
1.923	51
1.943	52
1.970	53
1.971	54
1.974	55
2.184	56
2.195	57
2.401	58
2.408	59
2.767	60

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

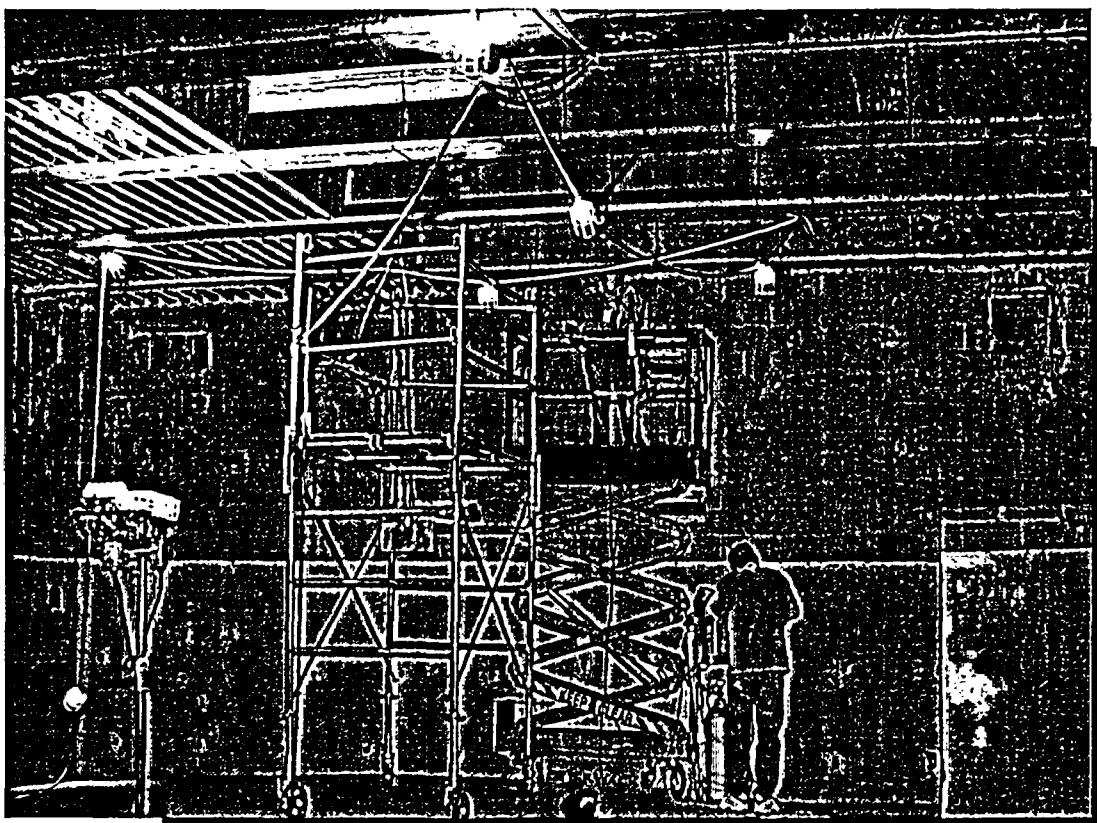
Static Measurement Locations Map



Trojan Nuclear Plant

Supplement to Final Survey Report
Spent Fuel Pool Impacted Areas

Volume 2 of 2



SUPPLEMENT TO APPENDIX B

SURVEY UNIT SUMMARY REPORTS – SPENT FUEL POOL IMPACTED AREAS

Survey Unit ID Code	Page(s)
S04093F	B-2 through B-7
S04093G	B-8 through B-19
S04093H	B-20 through B-26
S04093J	B-27 through B-32
S04093Q	B-33 through B-36
S04093R	B-37 through B-41
S04093T	B-42 through B-48
S04093V	B-49 through B-51
S04093X	B-52 through B-54
S04061G	B-55 through B-58
S05045M	B-59 through B-62
S05077N	B-63 through B-65
S05077P	B-66 through B-68
P62042A	B-69 through B-75
P62208A	B-76 through B-78

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	296	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.397e+003
Maximum Value	:	1.011e+004
Range	:	8.713e+003
Median	:	2.390e+003
Std. Deviation	:	1.218e+003
Mean	:	2.749e+003
95% UCL	:	2.866e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	2.629e+003	000018	2.074e+003	000035	2.430e+003
000002	2.121e+003	000019	2.224e+003	000036	6.591e+003
000003	2.440e+003	000020	3.078e+003	000037	2.437e+003
000004	6.104e+003	000021	2.403e+003	000038	2.993e+003
000005	2.474e+003	000022	2.268e+003	000039	2.497e+003
000006	2.459e+003	000023	2.089e+003	000040	3.610e+003
000007	2.449e+003	000024	1.903e+003	000041	2.434e+003
000008	1.808e+003	000025	2.066e+003	000042	4.366e+003
000009	1.854e+003	000026	3.819e+003	000043	1.585e+003
000010	2.069e+003	000027	2.203e+003	000044	1.823e+003
000011	1.852e+003	000028	3.052e+003	000045	1.840e+003
000012	2.175e+003	000029	5.674e+003	000046	1.805e+003
000013	2.154e+003	000030	2.286e+003	000047	1.862e+003
000014	1.897e+003	000031	2.174e+003	000048	2.214e+003
000015	2.049e+003	000032	5.467e+003	000049	2.940e+003
000016	2.175e+003	000033	2.454e+003	000050	2.866e+003
000017	2.287e+003	000034	4.889e+003	000051	2.774e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Scan Measurement Data

Location	Value	Location	Value	Location	Value
000052	2.734e+003	000099	1.717e+003	000146	3.616e+003
000053	2.527e+003	000100	1.397e+003	000152	7.358e+003
000054	2.601e+003	000101	2.128e+003	000155	2.376e+003
000055	2.657e+003	000102	1.934e+003	000156	2.258e+003
000056	2.784e+003	000103	2.028e+003	000157	2.515e+003
000057	3.059e+003	000104	5.659e+003	000158	2.080e+003
000058	2.634e+003	000105	1.925e+003	000159	2.267e+003
000059	2.674e+003	000106	2.088e+003	000160	2.749e+003
000060	8.041e+003	000107	8.124e+003	000161	2.114e+003
000061	1.011e+004	000108	2.326e+003	000162	2.028e+003
000062	7.619e+003	000109	6.863e+003	000163	2.355e+003
000063	3.180e+003	000110	2.134e+003	000164	2.621e+003
000064	2.813e+003	000111	2.846e+003	000165	3.404e+003
000065	2.607e+003	000112	2.083e+003	000166	2.184e+003
000066	2.556e+003	000113	2.132e+003	000167	2.294e+003
000067	2.825e+003	000114	2.197e+003	000168	2.446e+003
000068	2.574e+003	000115	1.986e+003	000169	2.430e+003
000069	4.171e+003	000116	6.710e+003	000170	2.252e+003
000070	2.607e+003	000117	2.542e+003	000171	2.307e+003
000071	5.006e+003	000118	6.125e+003	000172	2.332e+003
000072	6.563e+003	000119	2.232e+003	000173	2.386e+003
000073	2.817e+003	000120	2.435e+003	000174	2.423e+003
000074	2.955e+003	000121	6.982e+003	000175	2.257e+003
000075	2.786e+003	000122	6.465e+003	000176	2.264e+003
000076	3.149e+003	000123	2.296e+003	000177	2.261e+003
000077	2.693e+003	000124	3.974e+003	000178	4.358e+003
000078	2.615e+003	000125	1.994e+003	000179	2.194e+003
000079	2.591e+003	000126	2.111e+003	000180	2.385e+003
000080	2.588e+003	000127	2.026e+003	000181	2.733e+003
000081	2.950e+003	000128	2.008e+003	000182	2.284e+003
000082	2.589e+003	000129	1.874e+003	000183	2.412e+003
000083	4.268e+003	000130	2.311e+003	000184	2.320e+003
000084	2.849e+003	000131	2.375e+003	000185	2.634e+003
000085	3.043e+003	000132	2.166e+003	000186	2.278e+003
000086	3.074e+003	000133	2.407e+003	000187	2.009e+003
000087	2.725e+003	000134	1.988e+003	000188	2.287e+003
000088	2.787e+003	000135	2.043e+003	000189	2.740e+003
000089	2.836e+003	000136	2.184e+003	000190	2.572e+003
000090	2.585e+003	000137	2.430e+003	000191	2.452e+003
000091	3.008e+003	000138	2.331e+003	000192	2.360e+003
000092	2.852e+003	000139	6.560e+003	000193	2.384e+003
000093	2.839e+003	000140	2.148e+003	000194	3.044e+003
000094	2.913e+003	000141	2.435e+003	000195	2.730e+003
000095	2.763e+003	000142	2.155e+003	000196	2.648e+003
000096	2.592e+003	000143	3.229e+003	000197	2.640e+003
000097	2.356e+003	000144	2.815e+003	000198	2.438e+003
000098	2.674e+003	000145	2.735e+003	000199	2.198e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F **Classification:** Class 1
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half **Size (m^2):** 283

Scan Measurement Data

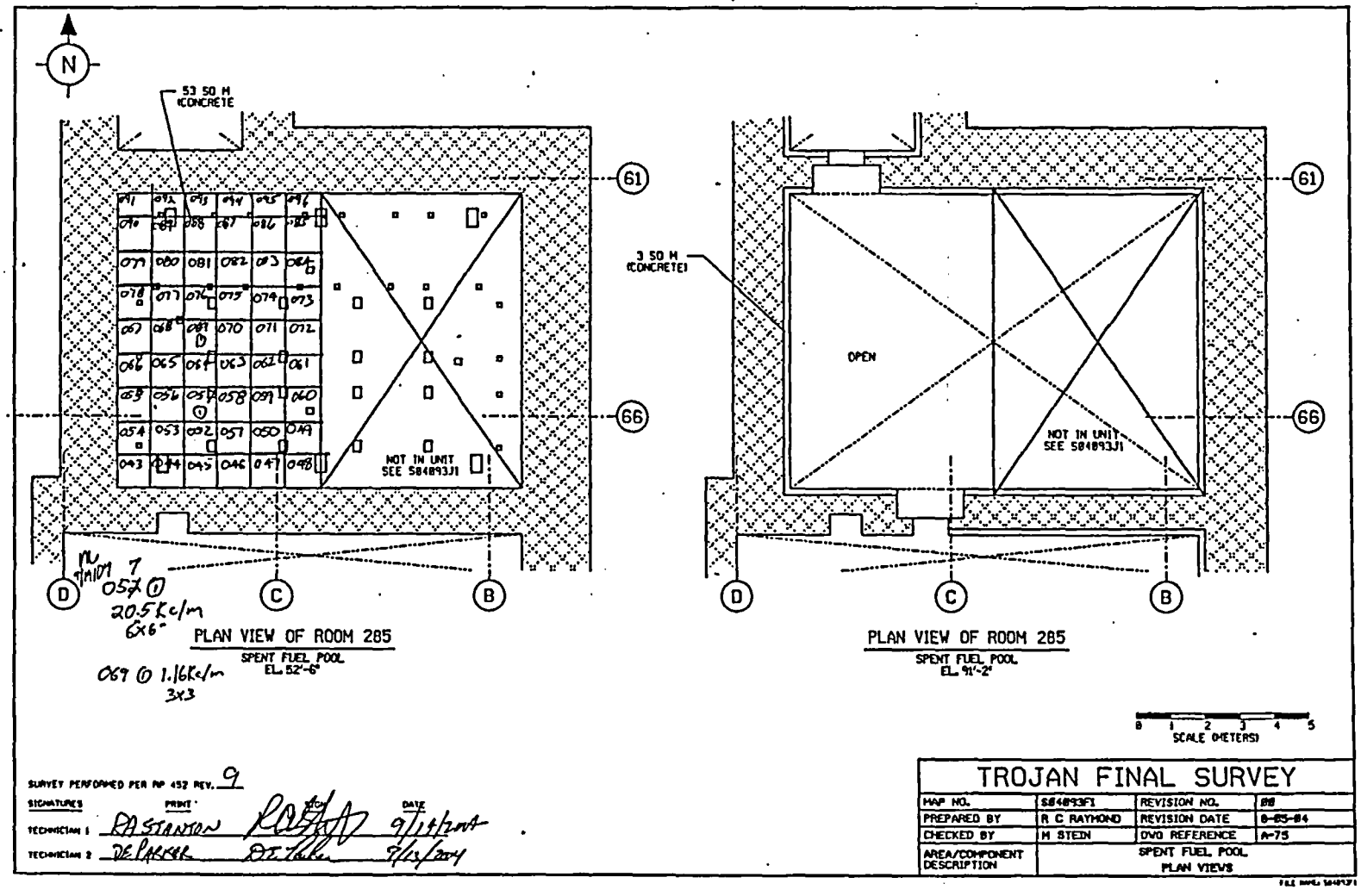
Location	Value	Location	Value	Location	Value
000200	2.796e+003	000252	4.790e+003	000299	3.012e+003
000201	5.394e+003	000253	1.872e+003	000300	3.028e+003
000202	2.990e+003	000254	2.181e+003	000301	2.390e+003
000203	3.173e+003	000255	2.355e+003	000302	4.446e+003
000209	1.848e+003	000256	2.624e+003	000303	2.789e+003
000210	1.685e+003	000257	2.483e+003	000304	2.632e+003
000211	2.005e+003	000258	2.417e+003	000305	2.394e+003
000212	2.069e+003	000259	2.217e+003	000306	2.596e+003
000213	2.280e+003	000260	2.203e+003	000307	2.560e+003
000214	2.378e+003	000261	2.031e+003	000317	6.101e+003
000215	2.235e+003	000262	2.592e+003		
000216	2.120e+003	000263	2.434e+003		
000217	2.234e+003	000264	2.192e+003		
000218	2.341e+003	000265	2.232e+003		
000219	2.117e+003	000266	2.335e+003		
000220	2.177e+003	000267	2.364e+003		
000221	2.000e+003	000268	2.786e+003		
000222	1.980e+003	000269	2.447e+003		
000223	2.089e+003	000270	2.349e+003		
000224	2.169e+003	000271	2.118e+003		
000225	2.171e+003	000272	2.278e+003		
000226	2.120e+003	000273	2.002e+003		
000227	2.002e+003	000274	3.514e+003		
000228	2.177e+003	000275	5.105e+003		
000229	1.771e+003	000276	1.926e+003		
000230	1.937e+003	000277	2.317e+003		
000231	2.184e+003	000278	2.527e+003		
000232	1.800e+003	000279	1.837e+003		
000233	1.725e+003	000280	1.969e+003		
000234	2.394e+003	000281	2.374e+003		
000235	2.206e+003	000282	2.269e+003		
000236	1.988e+003	000283	2.503e+003		
000237	2.109e+003	000284	2.552e+003		
000238	2.051e+003	000285	1.983e+003		
000239	2.214e+003	000286	3.554e+003		
000240	1.952e+003	000287	3.493e+003		
000241	2.321e+003	000288	2.563e+003		
000242	3.998e+003	000289	2.452e+003		
000243	2.272e+003	000290	2.040e+003		
000244	2.444e+003	000291	2.168e+003		
000245	2.048e+003	000292	2.140e+003		
000246	2.151e+003	000293	2.020e+003		
000247	2.237e+003	000294	2.627e+003		
000248	2.220e+003	000295	2.172e+003		
000249	2.271e+003	000296	2.538e+003		
000250	2.447e+003	000297	2.049e+003		
000251	2.401e+003	000298	2.390e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half

Classification: Class 1
Size (m^2): 283

Scan Measurement Locations Map

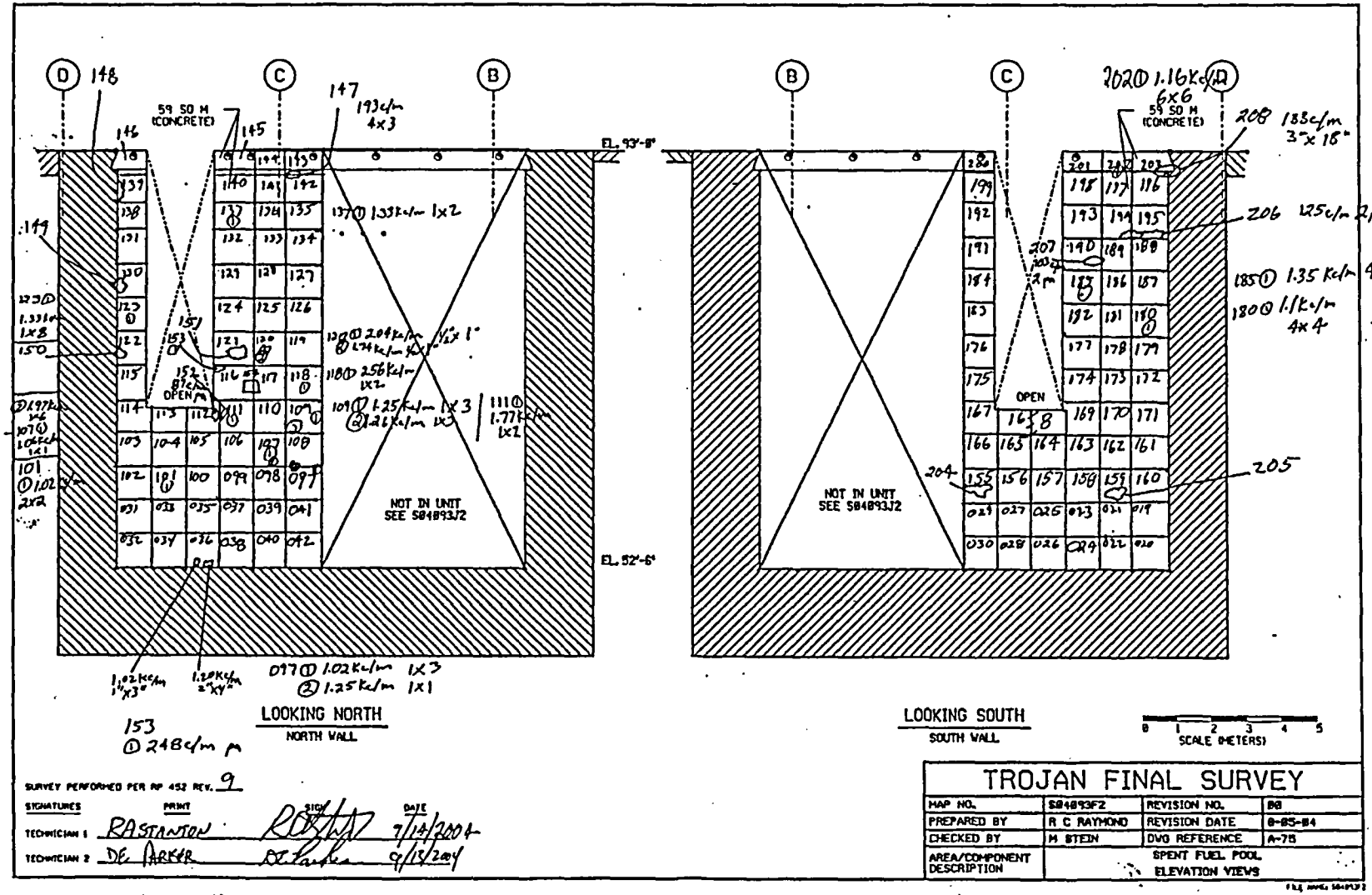


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half

Classification: Class 1
Size (m^2): 283

Scan Measurement Locations Map

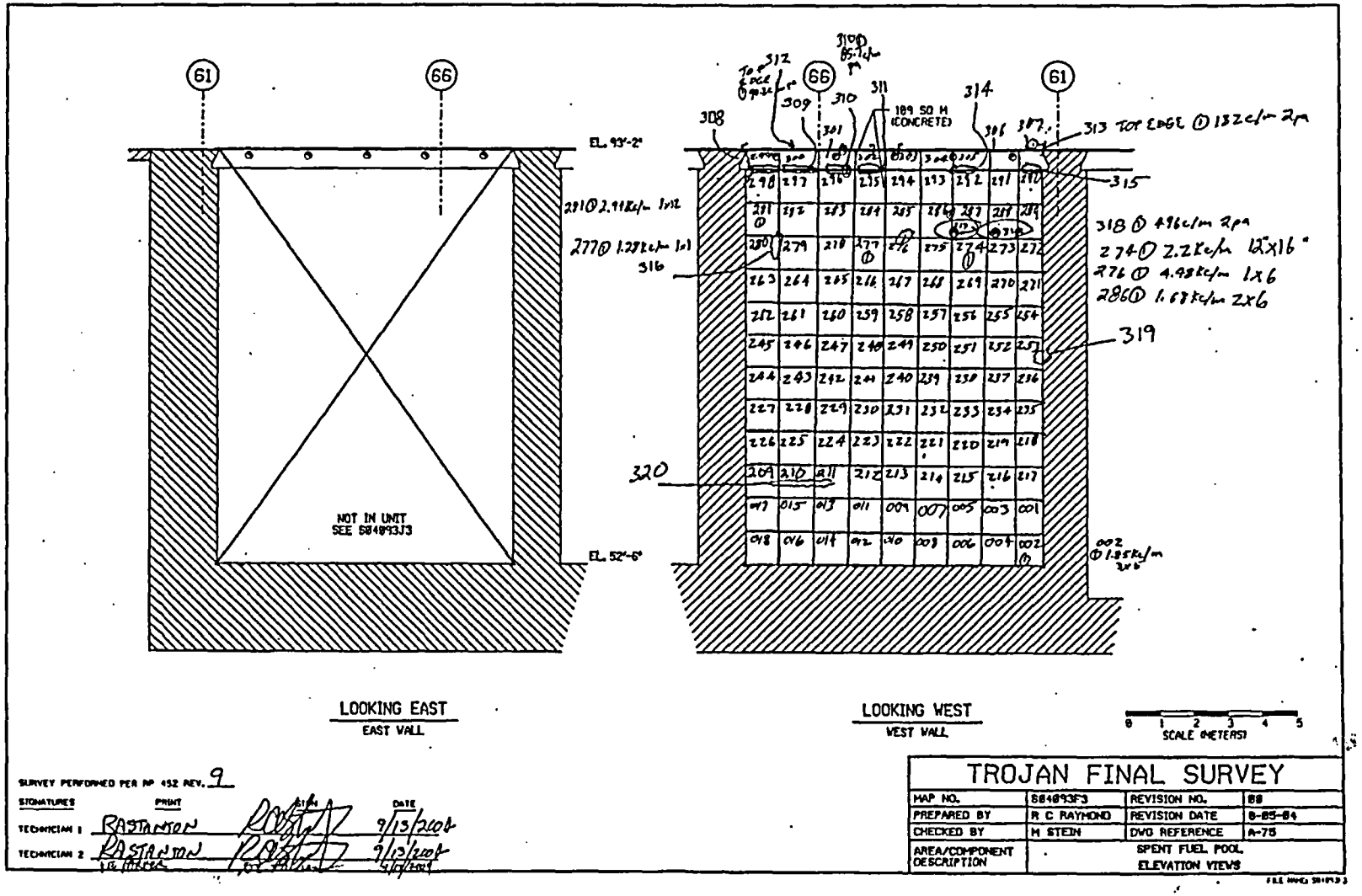


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093F
Survey Unit Name: FB 93' Elevation– Spent Fuel Pool – West Half

Classification: Class 1
Size (m^2): 283

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	496	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value :	1.658e+003
Maximum Value :	7.859e+003
Range :	6.201e+003
Median :	2.512e+003
Std. Deviation :	1.602e+003
Mean :	3.381e+003
95% UCL :	3.500e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	4.547e+003	000018	2.459e+003	000035	2.274e+003
000002	4.685e+003	000019	2.647e+003	000036	2.417e+003
000003	2.840e+003	000020	2.588e+003	000037	2.349e+003
000004	2.603e+003	000021	2.725e+003	000038	2.252e+003
000005	5.567e+003	000022	2.882e+003	000039	2.544e+003
000006	2.542e+003	000023	5.527e+003	000040	2.374e+003
000007	2.612e+003	000024	3.971e+003	000041	2.314e+003
000008	3.367e+003	000025	2.675e+003	000042	2.306e+003
000009	3.016e+003	000026	2.497e+003	000043	2.395e+003
000010	3.512e+003	000027	2.503e+003	000044	2.173e+003
000011	3.133e+003	000028	2.647e+003	000045	2.051e+003
000012	3.133e+003	000029	2.361e+003	000046	4.068e+003
000013	2.489e+003	000030	3.660e+003	000047	2.427e+003
000014	2.414e+003	000031	2.988e+003	000048	2.312e+003
000015	2.246e+003	000032	2.450e+003	000049	2.415e+003
000016	2.424e+003	000033	2.619e+003	000050	2.571e+003
000017	2.634e+003	000034	2.513e+003	000051	2.400e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Data

Location	Value	Location	Value	Location	Value
000052	2.376e+003	000099	1.889e+003	000146	5.990e+003
000053	2.408e+003	000100	1.945e+003	000147	2.737e+003
000054	2.433e+003	000101	2.358e+003	000148	2.742e+003
000055	2.349e+003	000102	2.331e+003	000149	2.940e+003
000056	2.319e+003	000103	1.658e+003	000150	2.163e+003
000057	3.333e+003	000104	1.919e+003	000151	5.304e+003
000058	2.761e+003	000105	2.389e+003	000152	4.673e+003
000059	2.647e+003	000106	2.185e+003	000153	2.696e+003
000060	2.397e+003	000107	2.353e+003	000154	2.795e+003
000061	2.367e+003	000108	2.415e+003	000155	4.575e+003
000062	2.098e+003	000109	2.863e+003	000156	2.955e+003
000063	2.609e+003	000110	2.379e+003	000157	4.262e+003
000064	2.457e+003	000111	2.447e+003	000158	3.545e+003
000065	2.299e+003	000112	5.930e+003	000159	6.306e+003
000066	2.403e+003	000113	5.774e+003	000160	6.126e+003
000067	2.349e+003	000114	2.328e+003	000161	2.152e+003
000068	2.465e+003	000115	6.228e+003	000162	4.067e+003
000069	2.318e+003	000116	2.483e+003	000163	3.331e+003
000070	2.476e+003	000117	2.341e+003	000164	3.115e+003
000071	2.113e+003	000118	2.840e+003	000165	2.510e+003
000072	2.565e+003	000119	2.783e+003	000166	6.764e+003
000073	2.278e+003	000120	2.866e+003	000167	3.941e+003
000074	4.354e+003	000121	3.150e+003	000168	5.992e+003
000075	2.468e+003	000122	4.889e+003	000169	2.595e+003
000076	3.149e+003	000123	2.834e+003	000170	3.692e+003
000077	3.168e+003	000124	2.743e+003	000171	1.929e+003
000078	2.465e+003	000125	2.290e+003	000172	2.244e+003
000079	2.237e+003	000126	2.398e+003	000173	2.014e+003
000080	2.488e+003	000127	2.264e+003	000174	1.945e+003
000081	2.250e+003	000128	2.613e+003	000184	6.600e+003
000082	2.411e+003	000129	2.161e+003	000186	5.736e+003
000083	2.330e+003	000130	2.154e+003	000187	5.345e+003
000084	2.581e+003	000131	2.480e+003	000188	6.928e+003
000085	2.671e+003	000132	2.262e+003	000189	6.641e+003
000086	4.293e+003	000133	2.105e+003	000191	5.962e+003
000087	2.340e+003	000134	2.515e+003	000195	5.921e+003
000088	5.279e+003	000135	2.244e+003	000196	6.785e+003
000089	4.747e+003	000136	2.321e+003	000198	5.757e+003
000090	2.332e+003	000137	2.420e+003	000199	6.106e+003
000091	3.335e+003	000138	3.227e+003	000200	5.900e+003
000092	2.518e+003	000139	2.833e+003	000201	6.558e+003
000093	2.361e+003	000140	4.271e+003	000203	5.674e+003
000094	5.887e+003	000141	3.103e+003	000207	6.024e+003
000095	5.443e+003	000142	3.362e+003	000209	5.140e+003
000096	2.511e+003	000143	5.314e+003	000210	6.867e+003
000097	3.220e+003	000144	2.009e+003	000211	5.736e+003
000098	2.302e+003	000145	4.513e+003	000214	6.600e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Data

Location	Value	Location	Value	Location	Value
000217	6.579e+003	000285	2.301e+003	000332	2.501e+003
000218	5.715e+003	000286	2.219e+003	000333	2.344e+003
000219	6.435e+003	000287	2.280e+003	000334	2.518e+003
000222	6.867e+003	000288	2.201e+003	000335	2.643e+003
000223	6.497e+003	000289	1.892e+003	000336	2.327e+003
000224	4.708e+003	000290	2.449e+003	000337	2.287e+003
000225	5.387e+003	000291	2.460e+003	000338	2.397e+003
000226	6.764e+003	000292	2.315e+003	000339	2.470e+003
000227	5.900e+003	000293	2.401e+003	000340	2.194e+003
000228	5.592e+003	000294	2.161e+003	000341	2.331e+003
000229	5.592e+003	000295	3.502e+003	000342	1.863e+003
000230	5.736e+003	000296	2.464e+003	000343	2.718e+003
000231	6.743e+003	000297	2.632e+003	000344	2.234e+003
000234	5.900e+003	000298	2.315e+003	000345	2.197e+003
000235	6.600e+003	000299	2.524e+003	000346	1.894e+003
000236	5.921e+003	000300	1.949e+003	000347	2.524e+003
000237	5.551e+003	000301	2.009e+003	000348	2.369e+003
000238	4.996e+003	000302	1.993e+003	000349	6.581e+003
000239	6.558e+003	000303	2.381e+003	000350	2.286e+003
000242	5.757e+003	000304	2.703e+003	000351	2.297e+003
000243	6.209e+003	000305	2.109e+003	000352	2.570e+003
000244	4.914e+003	000306	2.352e+003	000353	2.243e+003
000245	7.011e+003	000307	2.352e+003	000354	3.050e+003
000246	7.216e+003	000308	2.495e+003	000355	2.351e+003
000247	6.312e+003	000309	2.493e+003	000356	2.513e+003
000262	2.787e+003	000310	2.423e+003	000357	2.229e+003
000263	2.648e+003	000311	2.237e+003	000358	2.231e+003
000264	2.710e+003	000312	2.215e+003	000359	2.367e+003
000265	2.440e+003	000313	2.131e+003	000360	2.414e+003
000267	2.834e+003	000314	2.420e+003	000361	2.209e+003
000268	2.830e+003	000315	2.444e+003	000362	2.189e+003
000269	4.231e+003	000316	2.320e+003	000363	2.647e+003
000270	4.836e+003	000317	2.224e+003	000364	2.211e+003
000271	2.758e+003	000318	2.188e+003	000365	2.647e+003
000272	2.691e+003	000319	2.077e+003	000366	2.312e+003
000273	2.377e+003	000320	1.902e+003	000367	4.341e+003
000274	2.799e+003	000321	2.303e+003	000368	2.004e+003
000275	2.573e+003	000322	2.446e+003	000369	2.177e+003
000276	3.072e+003	000323	2.440e+003	000370	2.329e+003
000277	1.965e+003	000324	2.612e+003	000371	2.324e+003
000278	2.195e+003	000325	2.455e+003	000372	2.572e+003
000279	2.030e+003	000326	2.498e+003	000373	2.358e+003
000280	7.012e+003	000327	5.951e+003	000374	2.401e+003
000281	1.945e+003	000328	1.960e+003	000375	2.352e+003
000282	2.020e+003	000329	1.894e+003	000376	2.544e+003
000283	2.507e+003	000330	2.406e+003	000377	2.703e+003
000284	2.354e+003	000331	2.053e+003	000378	2.174e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Data

Location	Value	Location	Value	Location	Value
000379	1.960e+003	000426	2.624e+003	000473	2.261e+003
000380	2.259e+003	000427	5.802e+003	000474	2.297e+003
000381	2.148e+003	000428	2.576e+003	000475	2.483e+003
000382	2.221e+003	000429	2.200e+003	000476	4.899e+003
000383	1.883e+003	000430	2.420e+003	000477	2.532e+003
000384	2.287e+003	000431	6.475e+003	000478	2.696e+003
000385	2.045e+003	000432	2.314e+003	000479	3.617e+003
000386	2.518e+003	000433	2.573e+003	000480	3.184e+003
000387	2.964e+003	000434	4.432e+003	000481	2.732e+003
000388	2.175e+003	000435	2.024e+003	000482	2.669e+003
000389	2.284e+003	000436	2.641e+003	000483	5.859e+003
000390	2.218e+003	000437	2.274e+003	000484	2.370e+003
000391	7.248e+003	000438	2.331e+003	000485	2.460e+003
000392	2.206e+003	000439	5.736e+003	000486	2.683e+003
000393	1.942e+003	000440	2.208e+003	000487	2.712e+003
000394	2.073e+003	000441	2.271e+003	000488	5.562e+003
000395	3.225e+003	000442	2.249e+003	000489	4.948e+003
000396	2.469e+003	000443	2.331e+003	000490	6.120e+003
000397	2.025e+003	000444	2.140e+003	000491	5.673e+003
000398	1.841e+003	000445	5.325e+003	000492	4.992e+003
000399	2.214e+003	000446	2.214e+003	000493	2.123e+003
000400	2.054e+003	000447	2.246e+003	000494	2.487e+003
000401	2.435e+003	000448	2.157e+003	000495	2.370e+003
000402	5.171e+003	000449	1.942e+003	000496	6.312e+003
000403	2.269e+003	000450	1.685e+003	000497	5.983e+003
000404	2.317e+003	000451	2.200e+003	000498	5.859e+003
000405	2.437e+003	000452	2.191e+003	000499	6.661e+003
000406	2.200e+003	000453	2.549e+003	000500	6.188e+003
000407	2.051e+003	000454	2.229e+003	000501	6.086e+003
000408	2.434e+003	000455	5.804e+003	000504	6.373e+003
000409	1.701e+003	000456	5.878e+003	000513	6.743e+003
000410	2.215e+003	000457	6.269e+003	000514	6.106e+003
000411	2.472e+003	000458	2.503e+003	000518	6.949e+003
000412	2.407e+003	000459	2.165e+003	000519	6.764e+003
000413	2.086e+003	000460	2.140e+003	000520	5.983e+003
000414	2.059e+003	000461	2.366e+003	000521	6.497e+003
000415	2.492e+003	000462	3.322e+003	000523	7.237e+003
000416	2.415e+003	000463	2.667e+003	000524	5.695e+003
000417	2.117e+003	000464	5.952e+003	000525	6.291e+003
000418	2.186e+003	000465	5.432e+003	000526	5.469e+003
000419	2.129e+003	000466	5.915e+003	000527	4.235e+003
000420	2.332e+003	000467	2.709e+003	000529	4.914e+003
000421	2.309e+003	000468	7.296e+003	000530	5.983e+003
000422	2.286e+003	000469	2.381e+003	000532	6.990e+003
000423	2.321e+003	000470	2.101e+003	000533	5.572e+003
000424	2.746e+003	000471	2.607e+003	000535	5.839e+003
000425	6.118e+003	000472	2.796e+003	000536	5.304e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Data

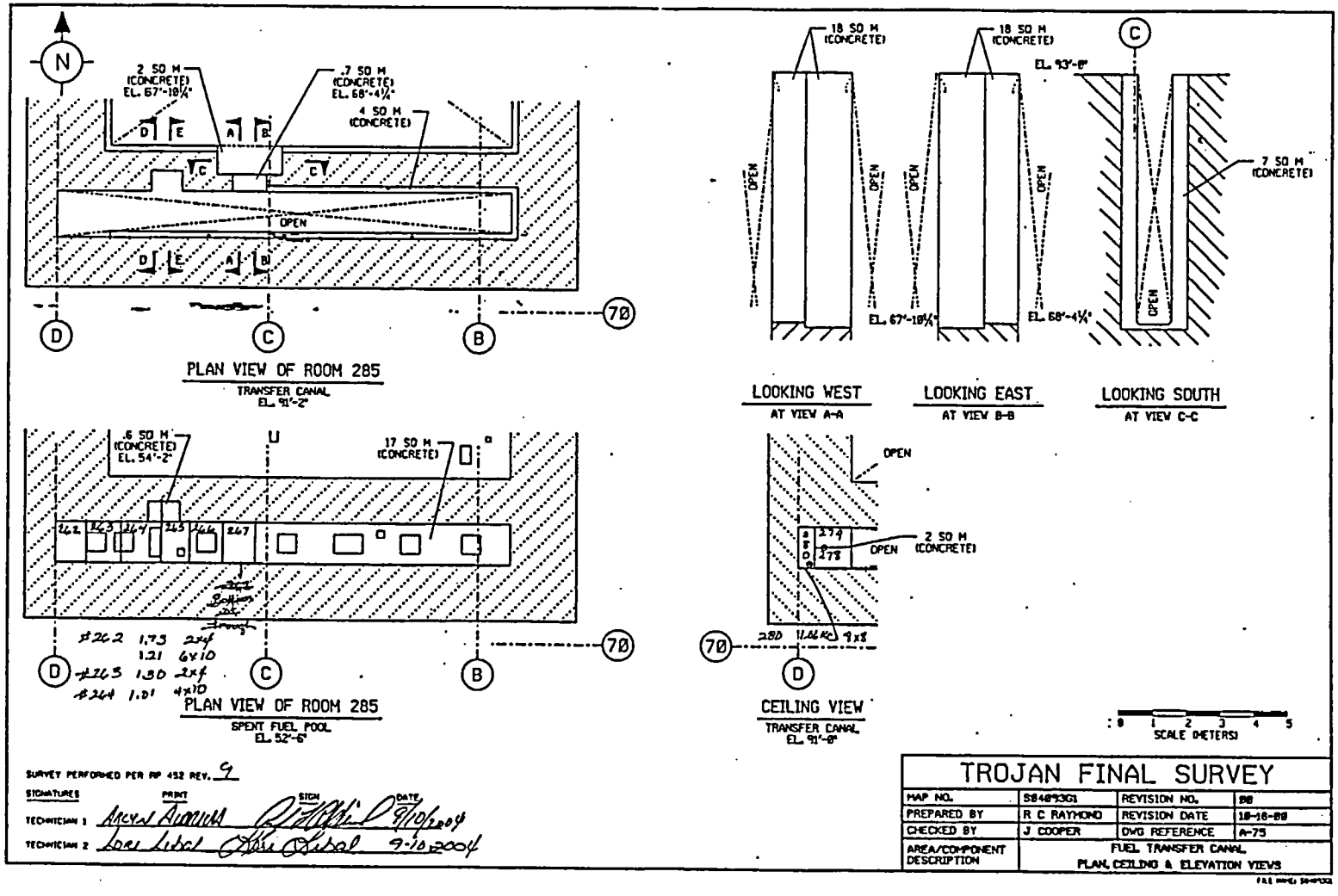
Location	Value
000537	5.654e+003
000538	6.127e+003
000540	5.777e+003
000542	5.407e+003
000543	6.620e+003
000544	6.456e+003
000546	4.914e+003
000548	4.831e+003
000549	7.859e+003
000550	6.497e+003
000564	6.229e+003
000565	4.729e+003
000567	4.873e+003
000568	6.928e+003
000573	6.928e+003
000574	2.006e+003
000575	2.410e+003
000576	2.155e+003
000577	2.351e+003
000578	2.296e+003
000579	2.271e+003
000580	2.660e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Locations Map

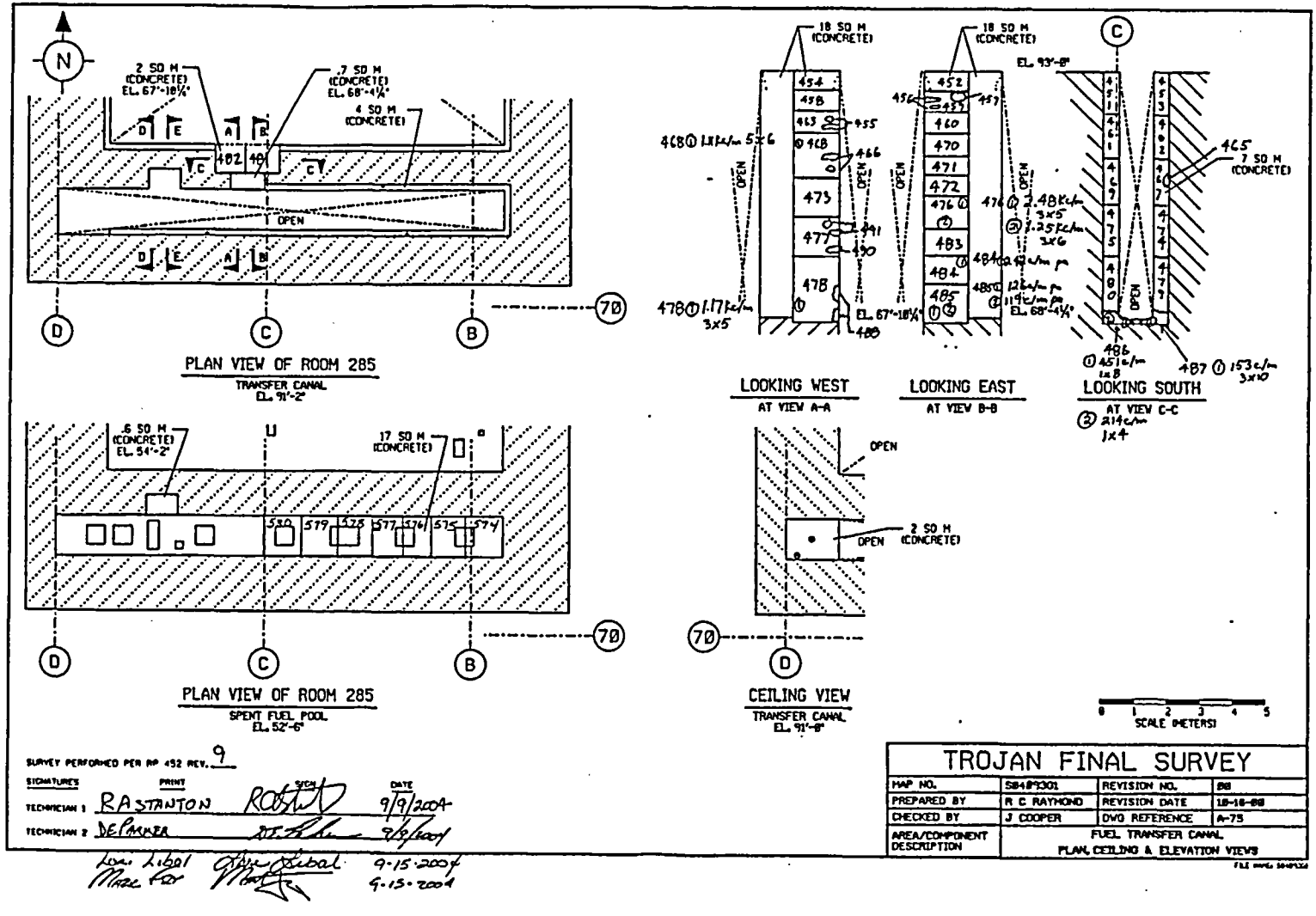


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Locations Map

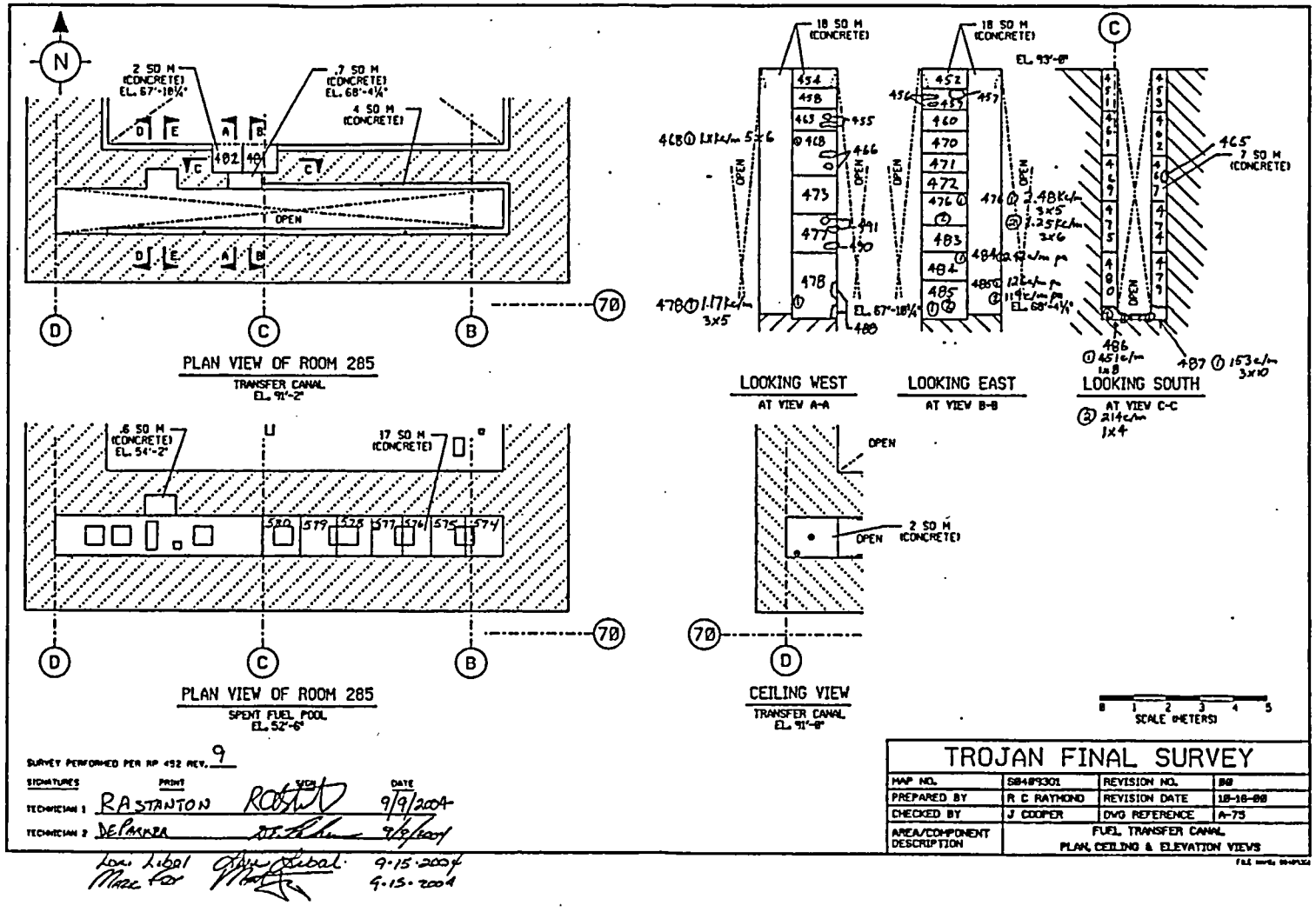


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Locations Map

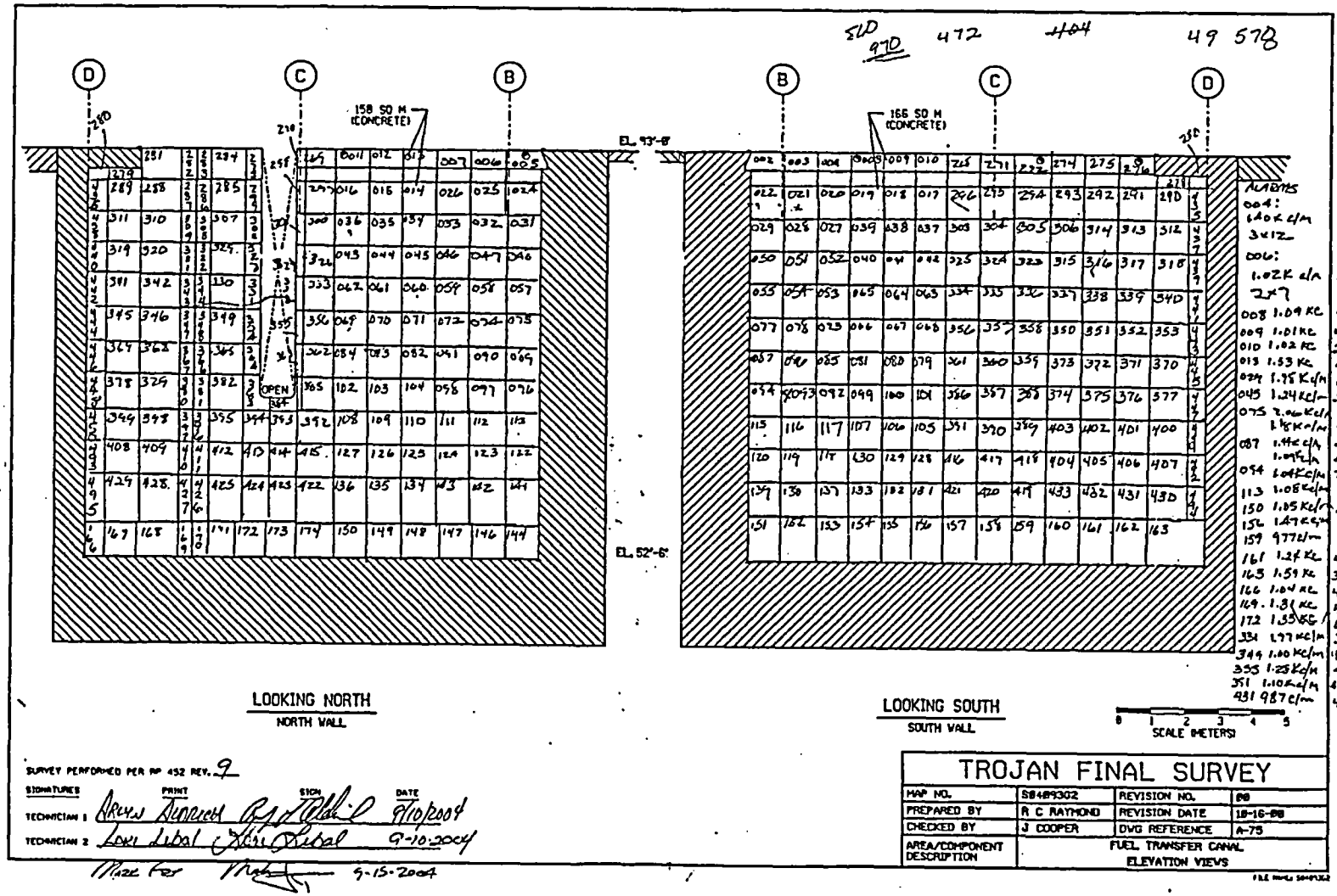


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Locations Map

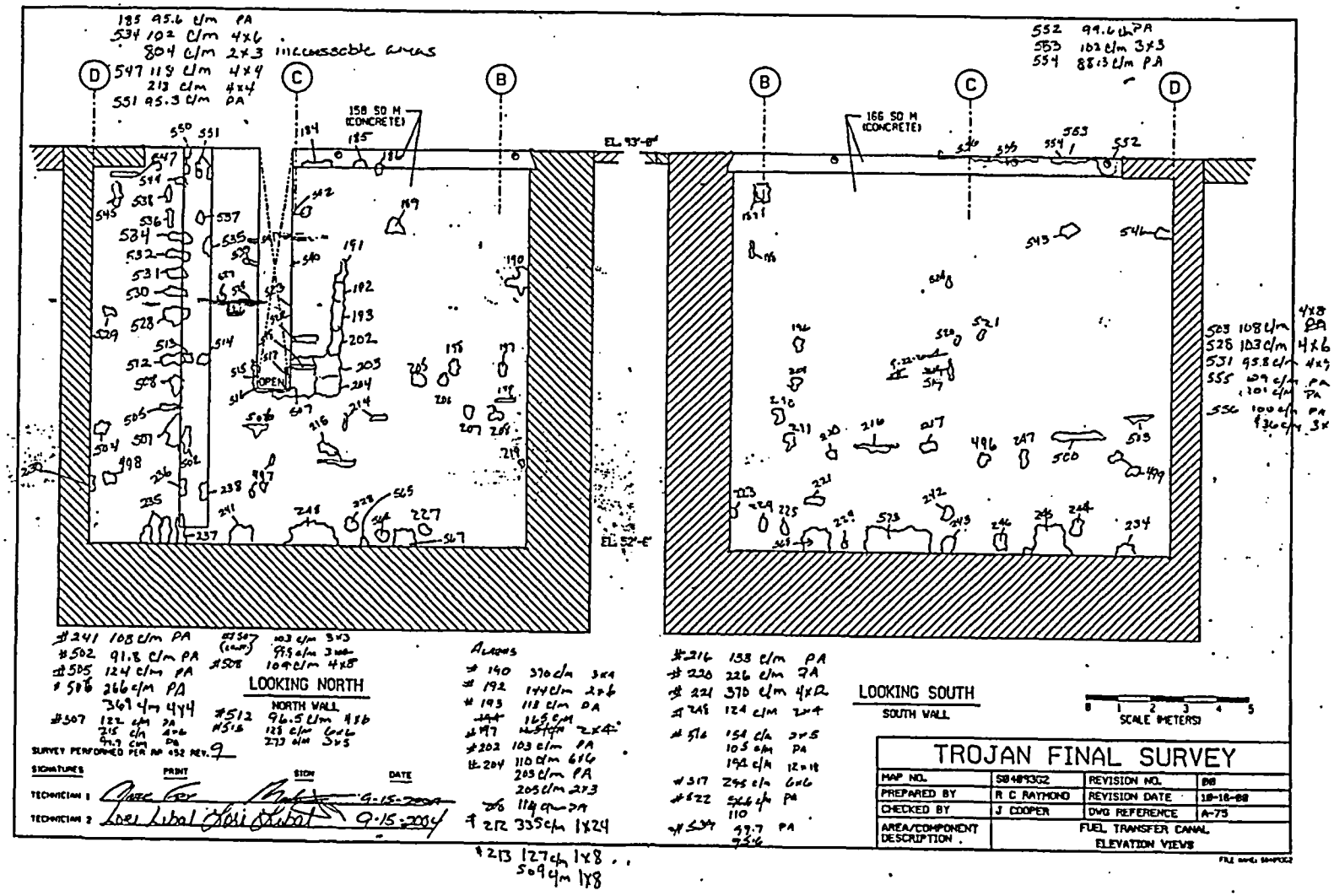


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Locations Map

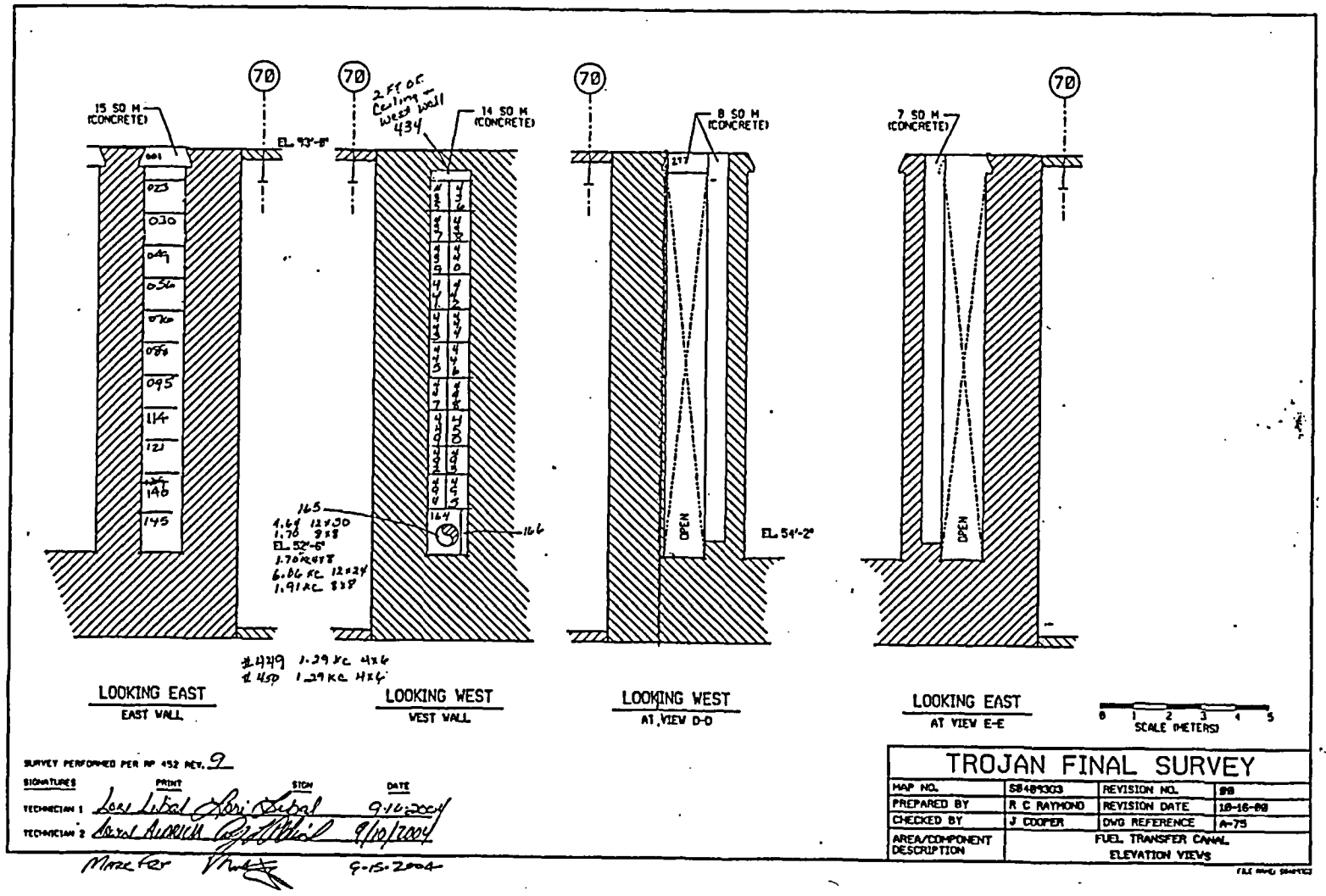


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Locations Map

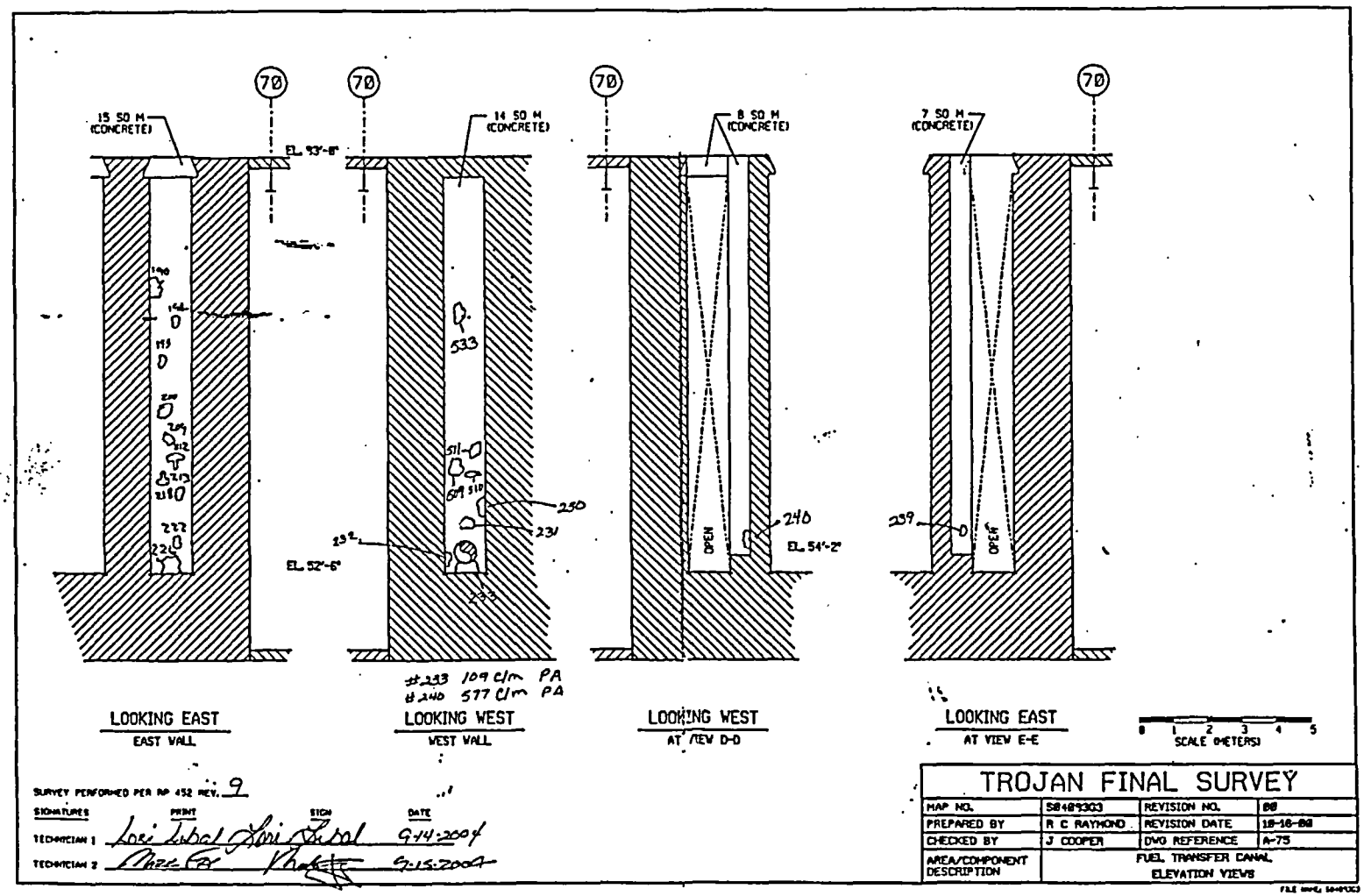


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093G
Survey Unit Name: FB 93' Elevation – Fuel Transfer Canal

Classification: Class 1
Size (m^2): 437

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	218	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.808e+003
Maximum Value	:	7.015e+003
Range	:	5.207e+003
Median	:	2.572e+003
Std. Deviation	:	1.048e+003
Mean	:	2.982e+003
95% UCL	:	3.099e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	4.833e+003	000018	2.167e+003	000035	2.231e+003
000002	2.943e+003	000019	2.185e+003	000036	2.681e+003
000003	3.680e+003	000020	2.418e+003	000037	2.375e+003
000004	2.813e+003	000021	2.187e+003	000038	2.515e+003
000005	4.112e+003	000022	2.554e+003	000039	3.054e+003
000006	4.702e+003	000023	2.463e+003	000040	2.121e+003
000007	3.100e+003	000024	2.349e+003	000041	2.329e+003
000008	3.484e+003	000025	2.099e+003	000042	2.440e+003
000009	2.274e+003	000026	3.947e+003	000043	3.276e+003
000010	2.397e+003	000027	4.365e+003	000044	2.373e+003
000011	2.567e+003	000028	3.005e+003	000045	2.422e+003
000012	2.225e+003	000029	2.347e+003	000046	2.578e+003
000013	2.285e+003	000030	2.508e+003	000047	2.516e+003
000014	2.418e+003	000031	2.375e+003	000048	2.144e+003
000015	2.291e+003	000032	2.968e+003	000049	2.368e+003
000016	2.257e+003	000033	2.156e+003	000050	2.330e+003
000017	2.120e+003	000034	2.329e+003	000051	4.273e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Scan Measurement Data

Location	Value	Location	Value	Location	Value
000052	2.265e+003	000099	2.646e+003	000146	2.220e+003
000053	2.274e+003	000100	2.404e+003	000147	2.068e+003
000054	2.463e+003	000101	3.496e+003	000148	2.660e+003
000055	2.650e+003	000102	2.984e+003	000149	2.170e+003
000056	2.457e+003	000103	4.407e+003	000150	2.191e+003
000057	3.465e+003	000104	3.029e+003	000151	2.547e+003
000058	2.247e+003	000105	5.009e+003	000152	2.108e+003
000059	2.661e+003	000106	3.295e+003	000153	2.364e+003
000060	2.202e+003	000107	3.124e+003	000154	2.408e+003
000061	2.257e+003	000108	3.592e+003	000155	2.278e+003
000062	2.947e+003	000109	2.765e+003	000156	2.558e+003
000063	2.397e+003	000110	3.983e+003	000157	2.291e+003
000064	3.791e+003	000111	3.785e+003	000158	2.290e+003
000065	2.126e+003	000112	2.657e+003	000159	2.650e+003
000066	2.756e+003	000113	2.579e+003	000160	2.706e+003
000067	2.399e+003	000114	2.488e+003	000161	2.625e+003
000068	3.589e+003	000115	2.839e+003	000162	2.076e+003
000069	6.351e+003	000116	5.628e+003	000163	2.281e+003
000070	4.367e+003	000117	2.492e+003	000164	2.369e+003
000071	3.815e+003	000118	2.752e+003	000165	2.397e+003
000072	2.268e+003	000119	2.312e+003	000166	2.364e+003
000073	2.617e+003	000120	2.443e+003	000167	2.620e+003
000074	2.829e+003	000121	2.426e+003	000168	2.765e+003
000075	3.306e+003	000122	2.530e+003	000169	1.808e+003
000076	2.488e+003	000123	2.334e+003	000170	2.214e+003
000077	7.015e+003	000124	2.830e+003	000171	2.272e+003
000078	6.739e+003	000125	5.115e+003	000172	2.644e+003
000079	2.576e+003	000126	2.170e+003	000173	4.739e+003
000080	2.251e+003	000127	2.259e+003	000174	4.708e+003
000081	2.211e+003	000128	2.858e+003	000175	2.440e+003
000082	2.355e+003	000129	2.393e+003	000176	2.198e+003
000083	2.647e+003	000130	2.279e+003	000177	4.788e+003
000084	2.467e+003	000131	2.242e+003	000178	3.124e+003
000085	2.544e+003	000132	2.324e+003	000179	2.266e+003
000086	2.805e+003	000133	2.335e+003	000180	2.418e+003
000087	2.409e+003	000134	2.191e+003	000181	2.654e+003
000088	2.467e+003	000135	2.654e+003	000182	3.341e+003
000089	2.628e+003	000136	2.423e+003	000183	3.921e+003
000090	2.532e+003	000137	4.035e+003	000184	4.176e+003
000091	4.640e+003	000138	5.247e+003	000185	3.751e+003
000092	2.302e+003	000139	2.133e+003	000186	2.935e+003
000093	2.340e+003	000140	2.200e+003	000187	2.679e+003
000094	2.280e+003	000141	3.102e+003	000188	2.920e+003
000095	2.622e+003	000142	2.127e+003	000189	2.987e+003
000096	2.417e+003	000143	2.307e+003	000190	3.232e+003
000097	3.576e+003	000144	4.745e+003	000191	2.606e+003
000098	5.774e+003	000145	2.120e+003	000192	2.749e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Scan Measurement Data

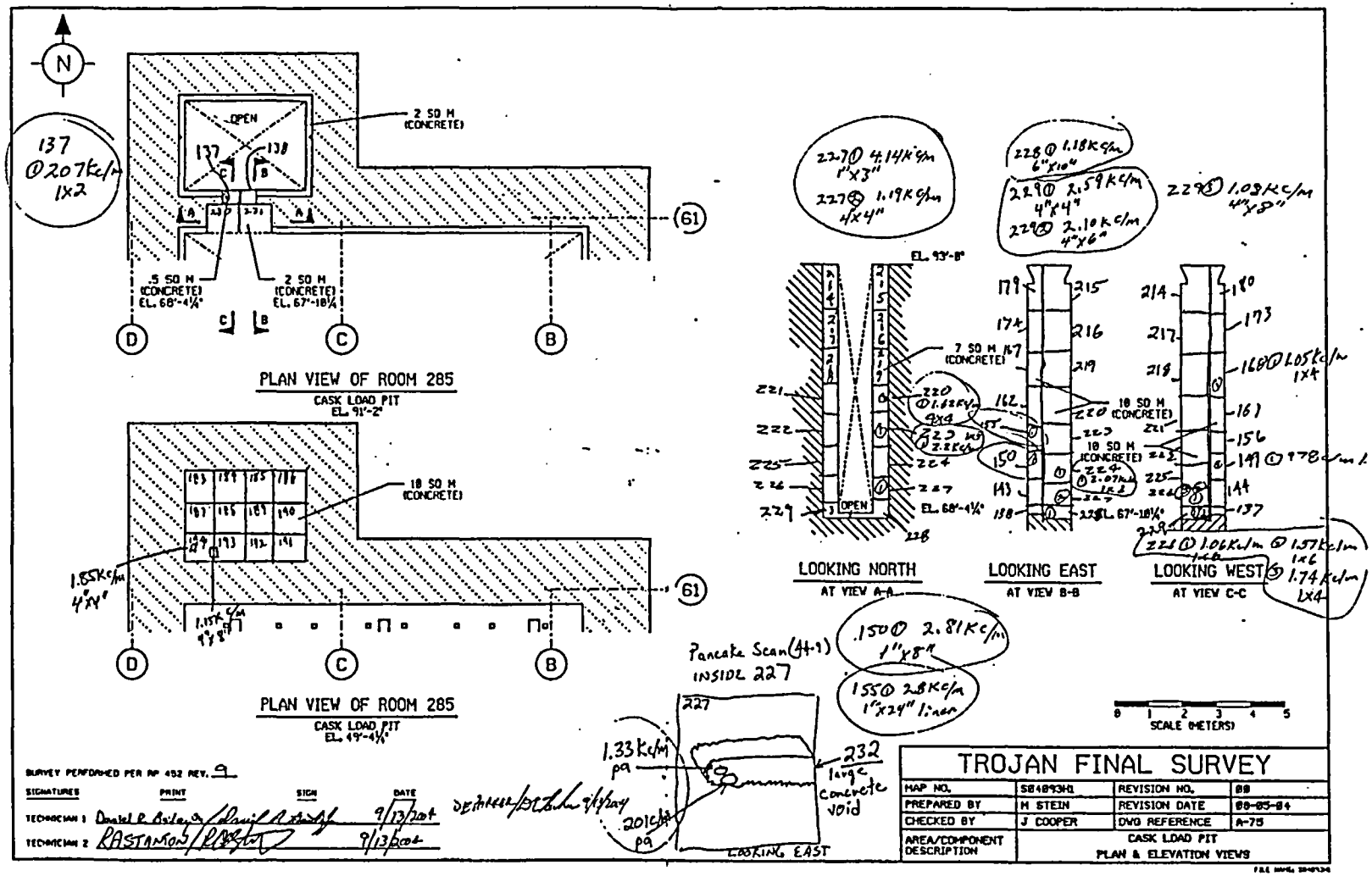
Location	Value
000193	2.430e+003
000194	2.805e+003
000195	4.985e+003
000197	5.990e+003
000198	4.743e+003
000199	5.599e+003
000200	6.194e+003
000210	5.729e+003
000214	2.801e+003
000215	3.291e+003
000216	2.320e+003
000217	2.111e+003
000218	2.294e+003
000219	2.357e+003
000220	2.739e+003
000221	6.214e+003
000222	2.853e+003
000223	2.681e+003
000224	2.687e+003
000225	3.070e+003
000226	4.177e+003
000227	6.971e+003
000228	3.191e+003
000229	4.886e+003
000230	2.692e+003
000231	3.991e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Scan Measurement Locations Map

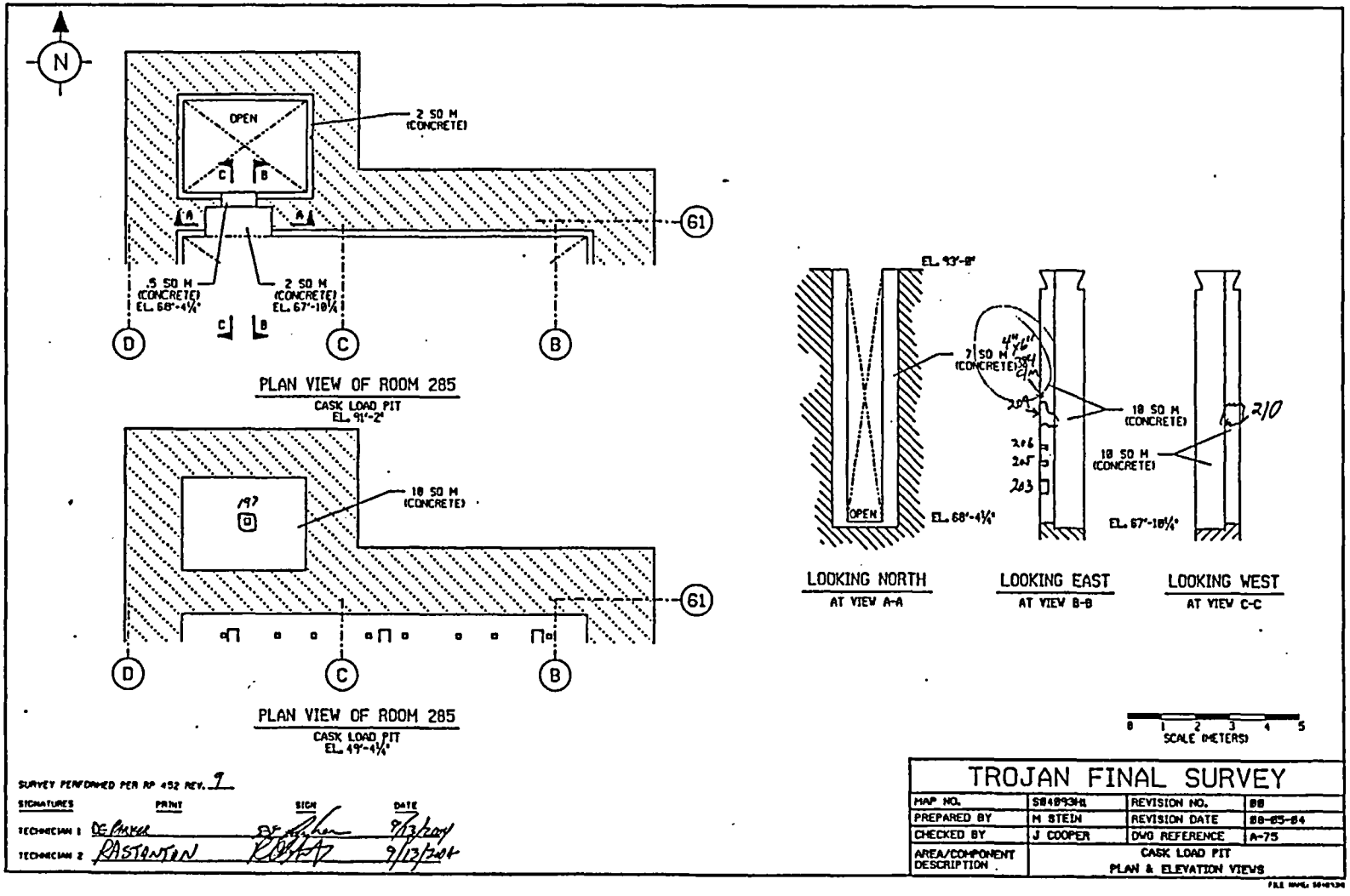


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Scan Measurement Locations Map

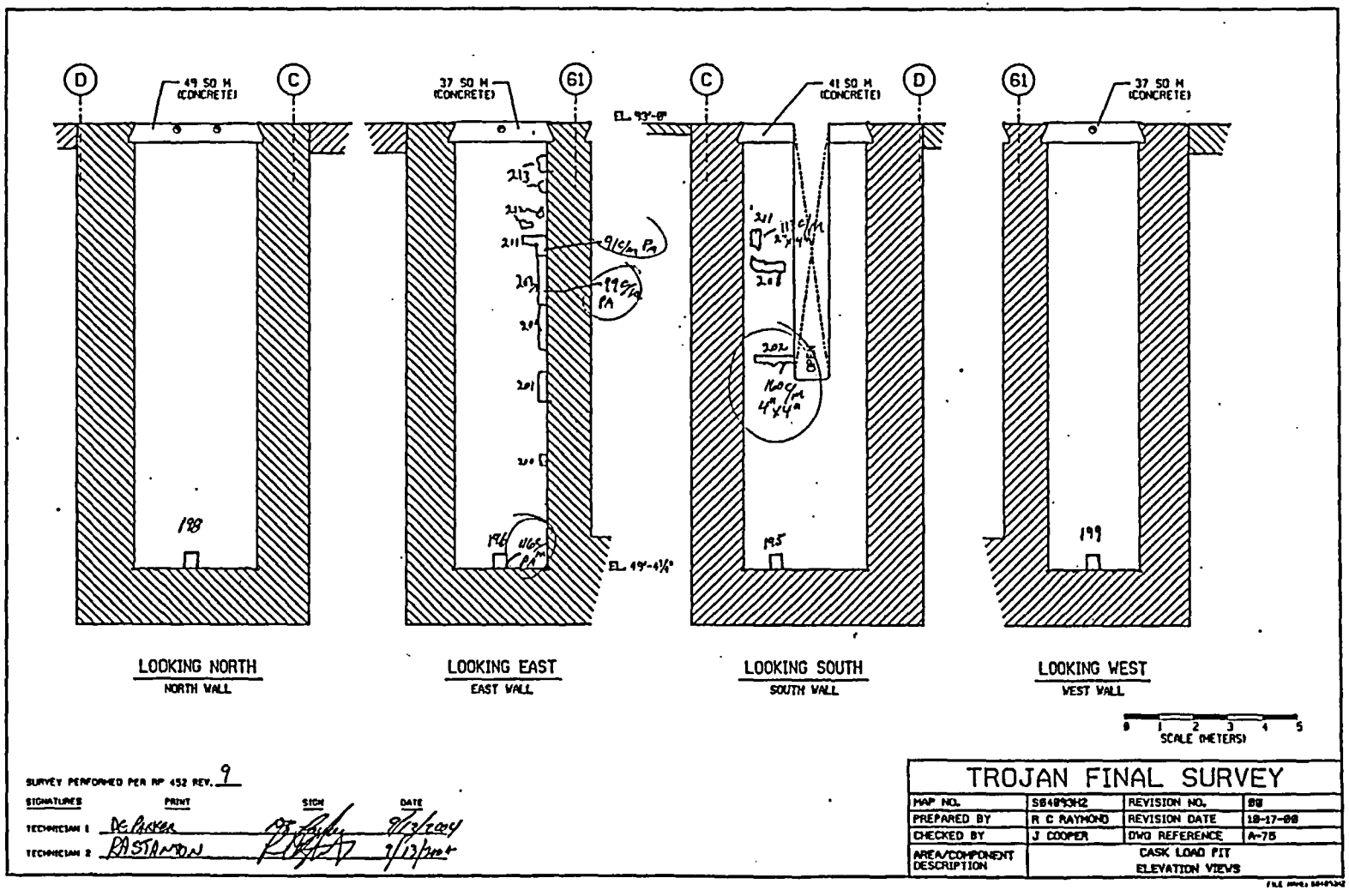


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Scan Measurement Locations Map

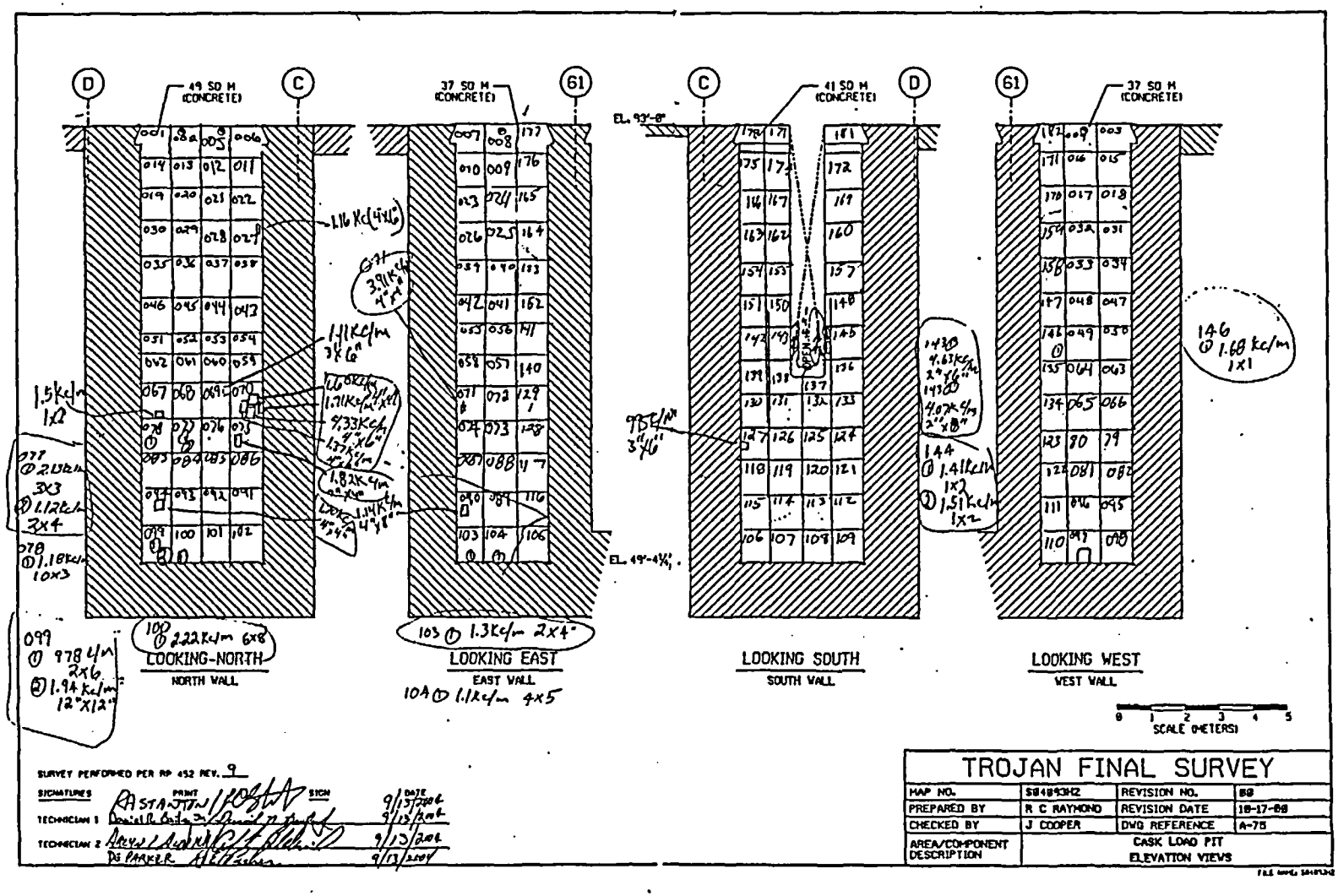


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093H
Survey Unit Name: FB 93' Elevation – Cask Load Pit

Classification: Class 1
Size (m^2): 206

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	329	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.673e+003
Maximum Value	:	7.130e+003
Range	:	5.457e+003
Median	:	2.369e+003
Std. Deviation	:	8.671e+002
Mean	:	2.578e+003
95% UCL	:	2.657e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	2.997e+003	000018	2.981e+003	000035	2.895e+003
000002	3.197e+003	000019	2.615e+003	000036	2.898e+003
000003	2.864e+003	000020	7.130e+003	000037	2.829e+003
000004	2.901e+003	000021	2.925e+003	000038	2.778e+003
000005	2.572e+003	000022	2.810e+003	000039	6.294e+003
000006	2.464e+003	000023	2.913e+003	000040	2.911e+003
000007	3.044e+003	000024	2.695e+003	000041	2.811e+003
000008	2.610e+003	000025	3.174e+003	000042	2.291e+003
000009	2.934e+003	000026	2.978e+003	000043	2.801e+003
000010	2.814e+003	000027	2.890e+003	000044	2.507e+003
000011	2.647e+003	000028	6.315e+003	000045	2.680e+003
000012	3.009e+003	000029	2.571e+003	000046	2.870e+003
000013	2.946e+003	000030	2.457e+003	000047	6.636e+003
000014	2.775e+003	000031	2.553e+003	000048	2.777e+003
000015	2.819e+003	000032	2.634e+003	000049	2.769e+003
000016	2.710e+003	000033	2.783e+003	000050	2.451e+003
000017	2.731e+003	000034	2.760e+003	000051	2.637e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Scan Measurement Data

Location	Value	Location	Value	Location	Value
000052	2.557e+003	000099	3.016e+003	000146	1.991e+003
000053	2.739e+003	000100	3.052e+003	000147	2.440e+003
000054	4.652e+003	000101	2.834e+003	000148	2.158e+003
000055	2.592e+003	000102	2.742e+003	000149	2.168e+003
000056	3.298e+003	000103	2.080e+003	000150	2.323e+003
000057	3.676e+003	000104	2.066e+003	000151	2.131e+003
000058	3.336e+003	000105	1.975e+003	000152	2.244e+003
000059	2.841e+003	000106	2.295e+003	000153	2.257e+003
000060	2.885e+003	000107	2.192e+003	000154	2.086e+003
000061	2.924e+003	000108	2.680e+003	000155	1.945e+003
000062	2.784e+003	000109	2.538e+003	000156	3.440e+003
000063	2.810e+003	000110	1.840e+003	000157	2.361e+003
000064	2.706e+003	000111	2.025e+003	000158	2.194e+003
000065	2.478e+003	000112	1.952e+003	000159	2.072e+003
000066	2.821e+003	000113	1.877e+003	000160	2.214e+003
000067	2.755e+003	000114	2.100e+003	000161	2.477e+003
000068	2.433e+003	000115	1.940e+003	000162	2.792e+003
000069	2.467e+003	000116	1.739e+003	000163	4.971e+003
000070	2.630e+003	000117	1.726e+003	000164	4.149e+003
000071	2.594e+003	000118	1.935e+003	000165	2.987e+003
000072	3.319e+003	000119	1.834e+003	000166	3.093e+003
000073	2.543e+003	000120	2.398e+003	000167	6.338e+003
000074	2.961e+003	000121	2.074e+003	000168	2.970e+003
000075	5.261e+003	000122	1.998e+003	000169	5.261e+003
000076	6.478e+003	000123	1.871e+003	000170	6.725e+003
000077	2.569e+003	000124	2.089e+003	000172	2.031e+003
000078	2.538e+003	000125	2.034e+003	000173	2.109e+003
000079	3.699e+003	000126	2.000e+003	000174	1.949e+003
000080	3.605e+003	000127	2.075e+003	000175	1.819e+003
000081	6.853e+003	000128	1.908e+003	000176	1.888e+003
000082	1.980e+003	000129	1.940e+003	000177	3.980e+003
000083	1.825e+003	000130	2.118e+003	000178	2.091e+003
000084	2.048e+003	000131	2.158e+003	000179	2.038e+003
000085	1.928e+003	000132	2.018e+003	000180	2.857e+003
000086	2.009e+003	000133	1.917e+003	000181	2.529e+003
000087	3.195e+003	000134	2.115e+003	000182	2.264e+003
000088	2.554e+003	000135	2.131e+003	000183	1.909e+003
000089	1.922e+003	000136	1.980e+003	000184	2.126e+003
000090	2.226e+003	000137	1.949e+003	000185	2.410e+003
000091	5.279e+003	000138	2.100e+003	000186	2.241e+003
000092	2.618e+003	000139	2.188e+003	000187	2.141e+003
000093	2.879e+003	000140	1.875e+003	000188	1.971e+003
000094	5.048e+003	000141	2.575e+003	000189	2.218e+003
000095	2.447e+003	000142	2.201e+003	000190	2.025e+003
000096	2.168e+003	000143	2.108e+003	000191	2.212e+003
000097	2.271e+003	000144	2.078e+003	000192	2.211e+003
000098	2.596e+003	000145	2.340e+003	000193	2.274e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half **Size (m^2):** 314

Scan Measurement Data

Location	Value	Location	Value	Location	Value
000194	2.062e+003	000246	2.234e+003	000293	2.174e+003
000195	1.929e+003	000247	1.989e+003	000294	2.414e+003
000196	2.295e+003	000248	2.507e+003	000295	2.108e+003
000197	2.068e+003	000249	2.441e+003	000296	1.942e+003
000198	2.146e+003	000250	2.369e+003	000297	2.051e+003
000199	2.217e+003	000251	2.529e+003	000298	2.097e+003
000200	2.034e+003	000252	2.343e+003	000299	2.208e+003
000201	1.943e+003	000253	2.306e+003	000300	2.215e+003
000202	3.444e+003	000254	2.366e+003	000301	2.312e+003
000203	2.105e+003	000255	2.015e+003	000302	2.403e+003
000204	2.385e+003	000256	2.541e+003	000303	2.517e+003
000205	2.400e+003	000257	2.218e+003	000304	2.264e+003
000206	2.005e+003	000258	2.078e+003	000305	2.140e+003
000207	2.117e+003	000259	1.971e+003	000306	2.172e+003
000208	2.055e+003	000260	1.989e+003	000307	2.246e+003
000209	2.500e+003	000261	2.510e+003	000308	2.180e+003
000210	2.420e+003	000262	2.217e+003	000309	2.188e+003
000211	2.604e+003	000263	2.405e+003	000310	2.246e+003
000212	2.101e+003	000264	2.548e+003	000311	2.287e+003
000213	2.137e+003	000265	2.144e+003	000312	2.372e+003
000214	1.945e+003	000266	2.228e+003	000313	2.400e+003
000215	2.092e+003	000267	2.197e+003	000314	2.318e+003
000216	2.470e+003	000268	2.304e+003	000315	2.471e+003
000217	2.506e+003	000269	2.168e+003	000316	2.616e+003
000218	2.160e+003	000270	2.191e+003	000317	2.562e+003
000219	2.171e+003	000271	2.083e+003	000318	2.264e+003
000220	2.025e+003	000272	1.696e+003	000319	2.386e+003
000221	1.971e+003	000273	1.673e+003	000320	2.078e+003
000222	2.308e+003	000274	2.668e+003	000321	2.634e+003
000223	3.014e+003	000275	2.320e+003	000322	2.550e+003
000224	2.621e+003	000276	1.859e+003	000323	2.237e+003
000225	2.961e+003	000277	2.169e+003	000324	2.572e+003
000226	2.912e+003	000278	2.473e+003	000325	2.404e+003
000227	2.822e+003	000279	2.168e+003	000326	2.563e+003
000228	3.385e+003	000280	1.931e+003	000327	2.792e+003
000231	5.971e+003	000281	1.954e+003	000328	2.975e+003
000234	5.022e+003	000282	1.872e+003	000329	2.679e+003
000236	2.077e+003	000283	1.966e+003	000330	2.790e+003
000237	2.057e+003	000284	2.095e+003	000331	2.742e+003
000238	1.948e+003	000285	2.338e+003	000332	2.836e+003
000239	2.172e+003	000286	1.885e+003	000333	2.964e+003
000240	2.407e+003	000287	2.006e+003	000334	2.852e+003
000241	2.655e+003	000288	2.220e+003	000345	2.645e+003
000242	2.489e+003	000289	1.977e+003		
000243	2.503e+003	000290	2.263e+003		
000244	2.160e+003	000291	2.281e+003		
000245	2.108e+003	000292	2.146e+003		

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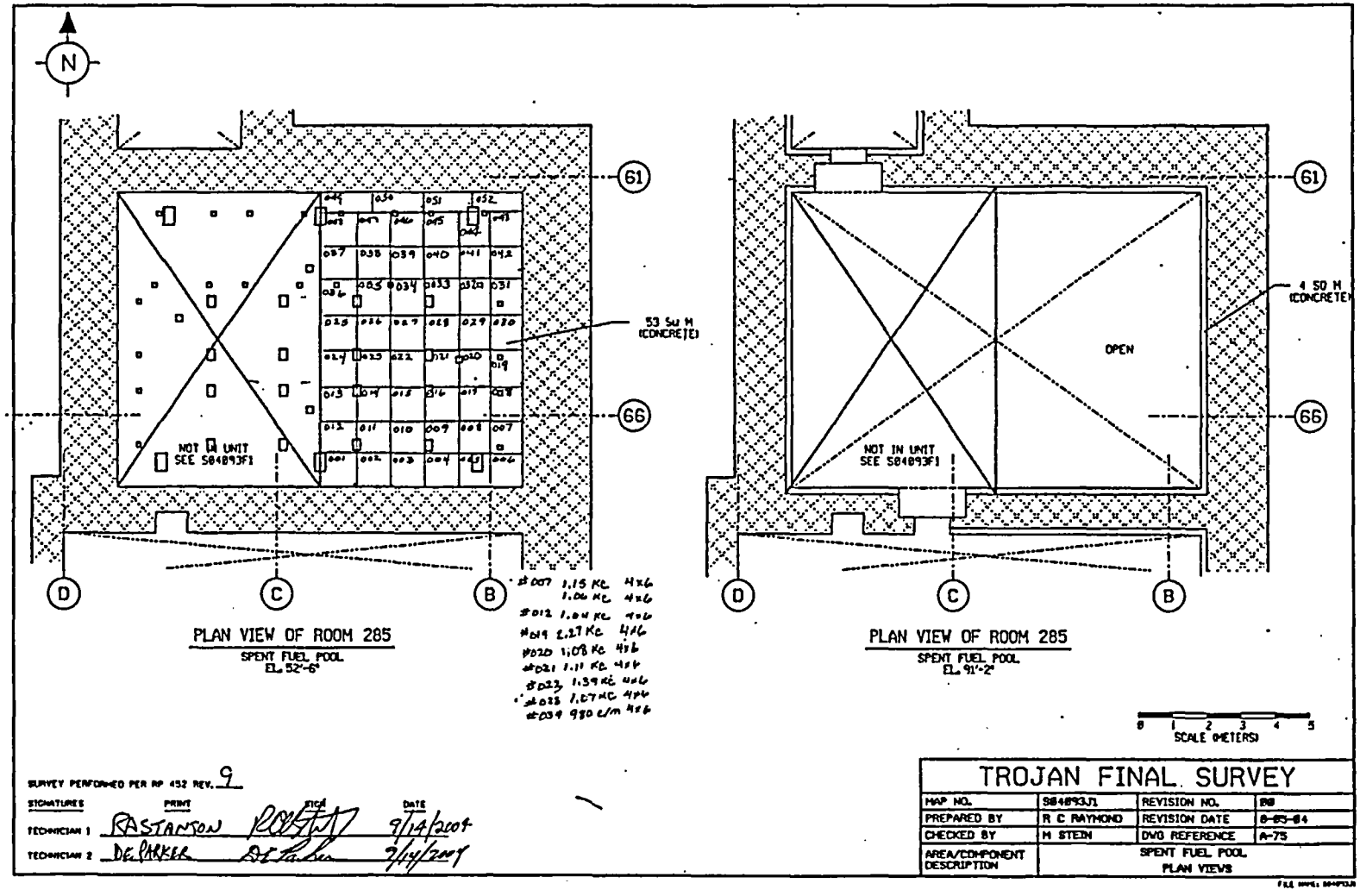
FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half

Classification: Class 1
Size (m^2): 314

Scan Measurement Locations Map

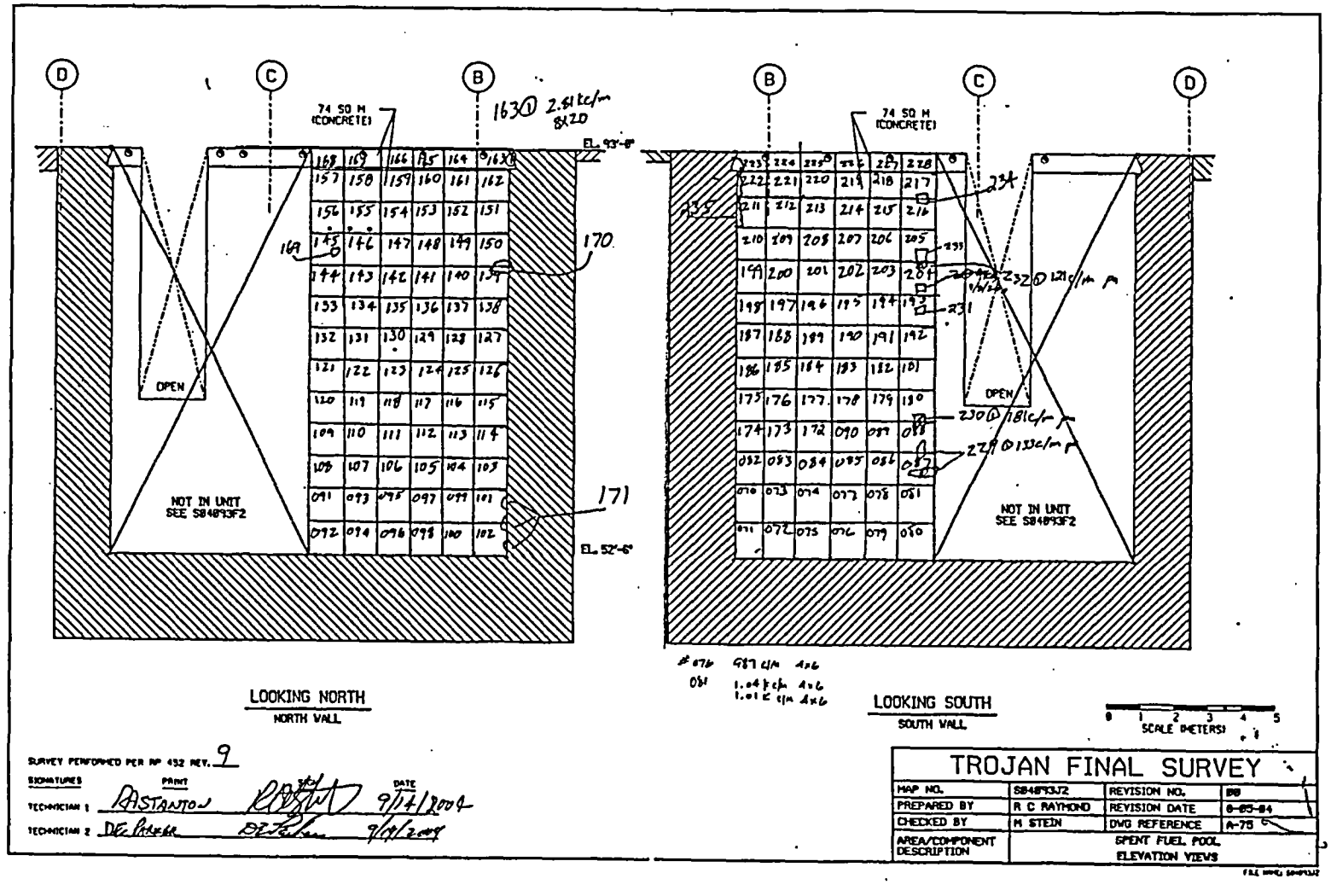


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half

Classification: Class 1
Size (m^2): 314

Scan Measurement Locations Map

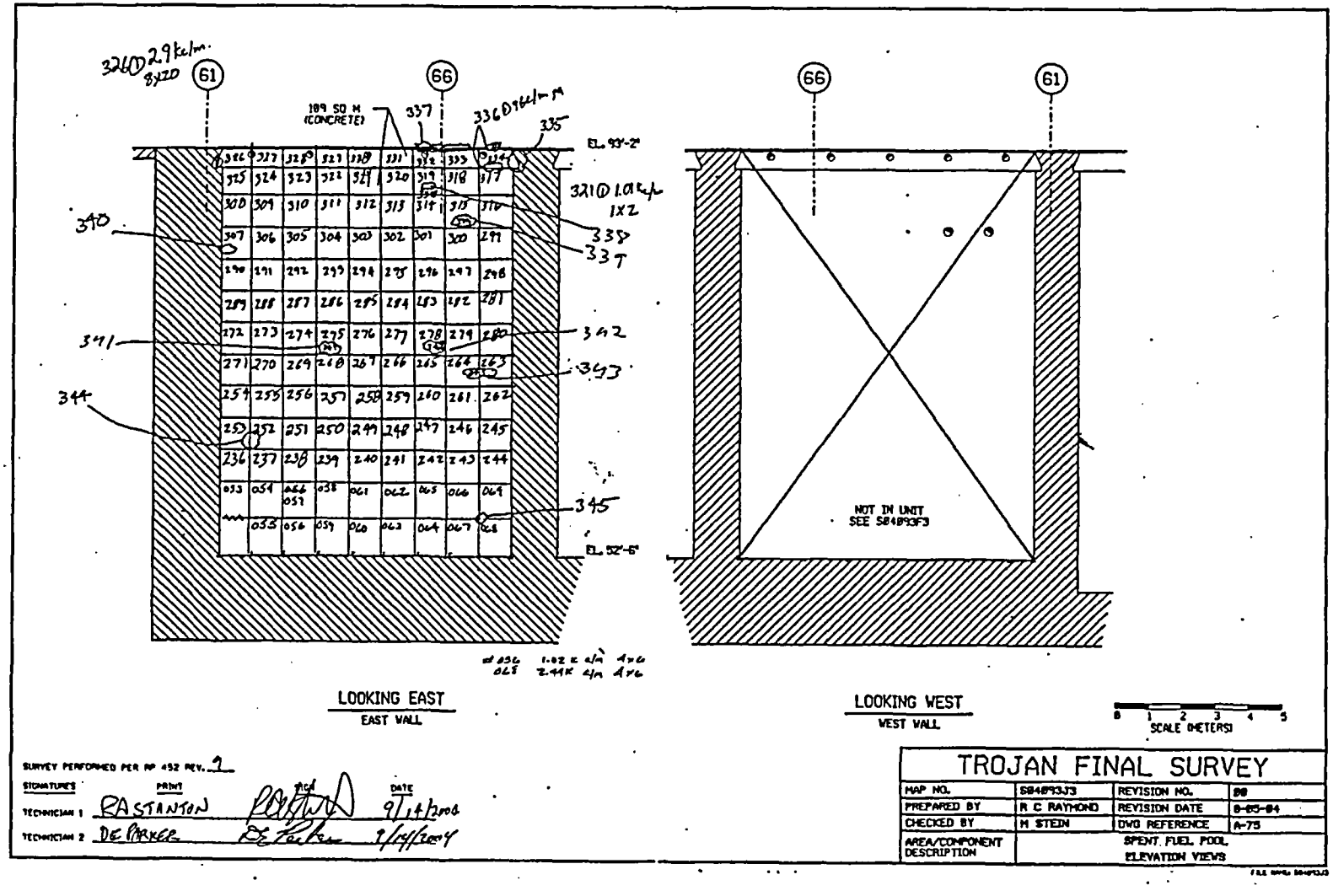


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093J
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool – East Half

Classification: Class 1
Size (m^2): 314

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	140	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	1.128e+003
Maximum Value	:	1.234e+004
Range	:	1.121e+004
Median	:	2.998e+003
Std. Deviation	:	1.679e+003
Mean	:	3.317e+003
95% UCL	:	3.552e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	3.119e+003	000018	3.550e+003	000035	2.833e+003
000002	2.953e+003	000019	3.342e+003	000036	2.938e+003
000003	2.936e+003	000020	3.438e+003	000037	3.233e+003
000004	3.023e+003	000021	3.500e+003	000038	2.972e+003
000005	3.118e+003	000022	5.526e+003	000039	3.105e+003
000006	2.845e+003	000023	3.452e+003	000040	2.942e+003
000007	3.113e+003	000024	3.376e+003	000041	3.093e+003
000008	6.865e+003	000025	5.291e+003	000042	2.998e+003
000009	3.173e+003	000026	2.620e+003	000043	4.024e+003
000010	3.549e+003	000027	3.068e+003	000044	3.124e+003
000011	3.725e+003	000028	2.521e+003	000045	2.956e+003
000012	3.384e+003	000029	2.843e+003	000046	2.864e+003
000013	3.353e+003	000030	2.855e+003	000047	3.037e+003
000014	3.784e+003	000031	2.801e+003	000048	2.792e+003
000015	3.370e+003	000032	2.975e+003	000049	2.936e+003
000016	3.592e+003	000033	2.988e+003	000050	3.199e+003
000017	3.607e+003	000034	2.842e+003	000051	2.840e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half **Size (m^2):** 121

Scan Measurement Data

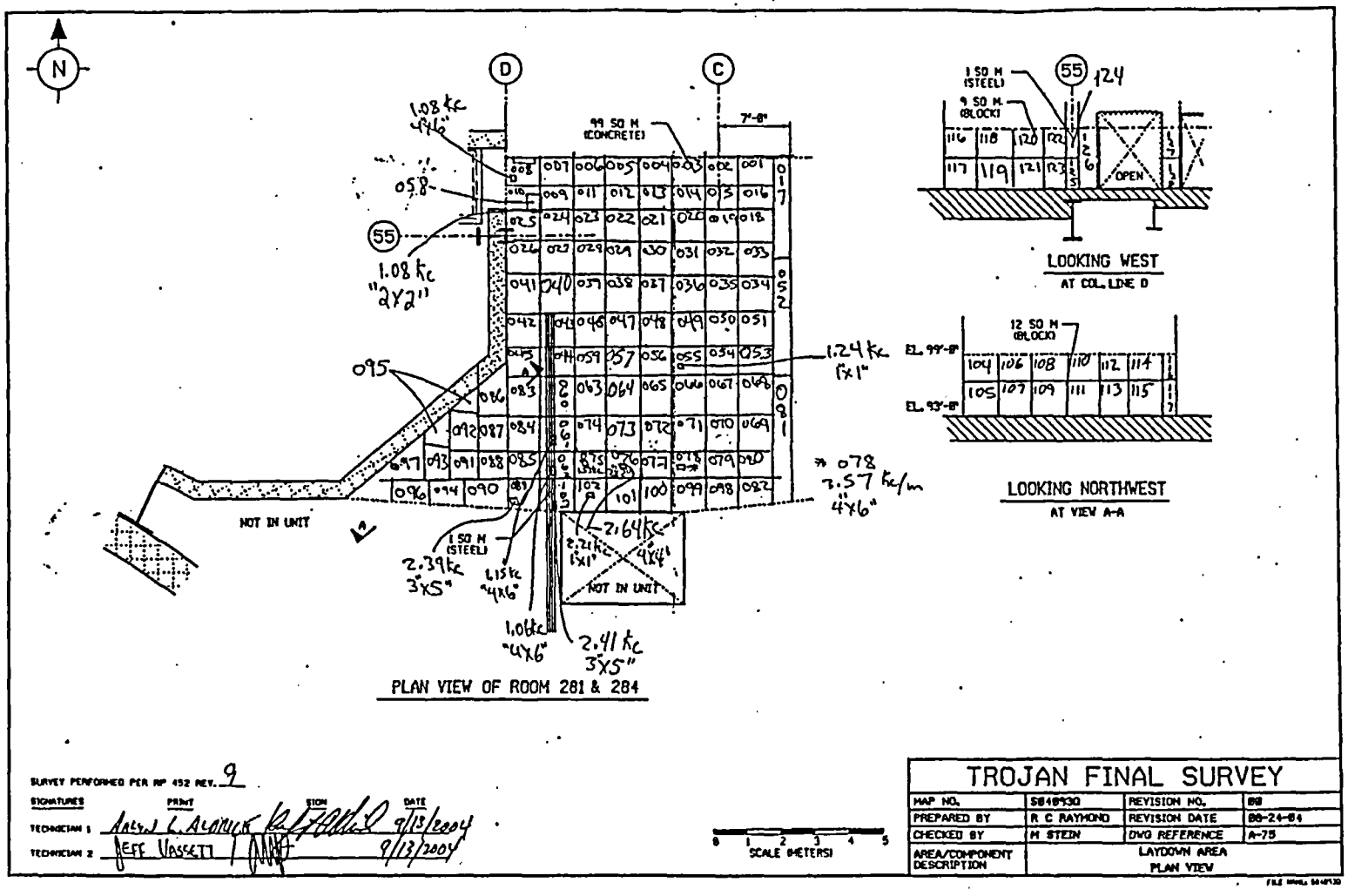
Location	Value	Location	Value
000052	2.902e+003	000099	3.106e+003
000053	3.065e+003	000100	3.592e+003
000054	2.910e+003	000101	3.059e+003
000055	2.538e+003	000102	2.314e+003
000056	3.311e+003	000103	2.651e+003
000057	2.992e+003	000104	1.457e+003
000058	6.848e+003	000105	1.492e+003
000059	3.147e+003	000106	1.527e+003
000060	4.222e+003	000107	1.547e+003
000061	7.277e+003	000108	1.604e+003
000062	6.722e+003	000109	1.299e+003
000063	3.088e+003	000110	1.856e+003
000064	2.954e+003	000111	1.810e+003
000065	3.273e+003	000112	1.493e+003
000066	3.038e+003	000113	1.363e+003
000067	3.627e+003	000114	1.421e+003
000068	2.908e+003	000115	1.411e+003
000069	2.958e+003	000116	1.805e+003
000070	3.175e+003	000117	1.458e+003
000071	3.255e+003	000118	1.429e+003
000072	3.136e+003	000119	1.497e+003
000073	2.944e+003	000120	1.544e+003
000074	2.997e+003	000121	1.658e+003
000075	2.870e+003	000122	2.309e+003
000076	7.976e+003	000123	1.592e+003
000077	3.946e+003	000124	1.128e+003
000078	1.234e+004	000125	1.174e+003
000079	3.849e+003	000126	1.272e+003
000080	3.066e+003	000127	1.675e+003
000081	3.388e+003	000128	1.428e+003
000082	3.161e+003	000129	6.944e+003
000083	3.047e+003	000130	1.632e+003
000084	3.314e+003	000131	1.719e+003
000085	2.916e+003	000132	7.118e+003
000086	3.217e+003	000133	5.013e+003
000087	2.910e+003	000134	6.725e+003
000088	2.792e+003	000135	7.227e+003
000089	2.892e+003	000136	7.205e+003
000090	2.922e+003	000137	6.662e+003
000091	2.777e+003	000138	7.140e+003
000092	2.956e+003	000139	7.400e+003
000093	2.843e+003	000140	6.749e+003
000094	3.428e+003		
000095	2.901e+003		
000096	2.870e+003		
000097	2.784e+003		
000098	3.003e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half

Classification: Class 1
Size (m^2): 121

Scan Measurement Locations Map

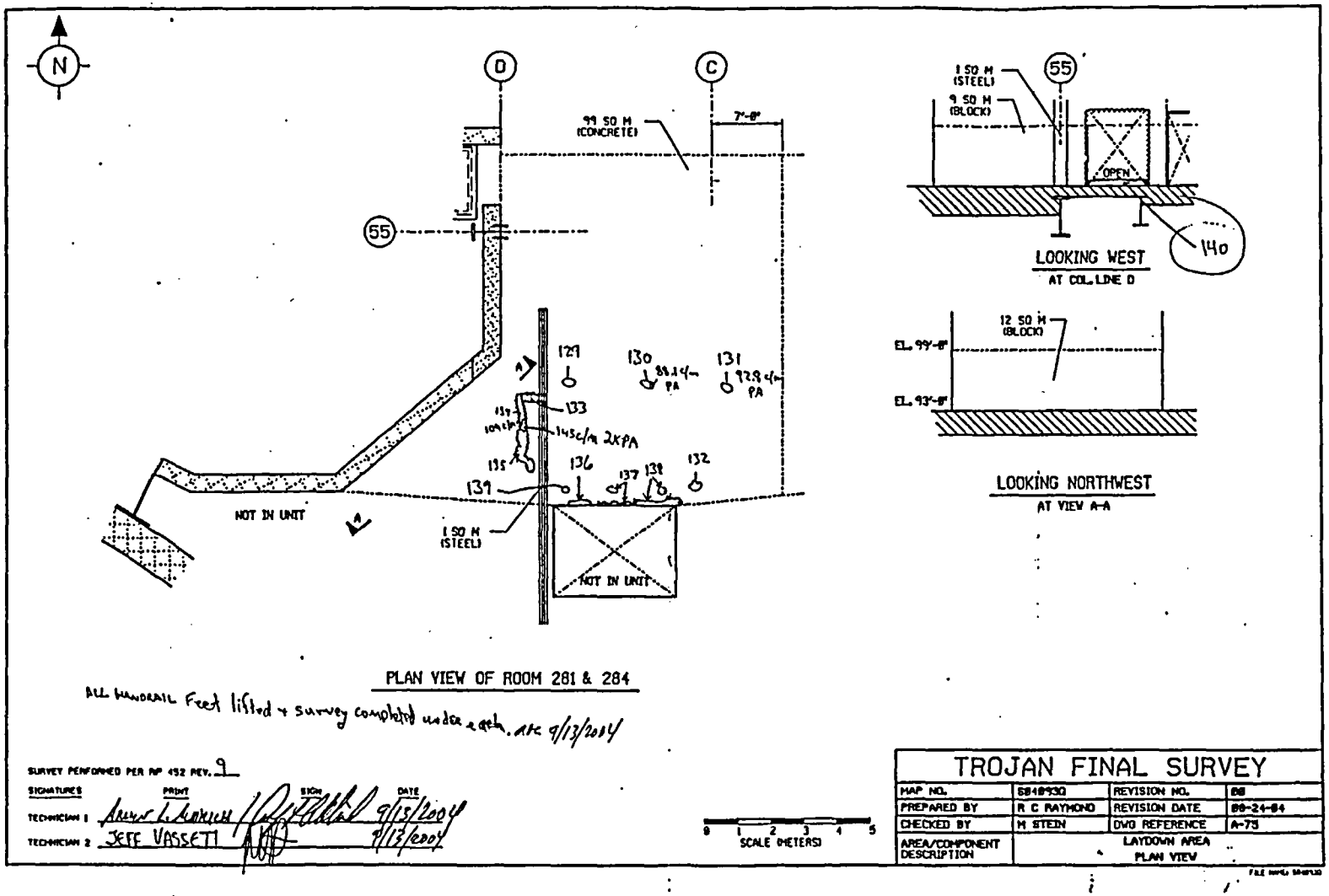


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093Q
Survey Unit Name: FB 93' Elevation – Laydown Area – West Half

Classification: Class 1
Size (m^2): 121

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	159	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	9.192e+002
Maximum Value	:	6.402e+003
Range	:	5.483e+003
Median	:	2.766e+003
Std. Deviation	:	1.085e+003
Mean	:	2.684e+003
95% UCL	:	2.827e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	3.401e+003	000018	2.904e+003	000035	2.725e+003
000002	2.990e+003	000019	3.071e+003	000036	2.395e+003
000003	2.892e+003	000020	3.133e+003	000037	3.227e+003
000004	3.149e+003	000021	3.037e+003	000038	3.062e+003
000005	3.171e+003	000022	3.106e+003	000039	2.869e+003
000006	3.059e+003	000023	3.247e+003	000040	2.746e+003
000007	3.022e+003	000024	2.990e+003	000041	3.106e+003
000008	3.307e+003	000025	2.934e+003	000042	3.031e+003
000009	3.472e+003	000026	2.954e+003	000043	3.321e+003
000010	3.324e+003	000027	3.189e+003	000044	3.019e+003
000011	2.805e+003	000028	3.078e+003	000045	3.061e+003
000012	2.981e+003	000029	3.460e+003	000046	3.035e+003
000013	3.205e+003	000030	3.357e+003	000047	3.071e+003
000014	3.118e+003	000031	2.358e+003	000048	3.637e+003
000015	3.242e+003	000032	2.680e+003	000049	2.771e+003
000016	3.174e+003	000033	2.344e+003	000050	2.718e+003
000017	3.183e+003	000034	2.474e+003	000051	2.967e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R **Classification:** Class 1
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half **Size (m^2):** 158

Scan Measurement Data

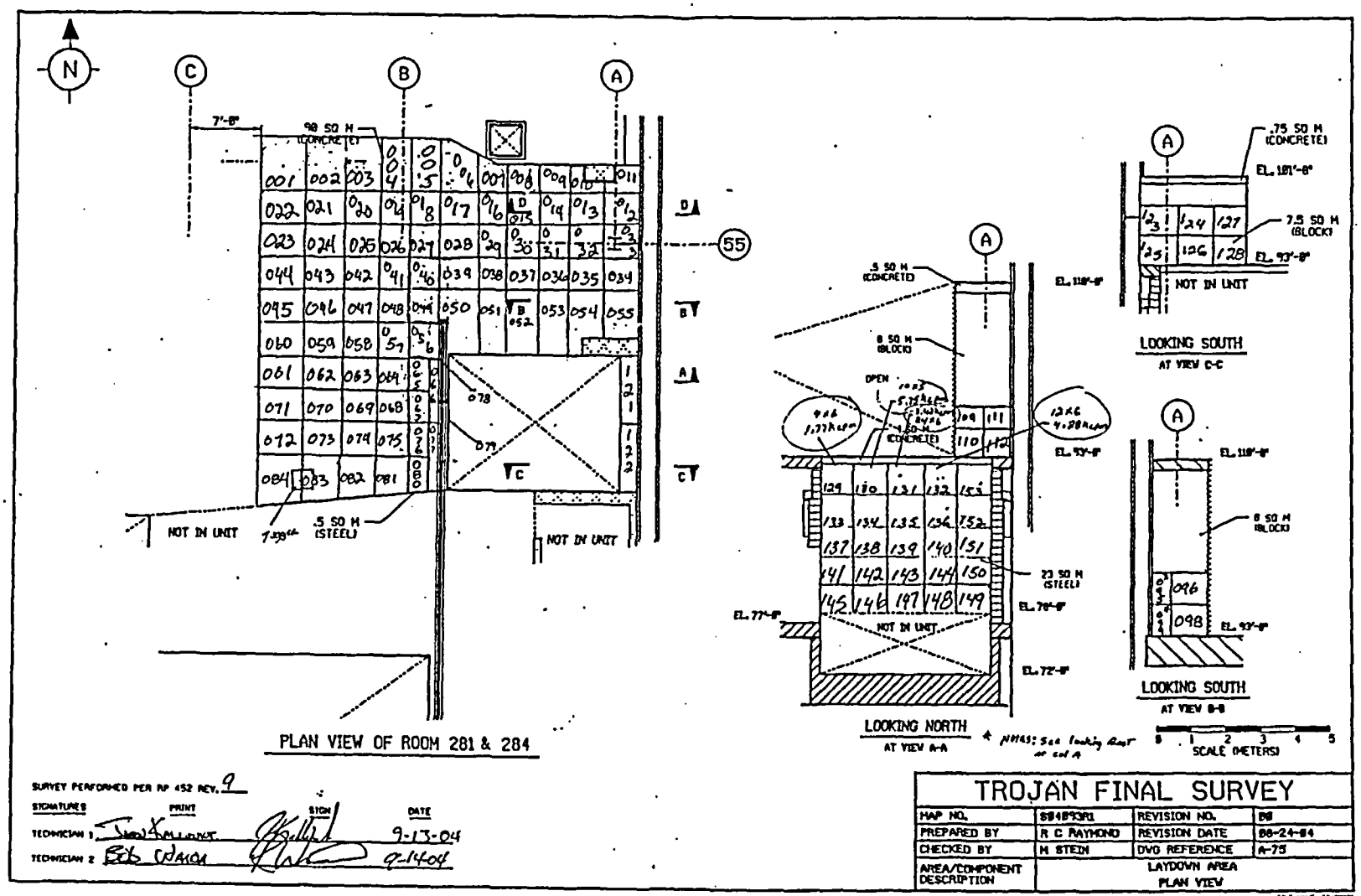
Location	Value	Location	Value	Location	Value
000052	3.141e+003	000099	2.220e+003	000148	9.772e+002
000053	2.501e+003	000100	2.246e+003	000149	1.087e+003
000054	2.533e+003	000101	2.200e+003	000150	9.192e+002
000055	2.435e+003	000103	1.528e+003	000151	1.024e+003
000056	2.766e+003	000104	4.630e+003	000152	1.057e+003
000057	2.692e+003	000105	6.402e+003	000153	4.027e+003
000058	3.085e+003	000106	5.602e+003	000154	6.209e+003
000059	2.764e+003	000107	5.793e+003	000155	5.783e+003
000060	2.836e+003	000109	1.745e+003	000156	2.146e+003
000061	2.833e+003	000110	2.064e+003	000157	5.519e+003
000062	2.702e+003	000111	1.898e+003	000158	6.351e+003
000063	4.885e+003	000112	1.837e+003	000159	3.180e+003
000064	2.391e+003	000113	1.909e+003	000160	5.215e+003
000065	3.000e+003	000114	1.825e+003	000161	2.755e+003
000066	2.922e+003	000115	1.933e+003		
000067	2.876e+003	000116	2.014e+003		
000068	2.683e+003	000117	1.638e+003		
000069	2.993e+003	000118	1.635e+003		
000070	2.898e+003	000119	2.589e+003		
000071	3.106e+003	000120	2.435e+003		
000072	2.813e+003	000121	1.768e+003		
000073	2.950e+003	000122	4.318e+003		
000074	2.801e+003	000123	1.996e+003		
000075	3.055e+003	000124	1.915e+003		
000076	2.789e+003	000125	1.789e+003		
000077	2.943e+003	000126	1.851e+003		
000078	4.024e+003	000127	1.928e+003		
000079	4.930e+003	000128	1.974e+003		
000080	3.087e+003	000129	1.786e+003		
000081	2.814e+003	000130	1.828e+003		
000082	2.937e+003	000131	2.011e+003		
000083	3.153e+003	000132	2.164e+003		
000084	2.902e+003	000133	1.217e+003		
000085	2.421e+003	000134	1.127e+003		
000086	2.191e+003	000135	1.139e+003		
000087	1.831e+003	000136	1.151e+003		
000088	2.054e+003	000137	1.056e+003		
000089	2.067e+003	000138	1.145e+003		
000090	2.222e+003	000139	1.078e+003		
000091	1.961e+003	000140	9.945e+002		
000092	1.892e+003	000141	1.004e+003		
000093	2.078e+003	000142	1.030e+003		
000094	2.627e+003	000143	1.084e+003		
000095	2.054e+003	000144	9.337e+002		
000096	2.175e+003	000145	1.709e+003		
000097	2.544e+003	000146	9.818e+002		
000098	2.373e+003	000147	1.094e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half

Classification: Class 1
Size (m^2): 158

Scan Measurement Locations Map

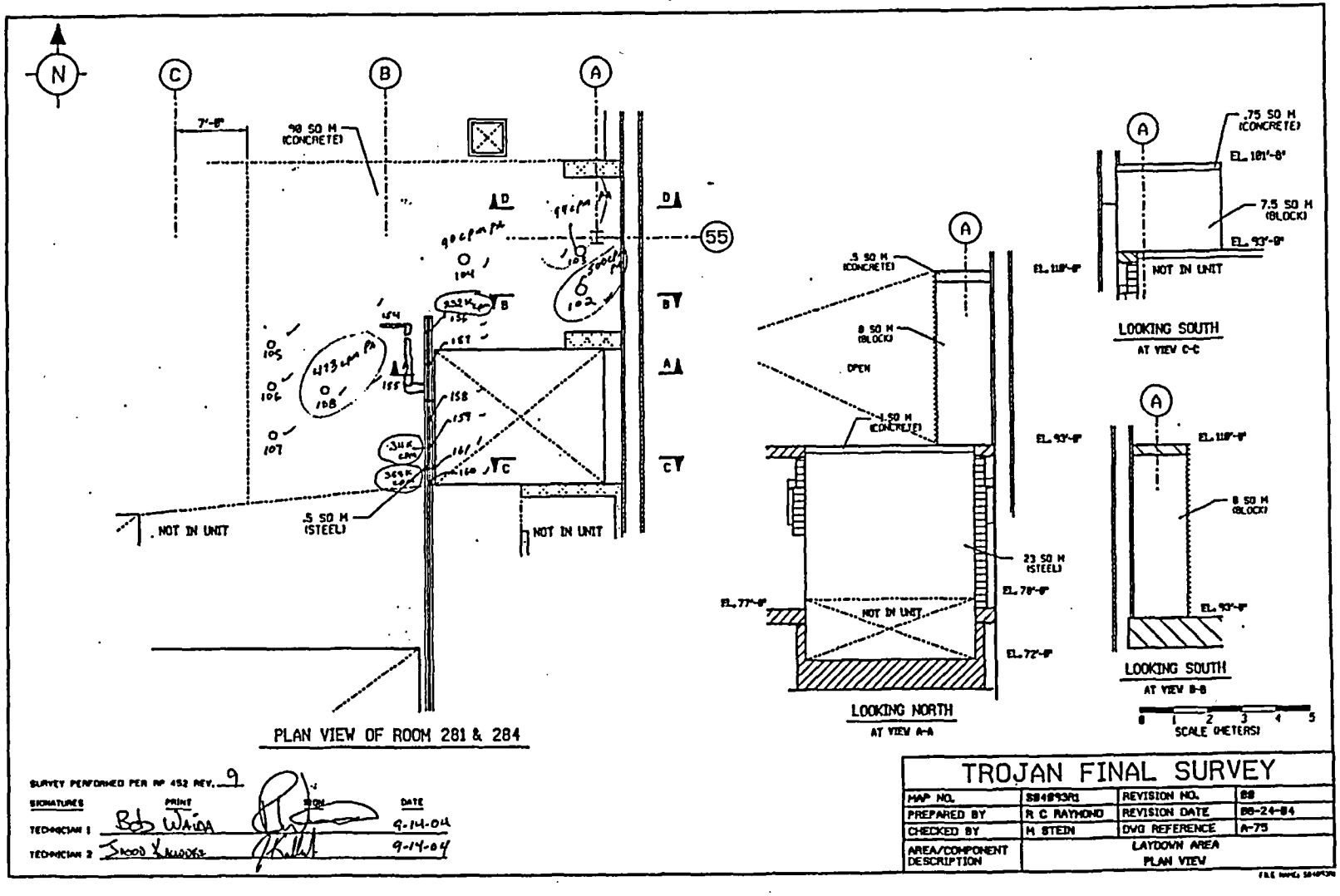


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half

Classification: Class 1
Size (m^2): 158

Scan Measurement Locations Map

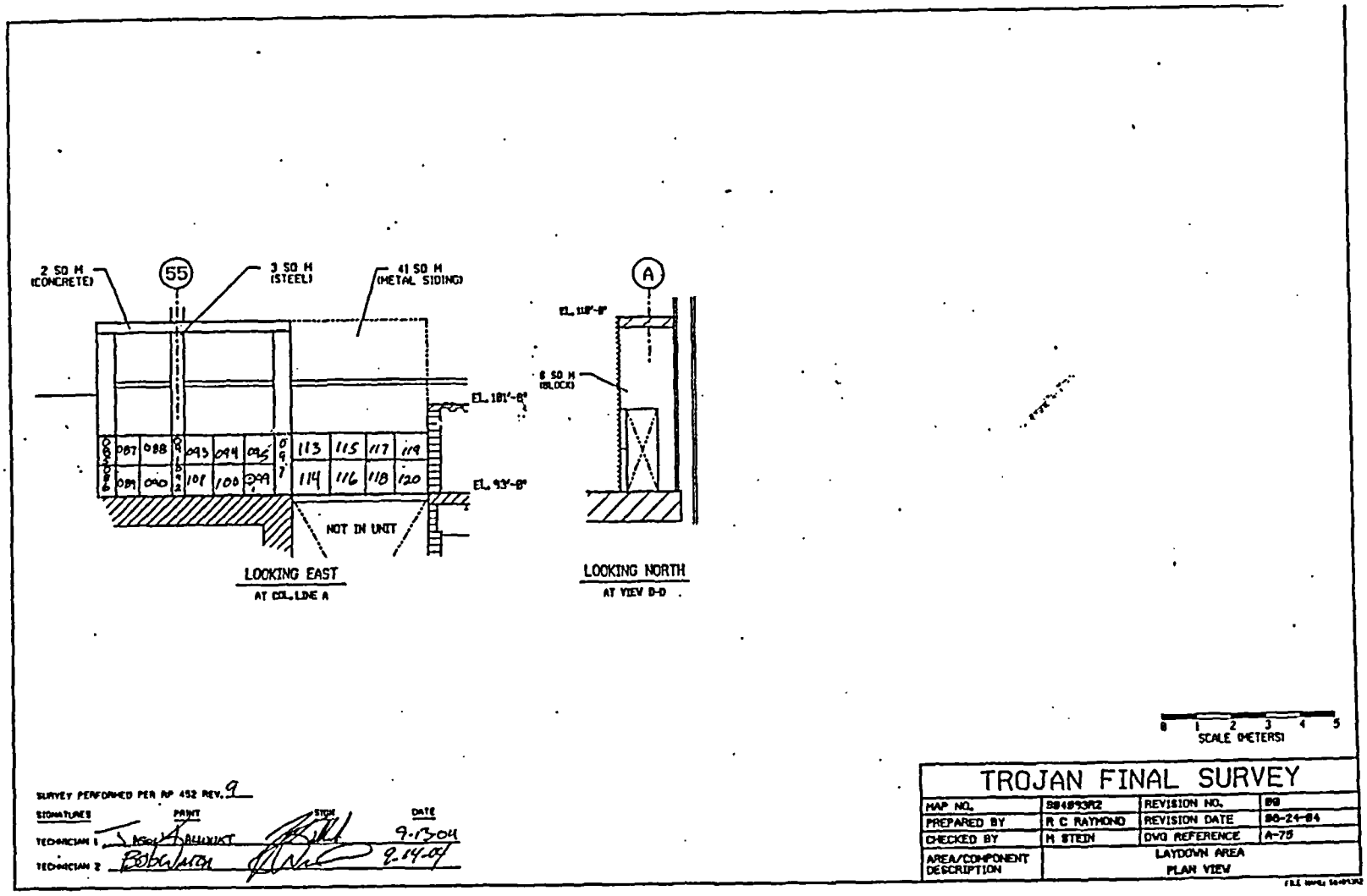


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093R
Survey Unit Name: FB 93' Elevation – Laydown Area – East Half

Classification: Class 1
Size (m^2): 158

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	270	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	8.769e+002
Maximum Value	:	1.099e+004
Range	:	1.011e+004
Median	:	2.365e+003
Std. Deviation	:	1.739e+003
Mean	:	2.765e+003
95% UCL	:	2.940e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	2.533e+003	000018	2.483e+003	000035	2.536e+003
000002	1.724e+003	000019	2.597e+003	000036	2.421e+003
000003	2.253e+003	000020	3.120e+003	000037	5.081e+003
000004	2.690e+003	000021	2.802e+003	000038	2.882e+003
000005	2.329e+003	000022	4.919e+003	000039	2.763e+003
000006	2.778e+003	000023	1.035e+004	000040	2.807e+003
000007	3.056e+003	000024	3.315e+003	000041	4.939e+003
000008	2.662e+003	000025	2.839e+003	000042	5.381e+003
000009	7.081e+003	000026	2.817e+003	000043	2.819e+003
000010	4.923e+003	000027	5.812e+003	000044	2.460e+003
000011	2.849e+003	000028	6.571e+003	000045	2.566e+003
000012	2.787e+003	000029	3.090e+003	000046	2.901e+003
000013	3.761e+003	000030	5.000e+003	000047	2.662e+003
000014	2.734e+003	000031	4.761e+003	000048	1.099e+004
000015	2.477e+003	000032	3.885e+003	000049	2.904e+003
000016	2.887e+003	000033	6.781e+003	000050	2.908e+003
000017	2.845e+003	000034	2.176e+003	000051	3.079e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Scan Measurement Data

Location	Value	Location	Value	Location	Value
000052	2.748e+003	000100	2.371e+003	000147	1.029e+003
000053	5.541e+003	000101	2.167e+003	000148	5.720e+003
000054	2.890e+003	000102	2.323e+003	000149	1.039e+003
000055	2.515e+003	000103	2.188e+003	000150	1.030e+003
000056	2.302e+003	000104	1.969e+003	000151	1.339e+003
000057	2.742e+003	000105	2.022e+003	000152	1.636e+003
000058	3.418e+003	000106	1.893e+003	000153	1.518e+003
000059	2.737e+003	000107	1.656e+003	000154	1.246e+003
000060	6.055e+003	000108	2.120e+003	000155	1.521e+003
000061	2.529e+003	000109	2.169e+003	000156	1.344e+003
000062	5.487e+003	000110	2.166e+003	000157	1.327e+003
000063	3.005e+003	000111	1.847e+003	000158	1.677e+003
000064	6.199e+003	000112	1.992e+003	000159	1.456e+003
000065	2.636e+003	000113	1.302e+003	000160	2.087e+003
000066	2.722e+003	000114	1.241e+003	000161	1.520e+003
000067	7.450e+003	000115	1.246e+003	000162	1.753e+003
000068	9.329e+003	000116	1.485e+003	000163	1.707e+003
000069	2.541e+003	000117	1.239e+003	000164	3.366e+003
000070	3.575e+003	000118	1.406e+003	000165	2.199e+003
000071	2.530e+003	000119	1.301e+003	000166	1.704e+003
000072	2.512e+003	000120	1.780e+003	000167	1.465e+003
000073	2.600e+003	000121	2.738e+003	000168	2.146e+003
000074	3.257e+003	000122	2.949e+003	000169	1.355e+003
000075	4.196e+003	000123	3.022e+003	000170	2.819e+003
000076	2.955e+003	000124	1.055e+003	000171	1.306e+003
000078	2.798e+003	000125	1.690e+003	000172	1.823e+003
000079	4.959e+003	000126	2.115e+003	000173	1.379e+003
000080	3.093e+003	000127	1.611e+003	000174	2.574e+003
000081	6.380e+003	000128	1.382e+003	000175	1.229e+003
000082	5.033e+003	000129	1.063e+003	000176	1.220e+003
000083	2.919e+003	000130	9.282e+002	000177	1.205e+003
000084	5.057e+003	000131	9.836e+002	000178	1.342e+003
000085	3.280e+003	000132	1.320e+003	000179	1.242e+003
000086	3.241e+003	000133	1.337e+003	000180	1.239e+003
000087	3.189e+003	000134	1.226e+003	000181	1.203e+003
000088	2.309e+003	000135	1.399e+003	000182	1.167e+003
000089	9.222e+003	000136	1.098e+003	000183	1.192e+003
000090	2.767e+003	000137	1.067e+003	000184	1.509e+003
000091	2.456e+003	000138	1.031e+003	000185	1.390e+003
000092	4.224e+003	000139	1.048e+003	000186	1.896e+003
000093	4.912e+003	000140	1.139e+003	000187	1.423e+003
000094	4.189e+003	000141	9.981e+002	000188	1.502e+003
000095	6.128e+003	000142	3.316e+003	000189	1.685e+003
000096	1.605e+003	000143	1.190e+003	000190	2.598e+003
000097	1.827e+003	000144	1.075e+003	000191	1.690e+003
000098	2.058e+003	000145	9.573e+002	000192	5.411e+003
000099	2.569e+003	000146	1.974e+003	000193	6.674e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Scan Measurement Data

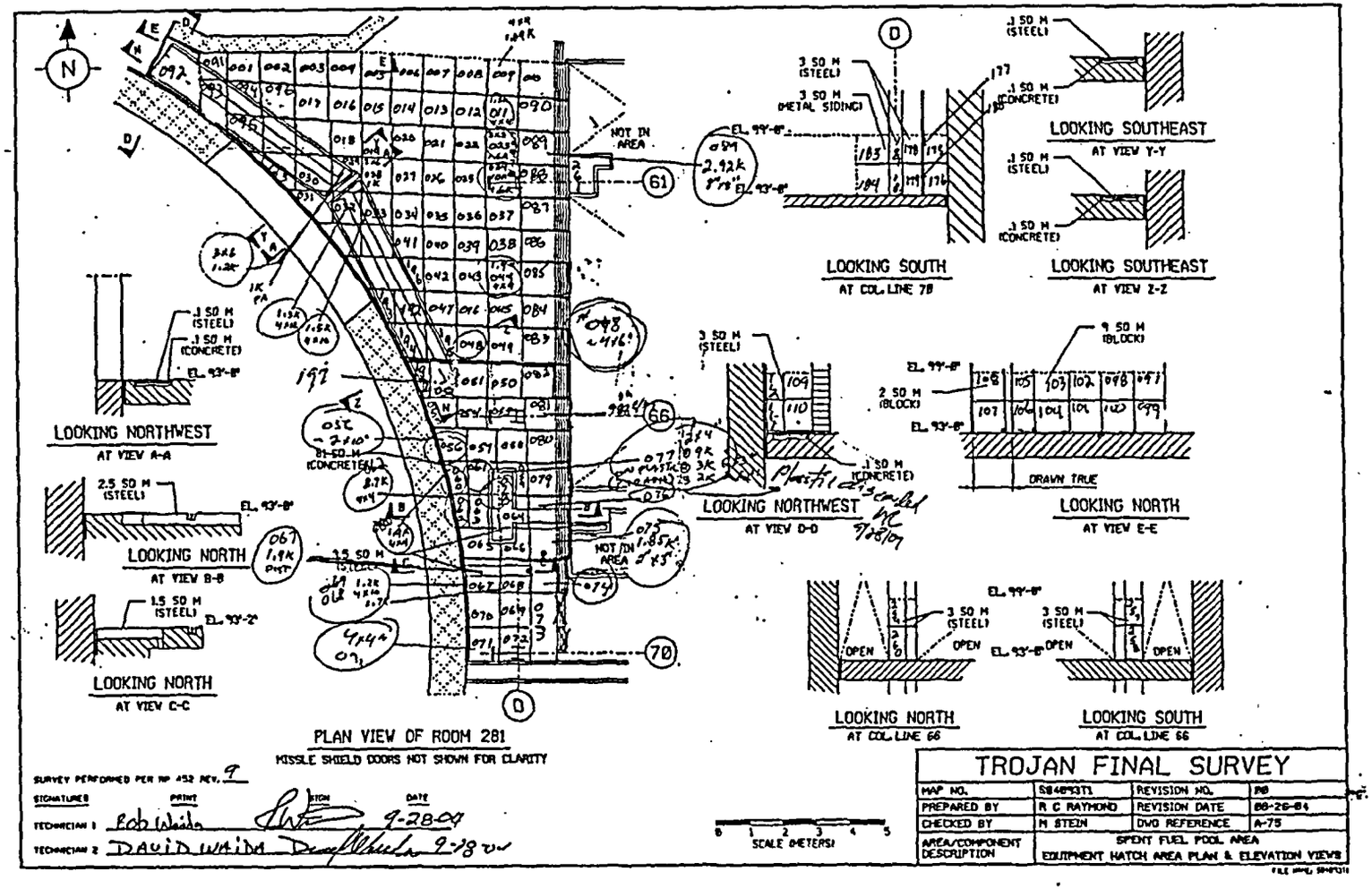
Location	Value	Location	Value
000194	5.298e+003	000241	2.254e+003
000195	3.746e+003	000242	2.347e+003
000196	6.793e+003	000243	1.860e+003
000197	6.819e+003	000244	2.285e+003
000198	2.870e+003	000245	2.641e+003
000199	2.375e+003	000246	2.736e+003
000200	2.262e+003	000247	5.924e+003
000201	2.529e+003	000248	3.911e+003
000202	2.365e+003	000249	1.896e+003
000203	2.189e+003	000250	2.256e+003
000204	2.238e+003	000251	1.052e+003
000205	2.364e+003	000252	1.000e+003
000206	2.138e+003	000253	1.679e+003
000207	2.139e+003	000254	1.037e+003
000208	2.021e+003	000255	1.105e+003
000209	2.118e+003	000256	3.574e+003
000210	1.949e+003	000257	9.478e+002
000211	2.260e+003	000258	8.893e+002
000212	1.922e+003	000259	8.769e+002
000213	2.338e+003	000260	1.144e+003
000214	9.876e+002	000261	1.707e+003
000215	1.038e+003	000262	6.778e+003
000216	1.033e+003	000263	5.296e+003
000217	1.064e+003	000264	6.514e+003
000218	1.033e+003	000265	6.027e+003
000219	1.245e+003	000266	5.154e+003
000220	1.018e+003	000267	5.337e+003
000221	1.879e+003	000268	2.294e+003
000222	1.943e+003	000269	6.656e+003
000223	3.024e+003	000270	4.566e+003
000224	1.911e+003	000271	6.676e+003
000225	2.258e+003		
000226	2.588e+003		
000227	3.069e+003		
000228	3.283e+003		
000229	2.525e+003		
000230	3.263e+003		
000231	2.395e+003		
000232	2.369e+003		
000233	2.439e+003		
000234	2.546e+003		
000235	4.609e+003		
000236	1.900e+003		
000237	1.496e+003		
000238	2.446e+003		
000239	1.707e+003		
000240	2.320e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Scan Measurement Locations Map

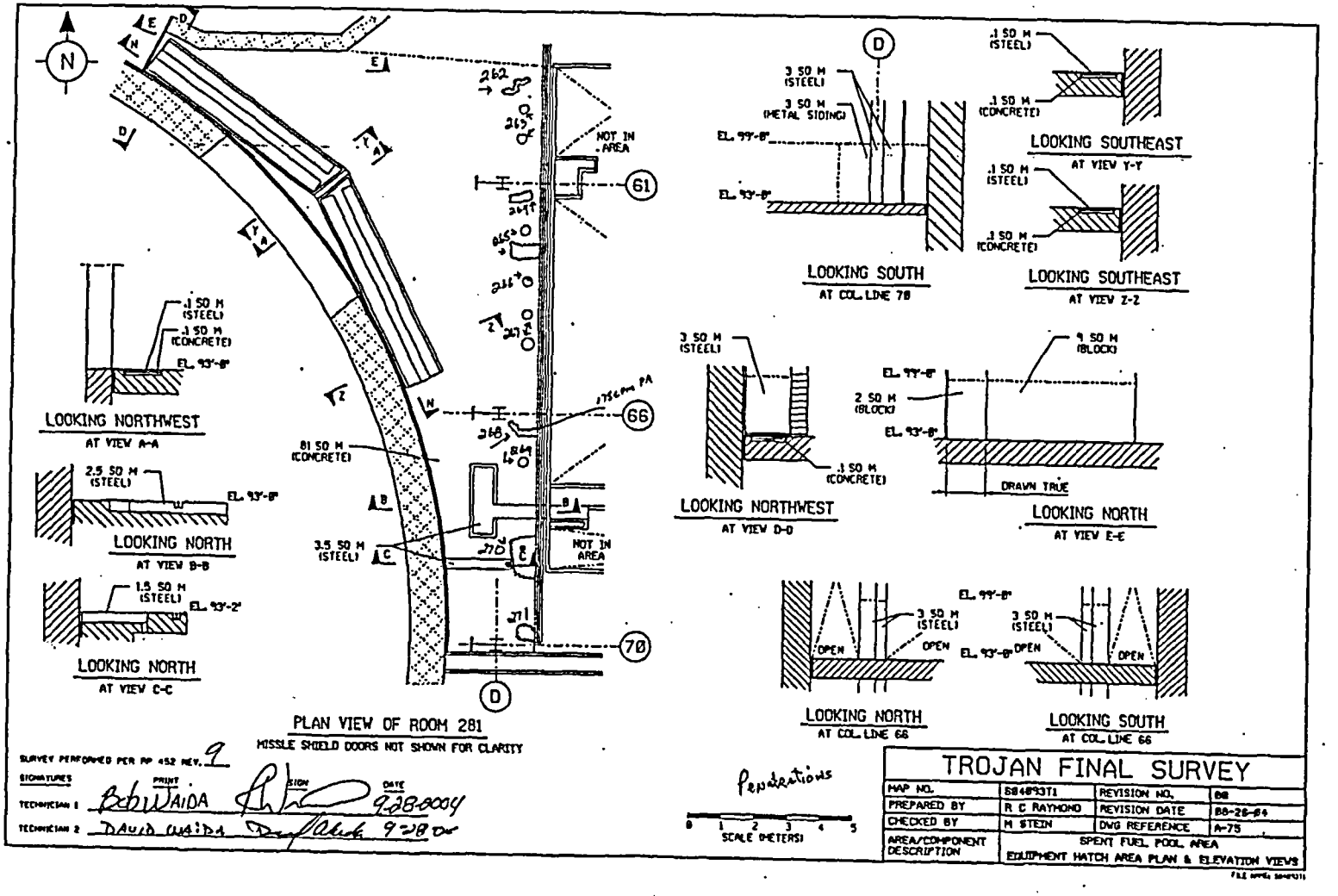


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Scan Measurement Locations Map

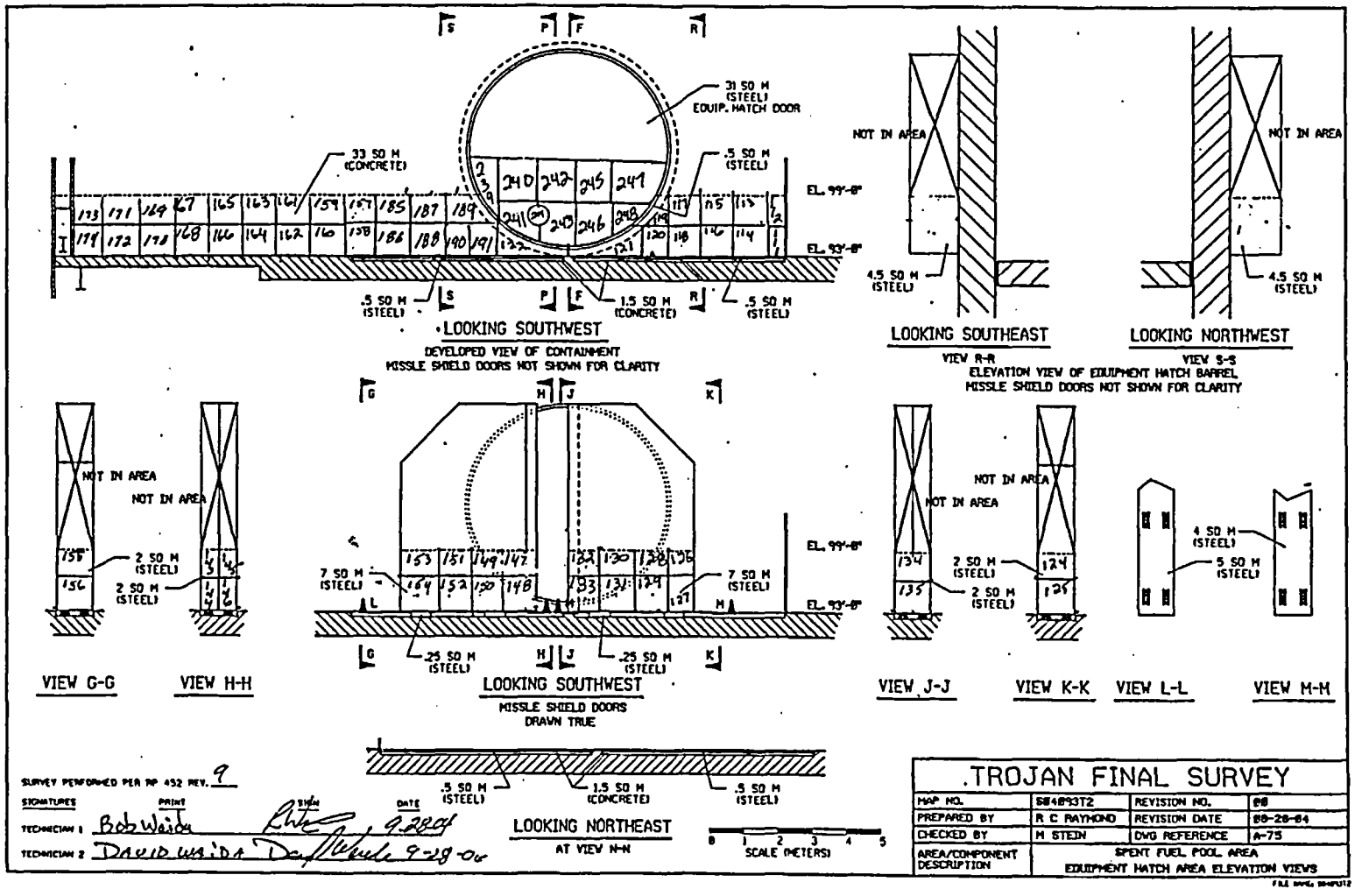


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Scan Measurement Locations Map

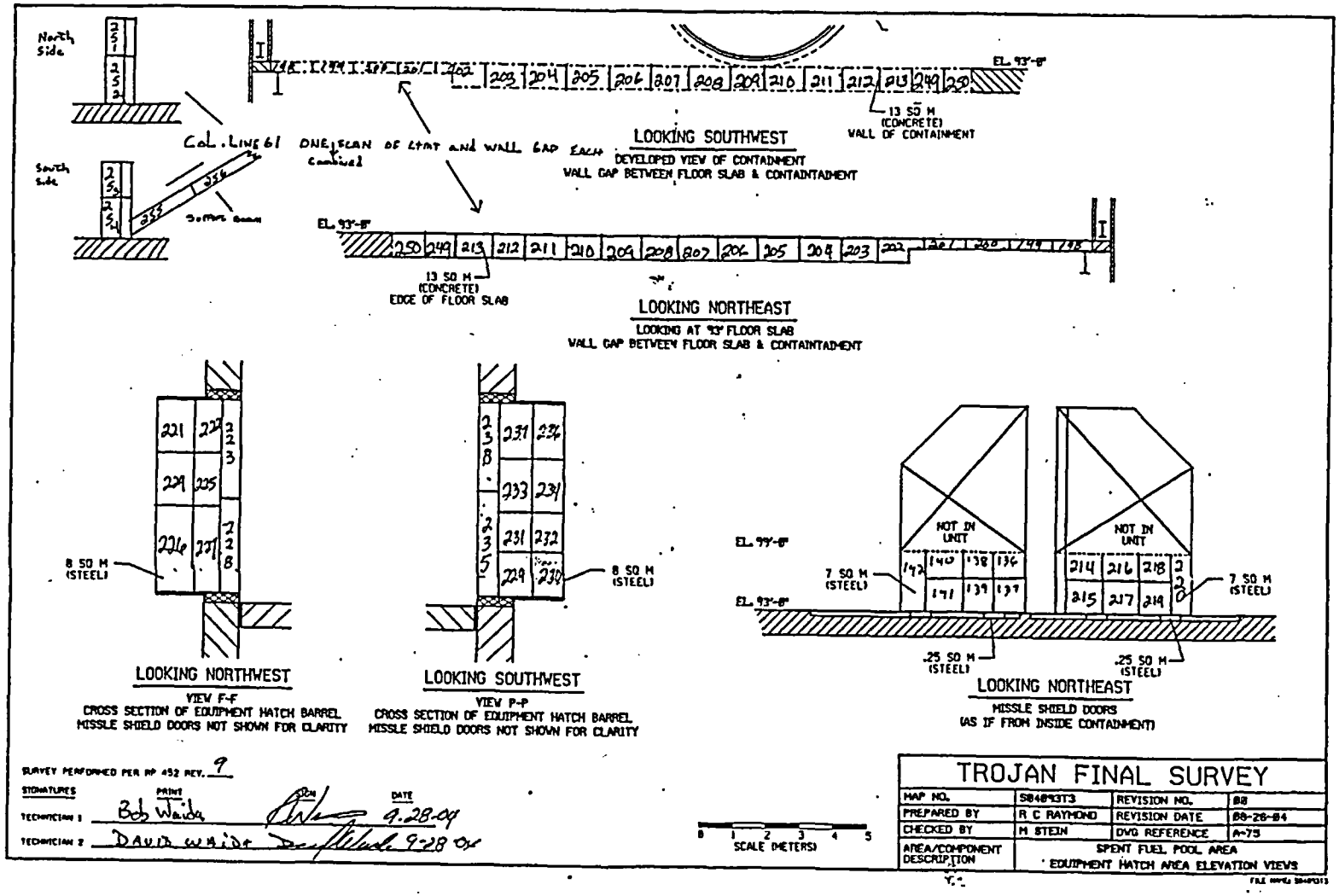


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093T
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southwest Floor and Lower Walls

Classification: Class 1
Size (m^2): 282

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	118	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	7.724e+002
Maximum Value	:	7.063e+003
Range	:	6.291e+003
Median	:	2.796e+003
Std. Deviation	:	1.356e+003
Mean	:	2.774e+003
95% UCL	:	2.981e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	7.742e+002	000018	9.726e+002	000035	2.581e+003
000002	9.788e+002	000019	6.119e+003	000036	2.874e+003
000003	9.185e+002	000020	9.185e+002	000037	2.739e+003
000004	8.371e+002	000021	1.695e+003	000038	2.563e+003
000005	7.724e+002	000022	1.144e+003	000039	2.668e+003
000006	7.821e+002	000023	1.111e+003	000040	2.761e+003
000007	1.129e+003	000024	1.147e+003	000041	2.631e+003
000008	8.734e+002	000025	1.043e+003	000042	2.834e+003
000009	9.185e+002	000026	9.867e+002	000043	4.095e+003
000010	9.221e+002	000027	9.398e+002	000044	2.761e+003
000011	9.168e+002	000028	5.967e+003	000045	6.931e+003
000012	9.894e+002	000029	3.023e+003	000046	5.309e+003
000013	9.673e+002	000030	1.058e+003	000047	2.973e+003
000014	8.734e+002	000031	1.431e+003	000048	2.976e+003
000015	9.053e+002	000032	2.862e+003	000049	2.896e+003
000016	8.654e+002	000033	2.687e+003	000050	2.626e+003
000017	1.645e+003	000034	2.523e+003	000051	2.380e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Scan Measurement Data

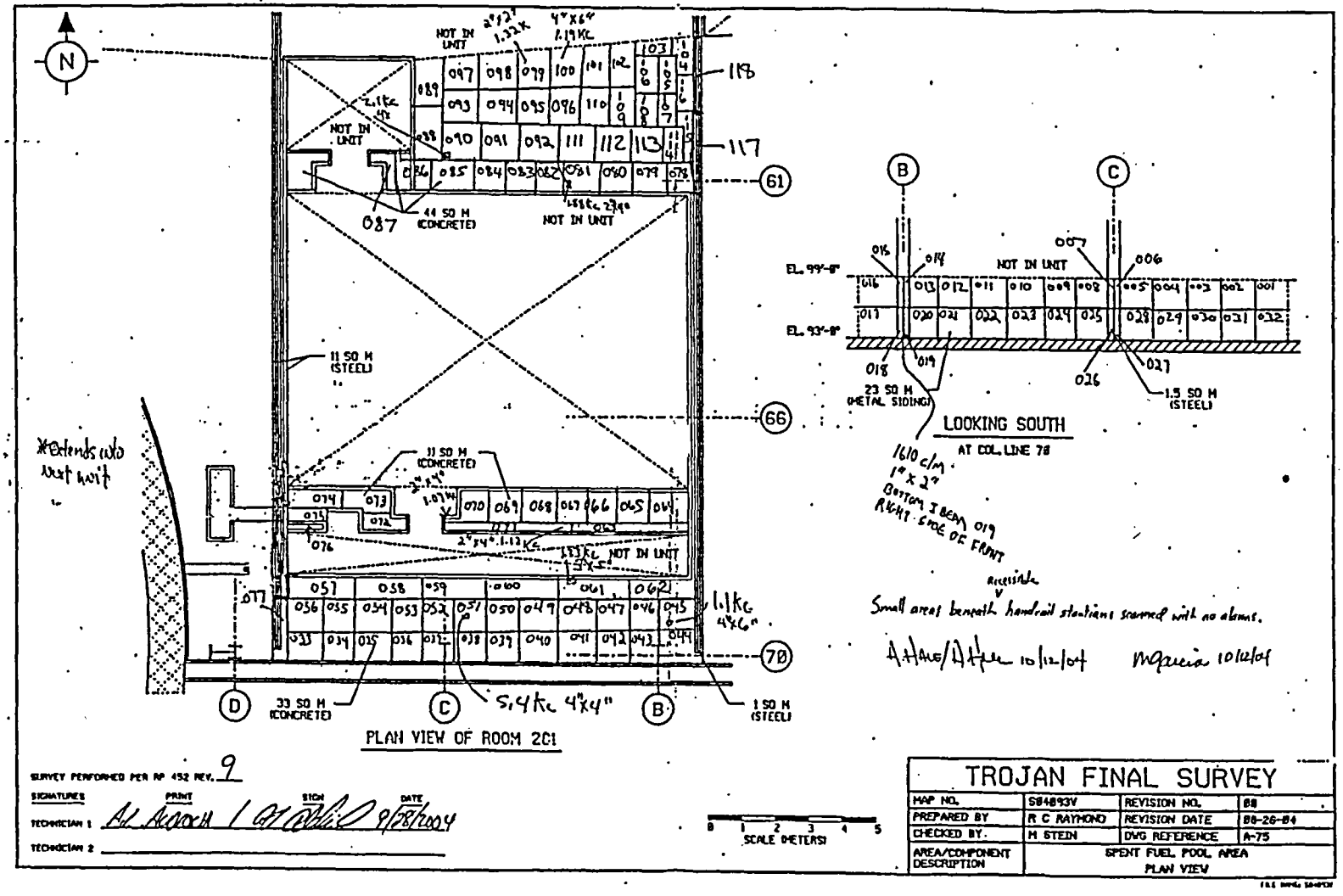
Location	Value	Location	Value
000052	2.795e+003	000099	2.346e+003
000053	2.555e+003	000100	2.361e+003
000054	2.961e+003	000101	4.605e+003
000055	2.994e+003	000102	2.978e+003
000056	3.094e+003	000103	2.907e+003
000057	3.468e+003	000104	2.733e+003
000058	4.089e+003	000105	2.749e+003
000059	2.767e+003	000106	3.548e+003
000060	4.817e+003	000107	2.845e+003
000061	2.361e+003	000108	3.019e+003
000062	3.038e+003	000109	2.750e+003
000063	4.199e+003	000110	2.829e+003
000064	3.139e+003	000111	2.764e+003
000065	2.982e+003	000112	2.917e+003
000066	2.789e+003	000113	2.826e+003
000067	3.242e+003	000114	3.108e+003
000068	3.378e+003	000115	3.751e+003
000069	3.307e+003	000116	2.975e+003
000070	6.770e+003	000117	3.462e+003
000071	7.063e+003	000118	3.875e+003
000072	2.796e+003		
000073	3.085e+003		
000074	3.592e+003		
000075	4.596e+003		
000076	3.570e+003		
000077	5.731e+003		
000078	4.258e+003		
000079	2.941e+003		
000080	2.843e+003		
000081	2.755e+003		
000082	2.824e+003		
000083	2.784e+003		
000084	2.786e+003		
000085	2.412e+003		
000086	5.483e+003		
000087	2.837e+003		
000088	2.539e+003		
000089	1.602e+003		
000090	2.772e+003		
000091	3.642e+003		
000092	3.860e+003		
000093	2.629e+003		
000094	2.722e+003		
000095	2.867e+003		
000096	2.834e+003		
000097	2.933e+003		
000098	4.140e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093V
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool South Center Floor Area

Classification: Class 1
Size (m^2): 113

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	189	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	7.986e+002
Maximum Value	:	1.192e+004
Range	:	1.112e+004
Median	:	2.681e+003
Std. Deviation	:	1.566e+003
Mean	:	2.754e+003
95% UCL	:	2.942e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	2.990e+003	000018	3.120e+003	000035	1.908e+003
000002	1.998e+003	000019	3.156e+003	000036	1.898e+003
000003	2.369e+003	000020	2.922e+003	000037	1.643e+003
000004	2.390e+003	000021	2.949e+003	000038	1.710e+003
000005	2.456e+003	000022	3.084e+003	000039	1.868e+003
000006	2.298e+003	000023	3.306e+003	000040	2.049e+003
000007	2.559e+003	000024	2.477e+003	000041	1.758e+003
000008	2.589e+003	000025	2.447e+003	000042	1.700e+003
000009	2.592e+003	000026	2.391e+003	000043	1.619e+003
000010	3.065e+003	000027	2.273e+003	000044	2.228e+003
000011	3.036e+003	000028	2.394e+003	000045	1.991e+003
000012	2.925e+003	000029	2.418e+003	000046	1.769e+003
000013	3.279e+003	000030	2.207e+003	000047	1.547e+003
000014	3.453e+003	000031	1.958e+003	000048	1.523e+003
000015	2.820e+003	000032	1.962e+003	000049	2.190e+003
000016	3.150e+003	000033	2.379e+003	000050	2.832e+003
000017	3.054e+003	000034	1.761e+003	000051	1.015e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Scan Measurement Data

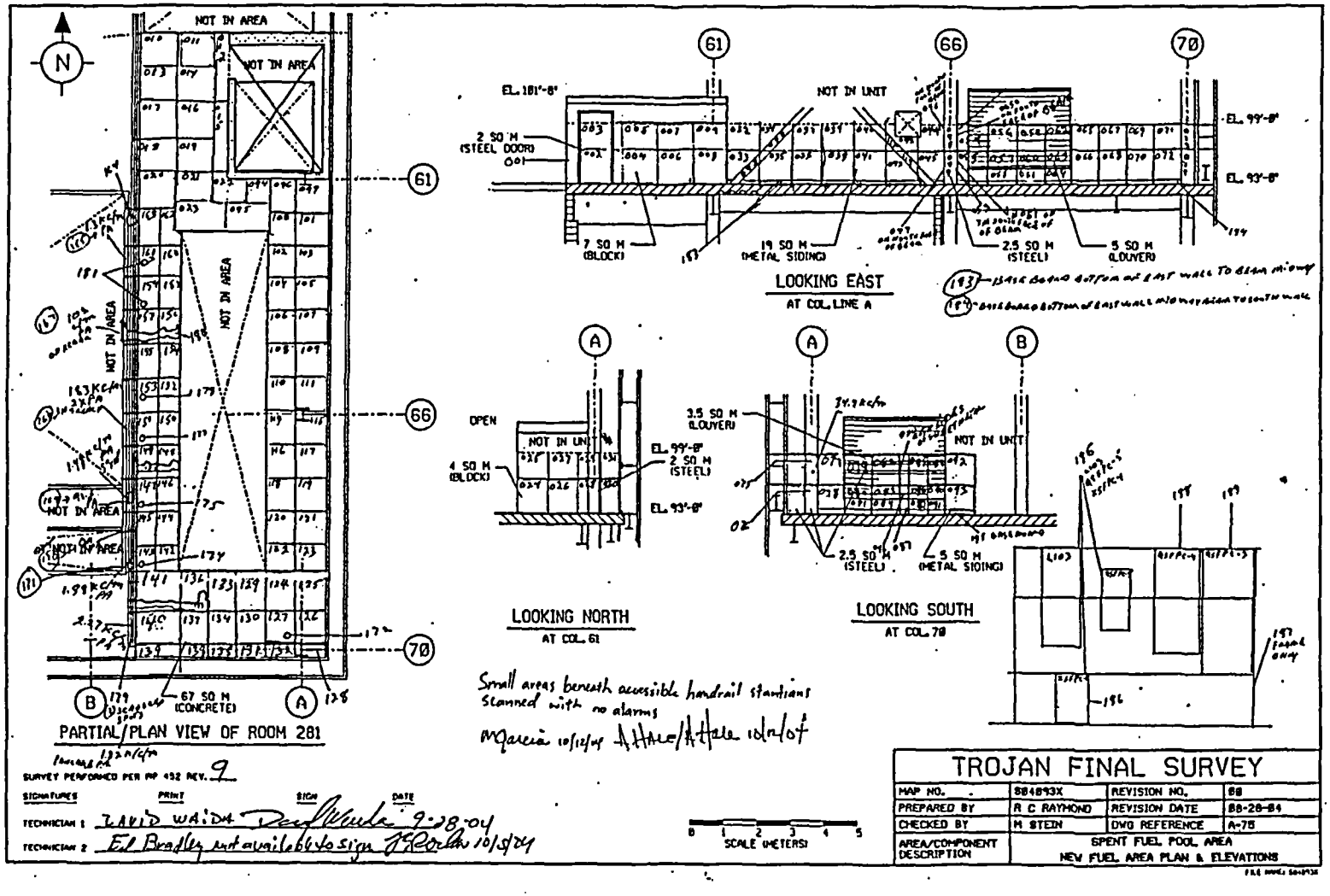
Location	Value	Location	Value	Location	Value
000052	9.508e+002	000099	1.601e+003	000146	2.836e+003
000053	9.301e+002	000100	2.754e+003	000147	5.426e+003
000054	8.487e+002	000101	2.921e+003	000148	2.673e+003
000055	1.099e+003	000102	2.783e+003	000149	5.967e+003
000056	1.255e+003	000103	2.813e+003	000150	2.955e+003
000057	1.099e+003	000104	2.797e+003	000151	4.127e+003
000058	1.234e+003	000105	2.650e+003	000152	3.105e+003
000059	1.041e+003	000106	2.952e+003	000153	3.996e+003
000060	1.118e+003	000107	2.696e+003	000154	3.105e+003
000061	1.070e+003	000108	2.692e+003	000155	4.955e+003
000062	1.171e+003	000109	2.819e+003	000156	2.806e+003
000063	1.228e+003	000110	2.813e+003	000157	5.815e+003
000064	1.125e+003	000111	2.709e+003	000158	2.970e+003
000065	1.312e+003	000112	1.615e+003	000159	3.524e+003
000066	1.125e+003	000113	2.758e+003	000160	2.833e+003
000067	9.430e+002	000114	2.972e+003	000161	6.306e+003
000068	9.828e+002	000115	3.005e+003	000162	3.054e+003
000069	9.266e+002	000116	2.864e+003	000163	5.068e+003
000070	9.993e+002	000117	2.818e+003	000164	6.231e+003
000071	1.042e+003	000118	2.777e+003	000165	3.920e+003
000072	1.069e+003	000119	3.002e+003	000166	5.621e+003
000073	9.820e+002	000120	5.575e+003	000167	8.983e+003
000074	7.986e+002	000121	2.681e+003	000168	5.736e+003
000075	9.353e+002	000122	3.094e+003	000169	7.450e+003
000076	8.262e+002	000123	2.796e+003	000170	2.108e+003
000077	1.507e+003	000124	2.943e+003	000171	5.640e+003
000078	1.026e+003	000125	2.828e+003	000172	3.789e+003
000079	1.004e+003	000126	2.735e+003	000173	5.893e+003
000080	8.704e+002	000127	2.636e+003	000174	5.979e+003
000081	1.025e+003	000128	2.515e+003	000175	5.760e+003
000082	1.093e+003	000129	2.986e+003	000176	5.711e+003
000083	9.327e+002	000130	2.655e+003	000177	5.060e+003
000084	1.139e+003	000131	2.751e+003	000178	4.909e+003
000085	1.202e+003	000132	2.748e+003	000179	1.192e+004
000086	1.222e+003	000133	2.733e+003	000180	2.002e+003
000087	2.153e+003	000134	2.858e+003	000181	1.975e+003
000088	1.925e+003	000135	2.769e+003	000182	2.746e+003
000089	1.957e+003	000136	5.103e+003	000183	2.493e+003
000090	2.381e+003	000137	4.079e+003	000184	2.292e+003
000091	4.035e+003	000138	2.857e+003	000185	2.584e+003
000092	1.815e+003	000139	4.587e+003	000186	2.347e+003
000093	1.432e+003	000140	4.749e+003	000187	1.760e+003
000094	2.983e+003	000141	3.143e+003	000188	1.497e+003
000095	2.991e+003	000142	5.882e+003	000189	1.767e+003
000096	2.704e+003	000143	3.698e+003		
000097	2.898e+003	000144	3.011e+003		
000098	2.027e+003	000145	3.589e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04093X
Survey Unit Name: FB 93' Elevation – Spent Fuel Pool Southeast Floor Area

Classification: Class 1
Size (m^2): 120

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	165	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	7.605e+002
Maximum Value	:	7.454e+003
Range	:	6.694e+003
Median	:	1.203e+003
Std. Deviation	:	1.451e+003
Mean	:	1.752e+003
95% UCL	:	1.939e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	6.292e+003	000018	3.845e+003	000035	1.222e+003
000002	6.081e+003	000019	4.001e+003	000036	1.256e+003
000003	6.546e+003	000020	4.316e+003	000037	1.175e+003
000004	6.693e+003	000021	3.889e+003	000038	1.307e+003
000005	9.400e+002	000022	4.043e+003	000039	1.266e+003
000006	1.322e+003	000023	3.886e+003	000040	1.175e+003
000007	6.989e+003	000024	4.618e+003	000041	1.250e+003
000008	1.333e+003	000025	3.752e+003	000042	1.174e+003
000009	9.360e+002	000026	3.560e+003	000043	1.313e+003
000010	6.313e+003	000027	3.277e+003	000044	1.386e+003
000011	6.503e+003	000028	3.710e+003	000045	1.174e+003
000012	7.454e+003	000029	3.307e+003	000046	1.488e+003
000013	9.150e+002	000030	3.158e+003	000047	1.271e+003
000014	4.582e+003	000031	3.341e+003	000048	1.236e+003
000015	3.526e+003	000032	3.299e+003	000049	1.353e+003
000016	6.546e+003	000033	3.373e+003	000050	1.220e+003
000017	3.708e+003	000034	1.192e+003	000051	1.195e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G **Classification:** Class 1
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room **Size (m^2):** 155

Scan Measurement Data

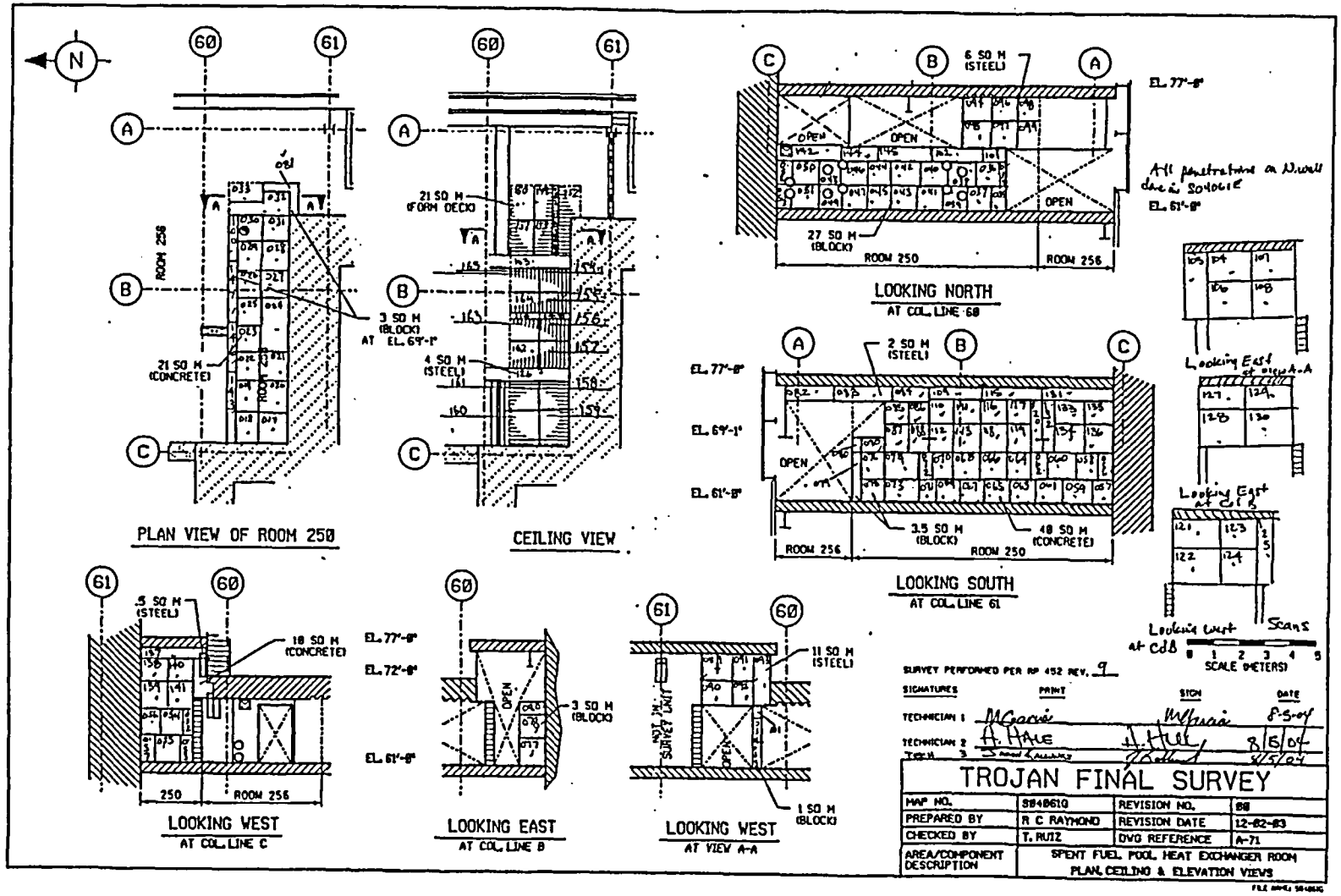
Location	Value	Location	Value	Location	Value
000052	1.133e+003	000099	1.061e+003	000146	1.183e+003
000053	1.243e+003	000100	1.482e+003	000147	1.173e+003
000054	1.170e+003	000101	1.167e+003	000148	1.018e+003
000055	1.198e+003	000102	1.031e+003	000149	1.139e+003
000056	1.192e+003	000103	9.905e+002	000150	1.313e+003
000057	1.326e+003	000104	9.850e+002	000151	1.057e+003
000058	1.239e+003	000105	8.815e+002	000152	1.172e+003
000059	1.237e+003	000106	9.575e+002	000153	1.335e+003
000060	1.203e+003	000107	9.090e+002	000154	1.237e+003
000061	1.346e+003	000108	1.002e+003	000155	1.348e+003
000062	1.013e+003	000109	1.005e+003	000156	1.343e+003
000063	1.104e+003	000110	1.134e+003	000157	1.365e+003
000064	1.024e+003	000111	1.049e+003	000158	1.189e+003
000065	1.577e+003	000112	9.805e+002	000159	1.402e+003
000066	1.204e+003	000113	1.158e+003	000160	1.704e+003
000067	1.210e+003	000114	1.197e+003	000161	1.243e+003
000068	1.133e+003	000115	1.207e+003	000162	1.298e+003
000069	1.154e+003	000116	1.107e+003	000163	1.348e+003
000070	1.254e+003	000117	1.240e+003	000164	1.194e+003
000071	1.248e+003	000118	1.584e+003	000165	1.215e+003
000072	9.594e+002	000119	1.053e+003		
000073	1.256e+003	000120	1.054e+003		
000074	1.100e+003	000121	8.586e+002		
000075	1.208e+003	000122	1.111e+003		
000076	1.364e+003	000123	1.177e+003		
000077	1.219e+003	000124	9.951e+002		
000078	1.261e+003	000125	7.660e+002		
000079	1.196e+003	000126	1.128e+003		
000080	1.617e+003	000127	8.174e+002		
000081	1.778e+003	000128	9.081e+002		
000082	1.278e+003	000129	8.687e+002		
000083	1.492e+003	000130	8.751e+002		
000084	1.115e+003	000131	1.241e+003		
000085	9.264e+002	000132	1.046e+003		
000086	1.040e+003	000133	1.152e+003		
000087	1.065e+003	000134	1.085e+003		
000088	9.310e+002	000135	1.076e+003		
000089	8.641e+002	000136	1.105e+003		
000090	8.119e+002	000137	1.140e+003		
000091	7.605e+002	000138	1.119e+003		
000092	8.412e+002	000139	1.079e+003		
000093	8.183e+002	000140	1.210e+003		
000094	9.502e+002	000141	1.128e+003		
000095	9.438e+002	000142	1.488e+003		
000096	9.869e+002	000143	1.224e+003		
000097	8.925e+002	000144	1.432e+003		
000098	9.301e+002	000145	1.056e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room

Classification: Class 1
Size (m^2): 155

Scan Measurement Locations Map

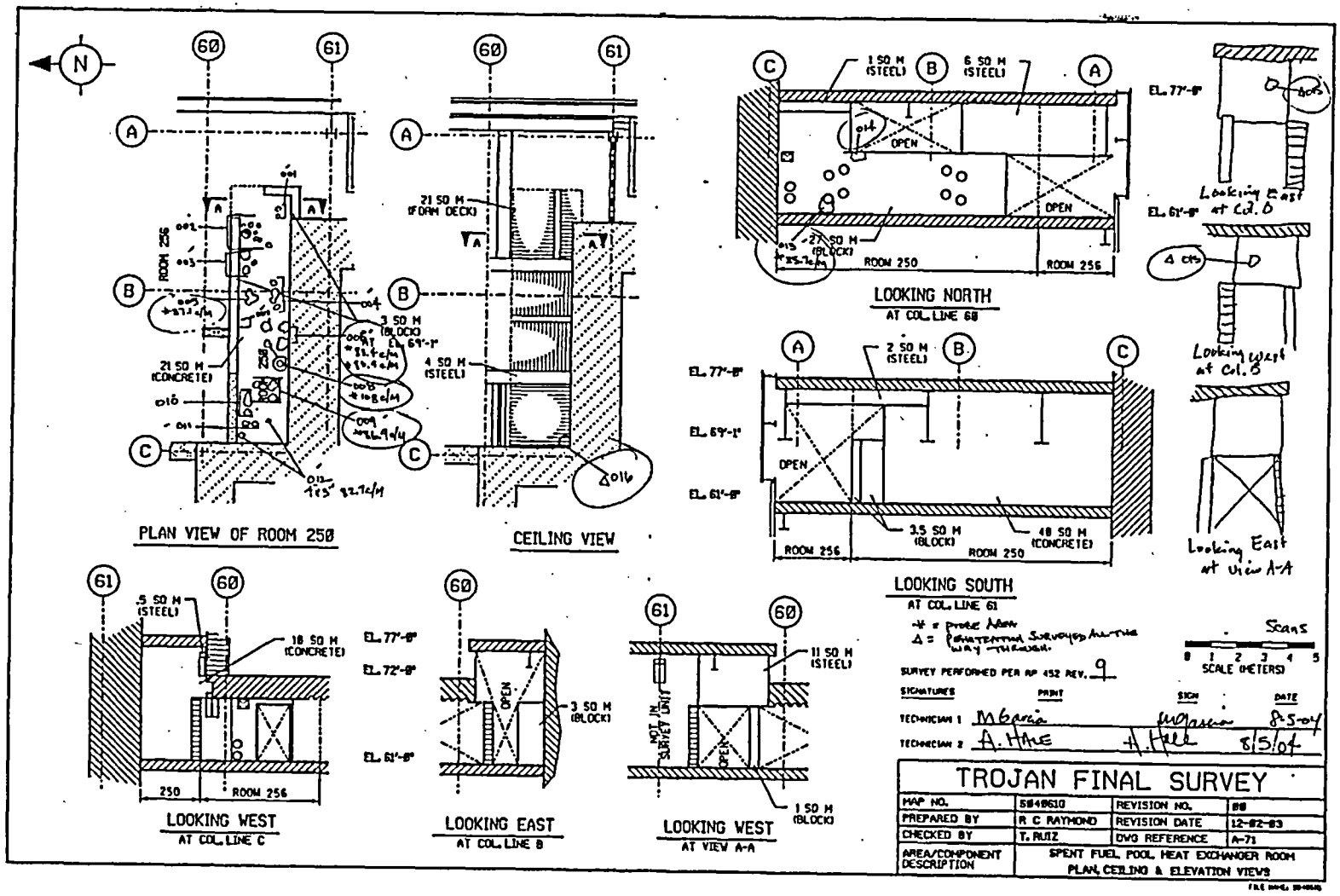


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S04061G
Survey Unit Name: FB 61' Elevation– SFP Heat Exchanger Room

Classification: Class 1
Size (m^2): 155

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	166	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	6.041e+002
Maximum Value	:	6.848e+003
Range	:	6.244e+003
Median	:	1.560e+003
Std. Deviation	:	1.267e+003
Mean	:	1.916e+003
95% UCL	:	2.079e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	2.321e+003	000018	2.734e+003	000035	2.420e+003
000002	2.529e+003	000019	2.565e+003	000036	2.199e+003
000003	1.859e+003	000020	2.574e+003	000037	1.834e+003
000004	2.080e+003	000021	2.728e+003	000038	2.030e+003
000005	2.110e+003	000022	2.577e+003	000039	2.062e+003
000006	2.126e+003	000023	2.793e+003	000040	1.898e+003
000007	2.347e+003	000024	2.704e+003	000041	1.982e+003
000008	2.463e+003	000025	3.364e+003	000042	2.000e+003
000009	2.423e+003	000026	2.879e+003	000043	1.934e+003
000010	2.492e+003	000027	2.508e+003	000044	1.615e+003
000011	2.818e+003	000028	2.645e+003	000045	1.915e+003
000012	2.433e+003	000029	3.440e+003	000046	1.985e+003
000013	2.341e+003	000030	6.660e+003	000047	1.891e+003
000014	2.741e+003	000031	2.418e+003	000048	1.769e+003
000015	2.476e+003	000032	1.631e+003	000049	1.631e+003
000016	2.527e+003	000033	2.542e+003	000050	1.591e+003
000017	2.715e+003	000034	2.393e+003	000051	1.596e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Scan Measurement Data

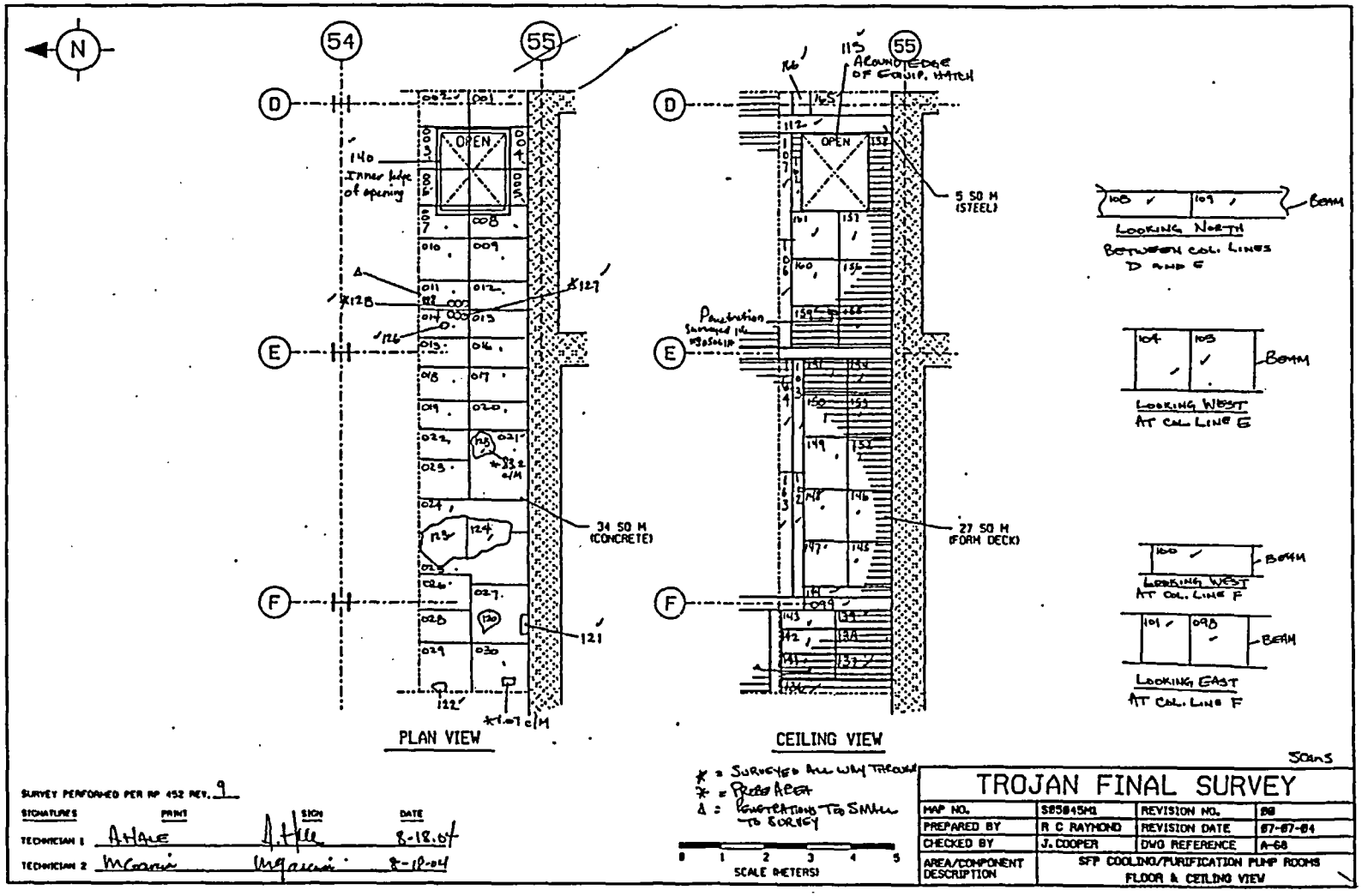
Location	Value	Location	Value	Location	Value
000052	2.037e+003	000099	7.058e+002	000146	1.248e+003
000053	1.834e+003	000100	6.041e+002	000147	1.267e+003
000054	2.096e+003	000101	7.354e+002	000148	1.209e+003
000055	2.078e+003	000102	9.179e+002	000149	1.252e+003
000056	2.030e+003	000103	9.144e+002	000150	1.196e+003
000057	1.949e+003	000104	9.587e+002	000151	1.339e+003
000058	2.306e+003	000105	8.605e+002	000152	1.356e+003
000059	1.716e+003	000106	9.544e+002	000153	1.124e+003
000060	2.383e+003	000107	8.457e+002	000154	2.663e+003
000061	1.568e+003	000108	8.127e+002	000155	1.233e+003
000062	1.928e+003	000109	7.649e+002	000156	1.330e+003
000063	1.626e+003	000110	8.049e+002	000157	2.899e+003
000064	2.816e+003	000111	6.997e+002	000158	1.155e+003
000065	2.173e+003	000112	8.127e+002	000159	2.318e+003
000066	1.196e+003	000113	9.014e+002	000160	2.316e+003
000067	1.221e+003	000114	6.719e+002	000161	1.120e+003
000068	1.299e+003	000115	1.685e+003	000162	9.983e+002
000069	1.303e+003	000116	9.370e+002	000163	1.552e+003
000070	1.313e+003	000117	7.849e+002	000164	1.376e+003
000071	1.376e+003	000118	7.562e+002	000165	1.209e+003
000072	1.325e+003	000119	7.901e+002	000166	9.115e+002
000073	1.215e+003	000120	5.536e+003		
000074	1.303e+003	000121	6.694e+003		
000075	1.009e+003	000122	6.231e+003		
000076	1.320e+003	000123	6.289e+003		
000077	1.357e+003	000124	6.231e+003		
000078	1.191e+003	000125	6.848e+003		
000079	8.866e+002	000126	5.035e+003		
000080	9.866e+002	000127	3.974e+003		
000081	1.133e+003	000128	3.781e+003		
000082	9.448e+002	000129	3.762e+003		
000083	1.109e+003	000130	4.070e+003		
000084	7.936e+002	000131	6.019e+003		
000085	1.159e+003	000132	8.702e+002		
000086	9.683e+002	000133	1.181e+003		
000087	9.840e+002	000134	8.420e+002		
000088	1.203e+003	000135	8.615e+002		
000089	9.674e+002	000136	1.224e+003		
000090	9.700e+002	000137	1.207e+003		
000091	1.117e+003	000138	1.302e+003		
000092	9.405e+002	000139	1.105e+003		
000093	1.105e+003	000140	1.992e+003		
000094	1.448e+003	000141	1.280e+003		
000095	9.344e+002	000142	1.400e+003		
000096	1.030e+003	000143	1.063e+003		
000097	1.120e+003	000144	1.183e+003		
000098	8.258e+002	000145	1.250e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Scan Measurement Locations Map

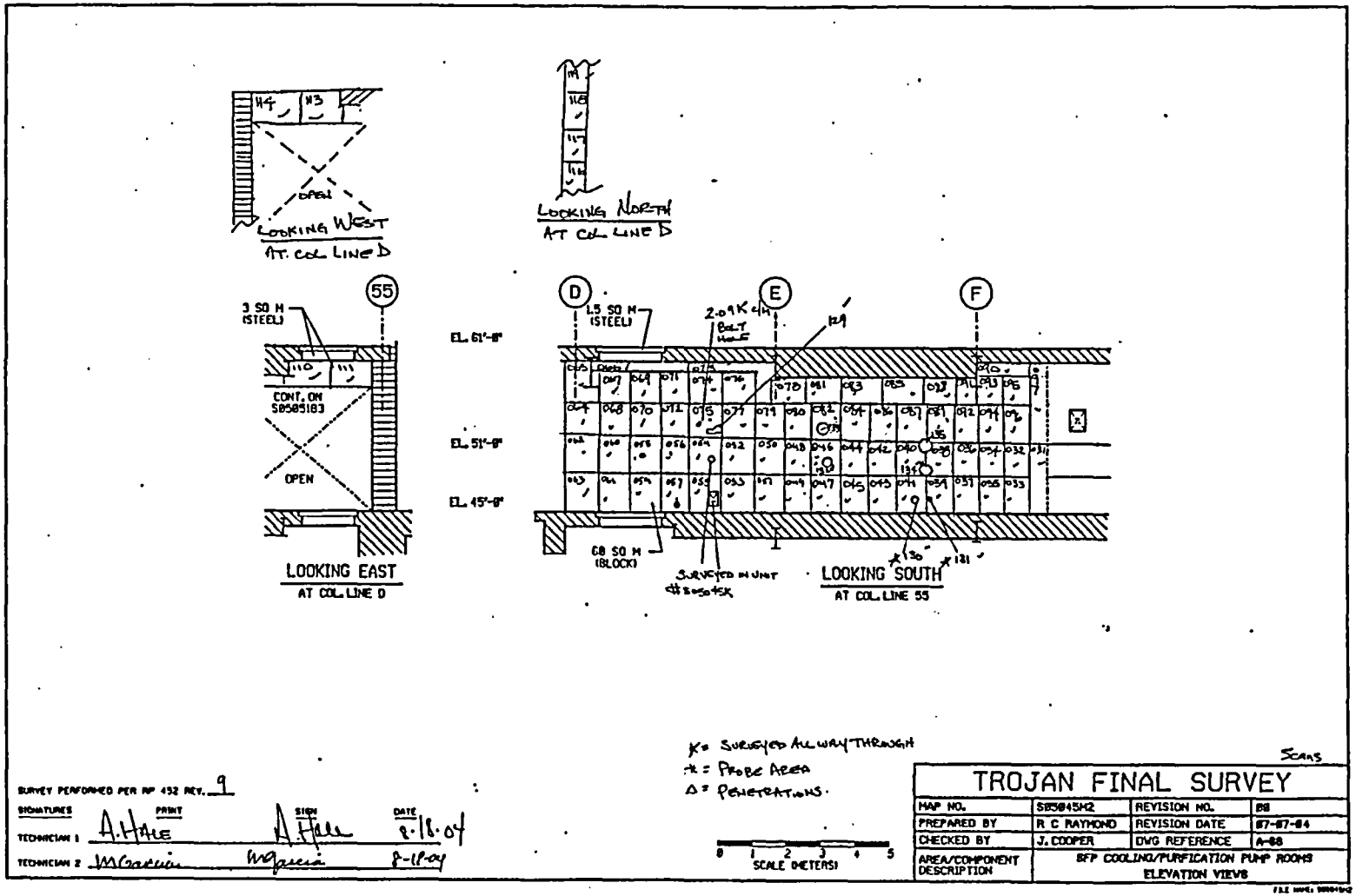


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05045M
Survey Unit Name: AB 45' Elevation– Spent Fuel Pool Cooling and Purification Pump Rooms

Classification: Class 1
Size (m^2): 131

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	52	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	8.693e+002
Maximum Value	:	7.417e+003
Range	:	6.548e+003
Median	:	1.592e+003
Std. Deviation	:	1.329e+003
Mean	:	1.967e+003
95% UCL	:	2.276e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	3.659e+003	000018	3.376e+003	000035	8.693e+002
000002	1.832e+003	000019	2.771e+003	000036	9.170e+002
000003	1.840e+003	000020	1.182e+003	000037	1.149e+003
000004	2.349e+003	000021	4.593e+003	000038	1.004e+003
000005	1.818e+003	000022	4.556e+003	000039	3.488e+003
000006	1.752e+003	000023	3.370e+003	000040	9.245e+002
000007	1.974e+003	000024	4.160e+003	000041	9.459e+002
000008	2.121e+003	000025	1.069e+003	000042	1.038e+003
000009	2.068e+003	000026	7.417e+003	000043	9.338e+002
000010	2.013e+003	000027	4.763e+003	000044	9.936e+002
000011	2.451e+003	000028	8.973e+002	000045	1.286e+003
000012	1.930e+003	000029	1.050e+003	000046	1.302e+003
000013	2.102e+003	000030	8.871e+002	000047	1.431e+003
000014	2.260e+003	000031	9.450e+002	000048	1.060e+003
000015	1.912e+003	000032	9.899e+002	000049	9.132e+002
000016	1.909e+003	000033	9.086e+002	000050	9.699e+002
000017	2.826e+003	000034	8.815e+002	000051	1.120e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Scan Measurement Data

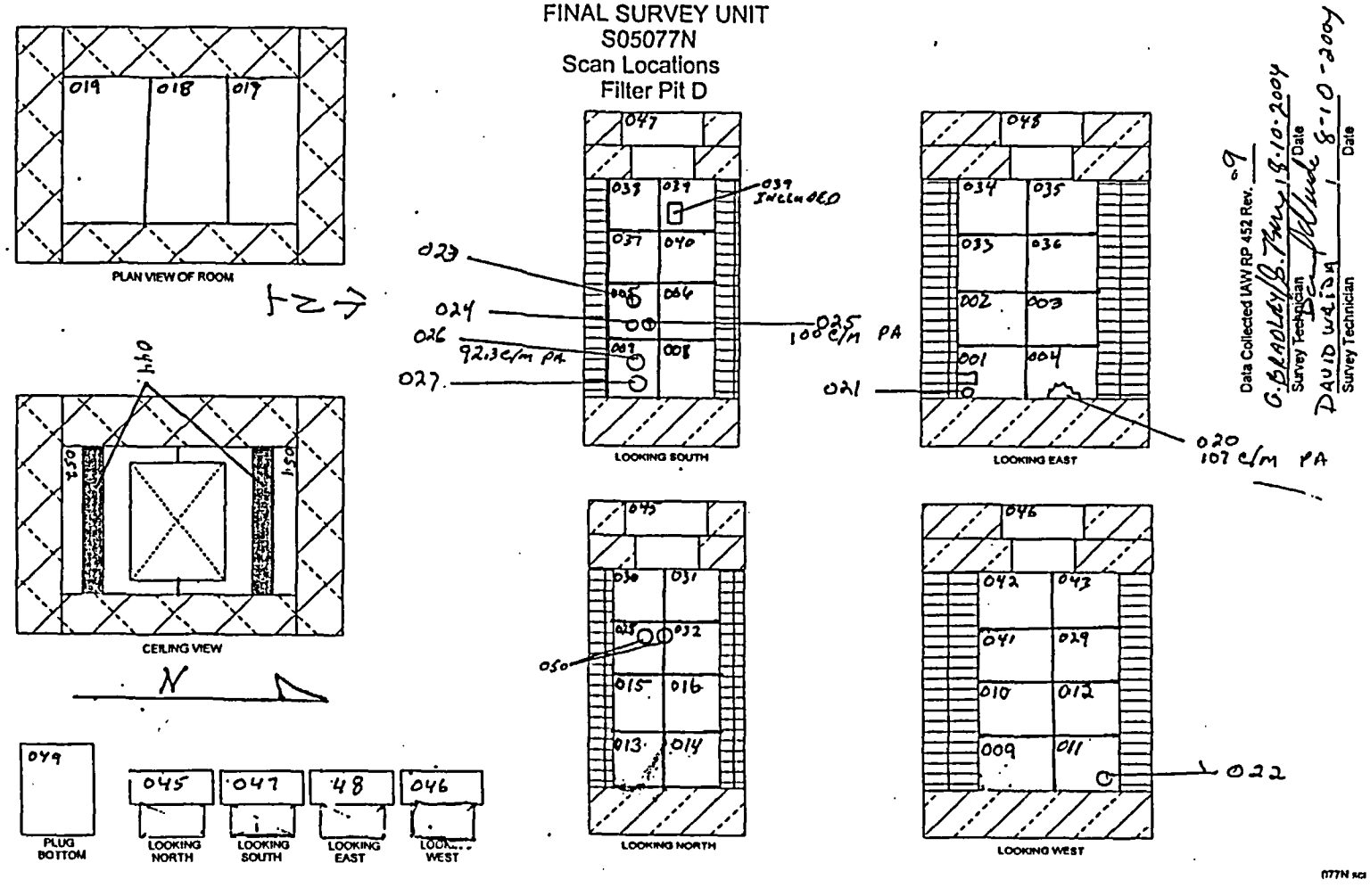
Location	Value
000052	1.302e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077N
Survey Unit Name: AB 77' Elevation– Filter Pit "D"

Classification: Class 1
Size (m^2): 36

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	57	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	9.516e+002
Maximum Value	:	7.209e+003
Range	:	6.257e+003
Median	:	1.810e+003
Std. Deviation	:	1.738e+003
Mean	:	2.397e+003
95% UCL	:	2.782e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	1.810e+003	000018	3.473e+003	000035	1.135e+003
000002	1.884e+003	000019	3.247e+003	000036	1.087e+003
000003	2.687e+003	000020	5.309e+003	000037	1.133e+003
000004	2.595e+003	000021	3.445e+003	000038	1.132e+003
000005	2.179e+003	000022	6.231e+003	000039	9.889e+002
000006	7.209e+003	000023	1.157e+003	000040	1.176e+003
000007	1.888e+003	000024	6.250e+003	000041	9.516e+002
000008	2.223e+003	000025	6.269e+003	000042	1.108e+003
000009	2.401e+003	000026	6.288e+003	000043	1.103e+003
000010	2.403e+003	000027	1.346e+003	000044	1.079e+003
000011	2.448e+003	000028	4.744e+003	000045	9.525e+002
000012	2.660e+003	000029	5.008e+003	000046	1.147e+003
000013	2.085e+003	000030	1.028e+003	000047	1.014e+003
000014	2.560e+003	000031	1.141e+003	000048	2.487e+003
000015	2.284e+003	000032	9.544e+002	000049	1.378e+003
000016	2.274e+003	000033	1.130e+003	000050	1.557e+003
000017	2.886e+003	000034	1.363e+003	000051	6.653e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Scan Measurement Data

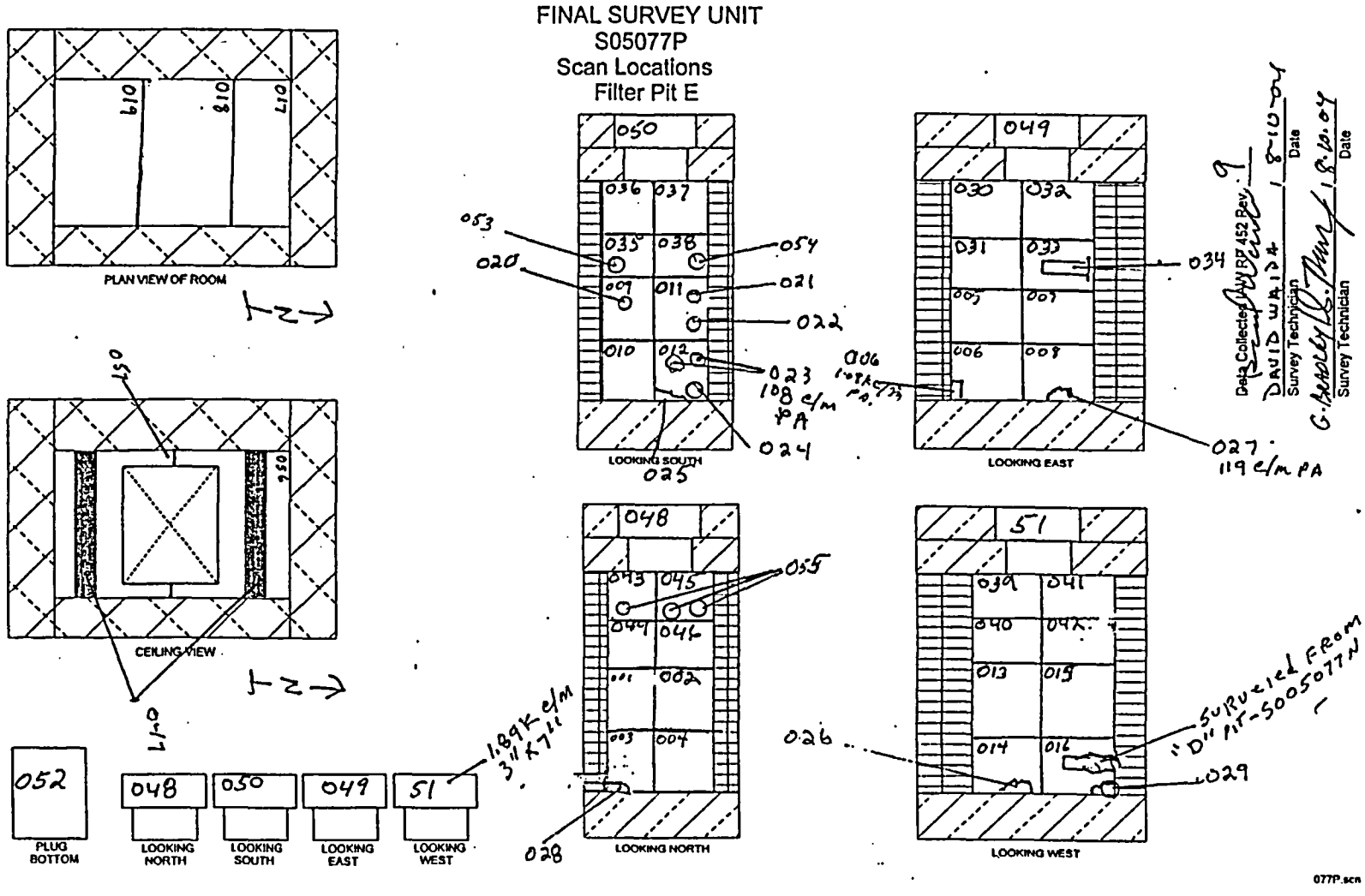
Location	Value
000052	1.019e+003
000053	1.366e+003
000054	1.180e+003
000055	1.189e+003
000056	1.404e+003
000057	1.526e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: S05077P
Survey Unit Name: AB 77' Elevation– Filter Pit "E"

Classification: Class 1
Size (m^2): 36

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	118	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	5.967e+002
Maximum Value	:	8.944e+003
Range	:	8.347e+003
Median	:	2.892e+003
Std. Deviation	:	1.954e+003
Mean	:	2.908e+003
95% UCL	:	3.206e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	7.492e+003	000018	6.569e+002	000035	6.272e+002
000002	7.911e+003	000019	8.465e+002	000036	6.497e+002
000003	3.782e+003	000020	7.602e+002	000037	7.387e+002
000004	2.467e+003	000021	6.784e+002	000038	8.240e+002
000005	1.804e+003	000022	7.521e+002	000039	8.654e+002
000006	1.822e+003	000023	7.207e+002	000040	6.641e+002
000007	7.503e+002	000024	1.059e+003	000041	7.000e+002
000008	6.928e+002	000025	3.034e+003	000042	7.126e+002
000009	8.618e+002	000026	1.271e+003	000043	6.497e+002
000010	1.298e+003	000027	9.076e+002	000044	7.818e+002
000011	4.048e+003	000028	7.935e+002	000045	1.760e+003
000012	2.168e+003	000029	8.950e+002	000046	7.423e+002
000013	7.063e+002	000030	1.026e+003	000047	2.963e+003
000014	7.054e+002	000031	8.699e+002	000048	9.669e+002
000015	6.901e+002	000032	7.782e+002	000049	7.026e+003
000016	7.027e+002	000033	5.967e+002	000050	2.548e+003
000017	6.012e+002	000034	6.200e+002	000051	7.425e+003

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Scan Measurement Data

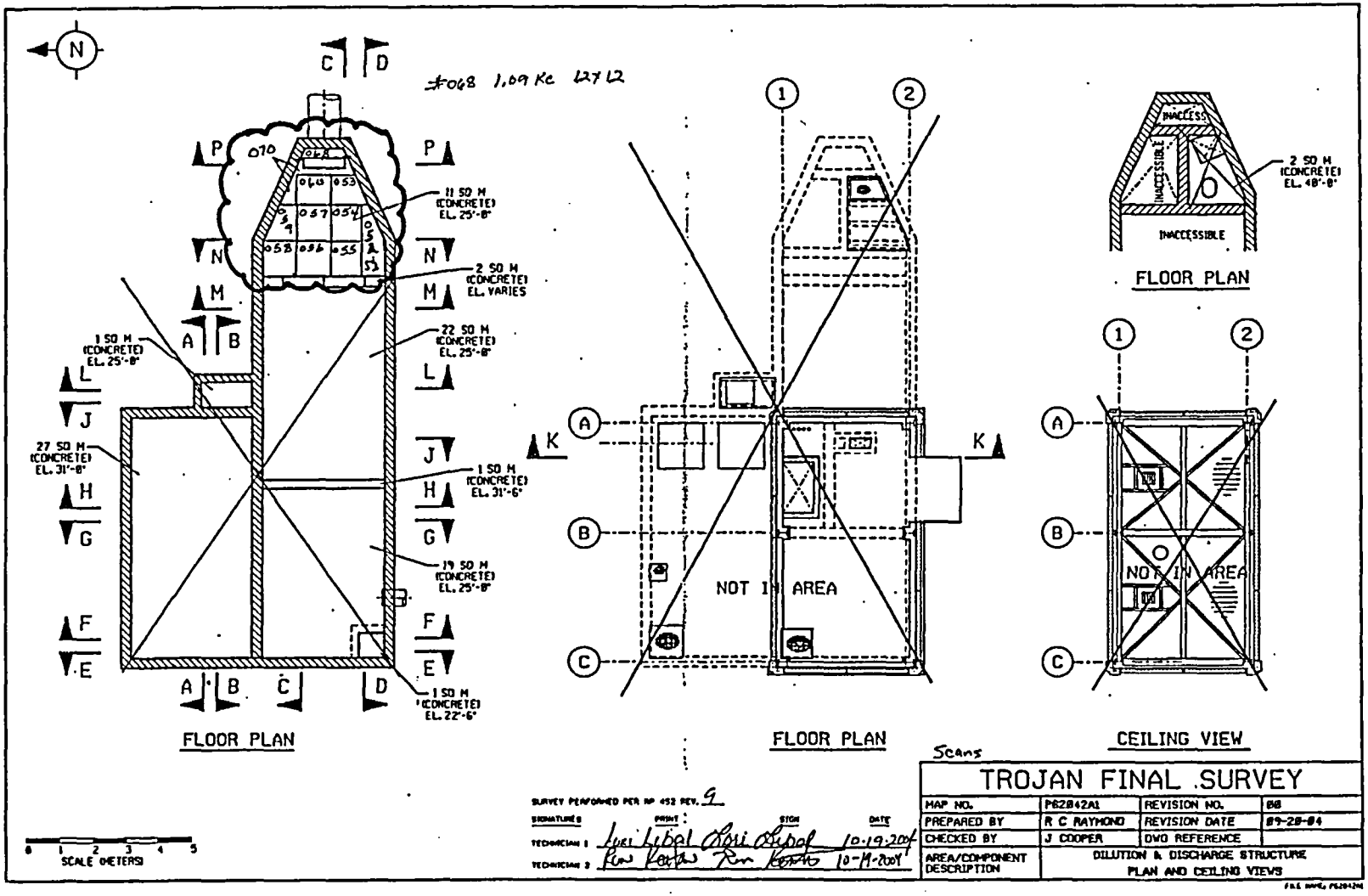
Location	Value	Location	Value
000052	2.825e+003	000099	3.222e+003
000053	2.909e+003	000100	2.748e+003
000054	2.967e+003	000101	2.658e+003
000055	3.059e+003	000102	2.673e+003
000056	3.090e+003	000103	2.751e+003
000057	3.110e+003	000104	2.717e+003
000058	2.960e+003	000105	2.532e+003
000059	3.438e+003	000106	2.667e+003
000060	5.025e+003	000107	2.729e+003
000061	3.437e+003	000108	2.754e+003
000062	6.323e+003	000109	2.627e+003
000063	8.944e+003	000110	3.260e+003
000064	3.321e+003	000111	2.946e+003
000065	7.451e+003	000112	2.604e+003
000066	3.938e+003	000113	3.659e+003
000067	6.359e+003	000114	2.738e+003
000068	6.984e+003	000115	3.047e+003
000069	4.404e+003	000116	4.079e+003
000070	5.795e+003	000117	3.089e+003
000071	4.167e+003	000118	3.071e+003
000072	6.488e+003		
000073	4.668e+003		
000074	3.045e+003		
000075	6.963e+003		
000076	3.231e+003		
000077	4.479e+003		
000078	4.155e+003		
000079	3.105e+003		
000080	4.892e+003		
000081	4.109e+003		
000082	3.204e+003		
000083	3.461e+003		
000084	4.815e+003		
000085	4.712e+003		
000086	6.277e+003		
000087	3.290e+003		
000088	3.056e+003		
000089	5.246e+003		
000090	3.020e+003		
000091	2.681e+003		
000092	2.874e+003		
000093	3.029e+003		
000094	2.550e+003		
000095	3.152e+003		
000096	4.431e+003		
000097	4.185e+003		
000098	3.491e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Scan Measurement Locations Map

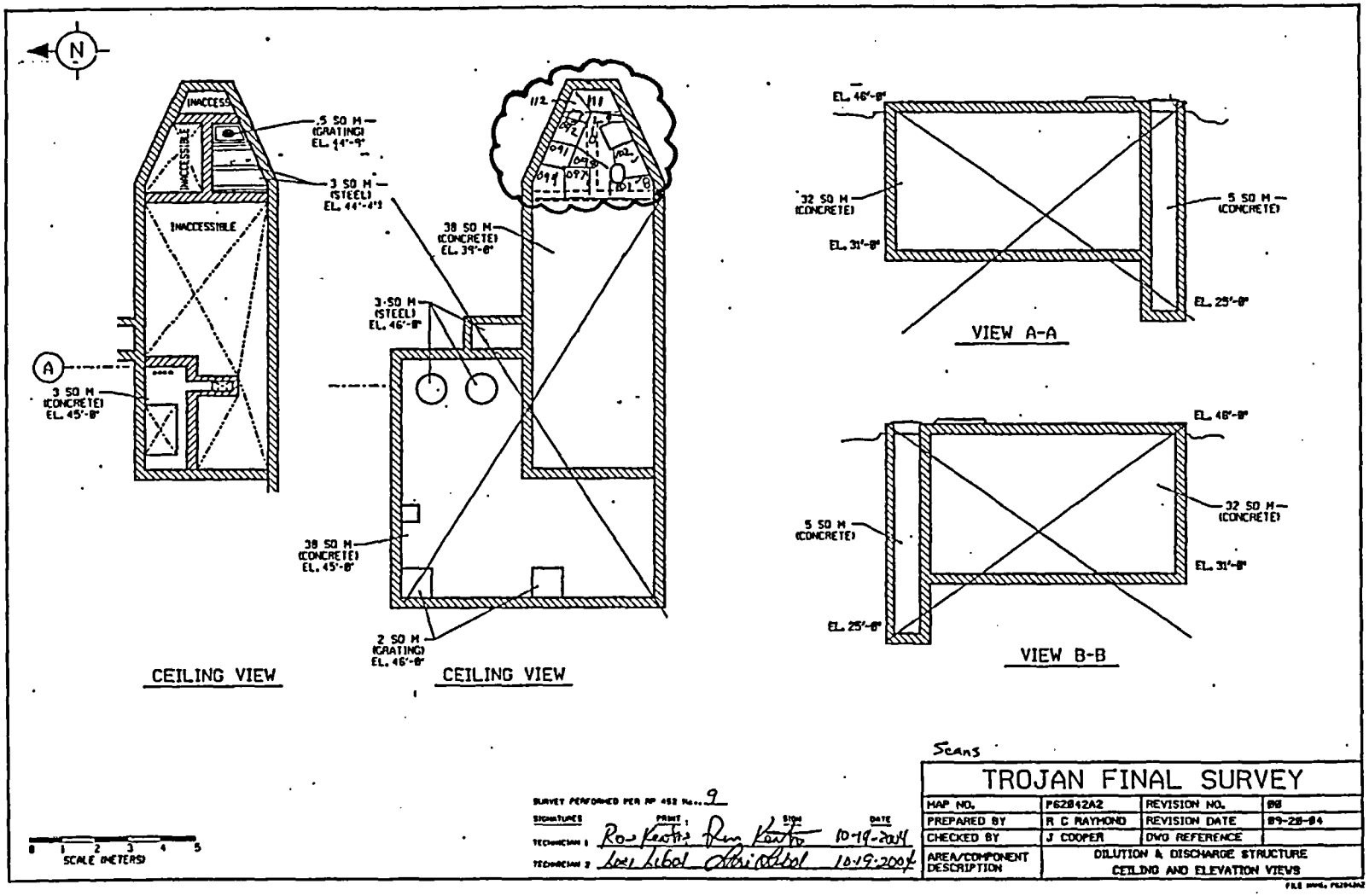


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Scan Measurement Locations Map

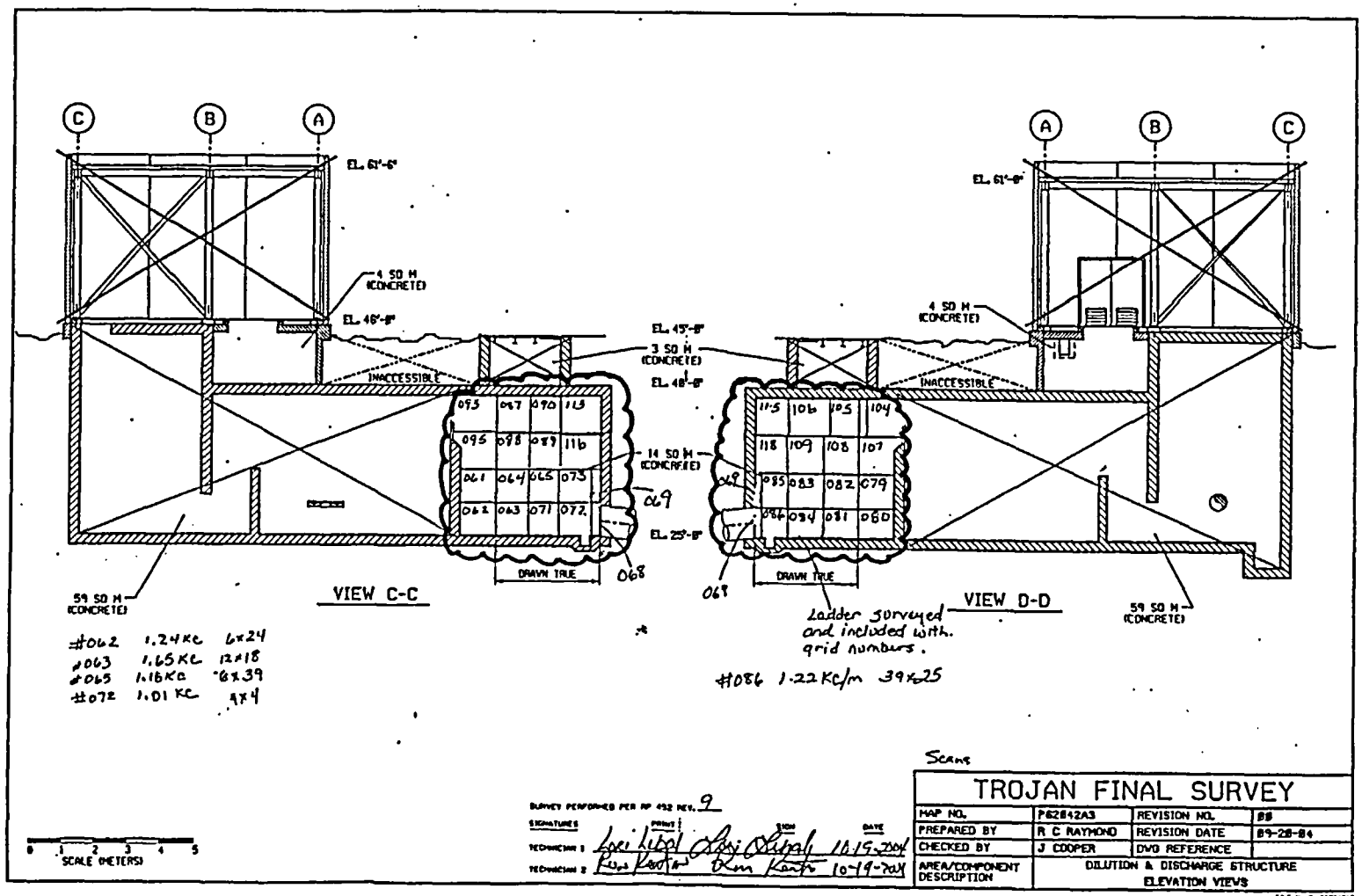


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Scan Measurement Locations Map

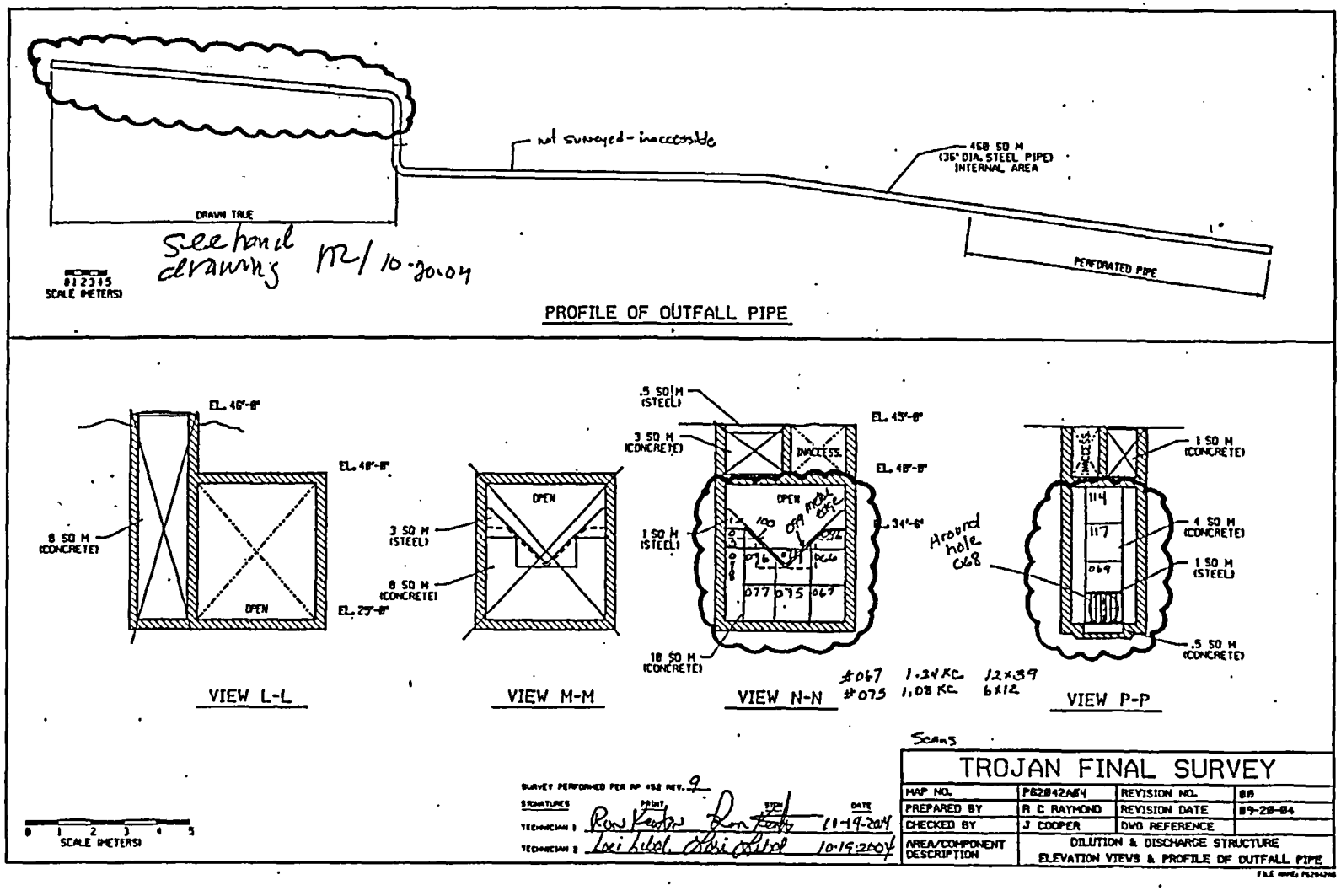


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Scan Measurement Locations Map

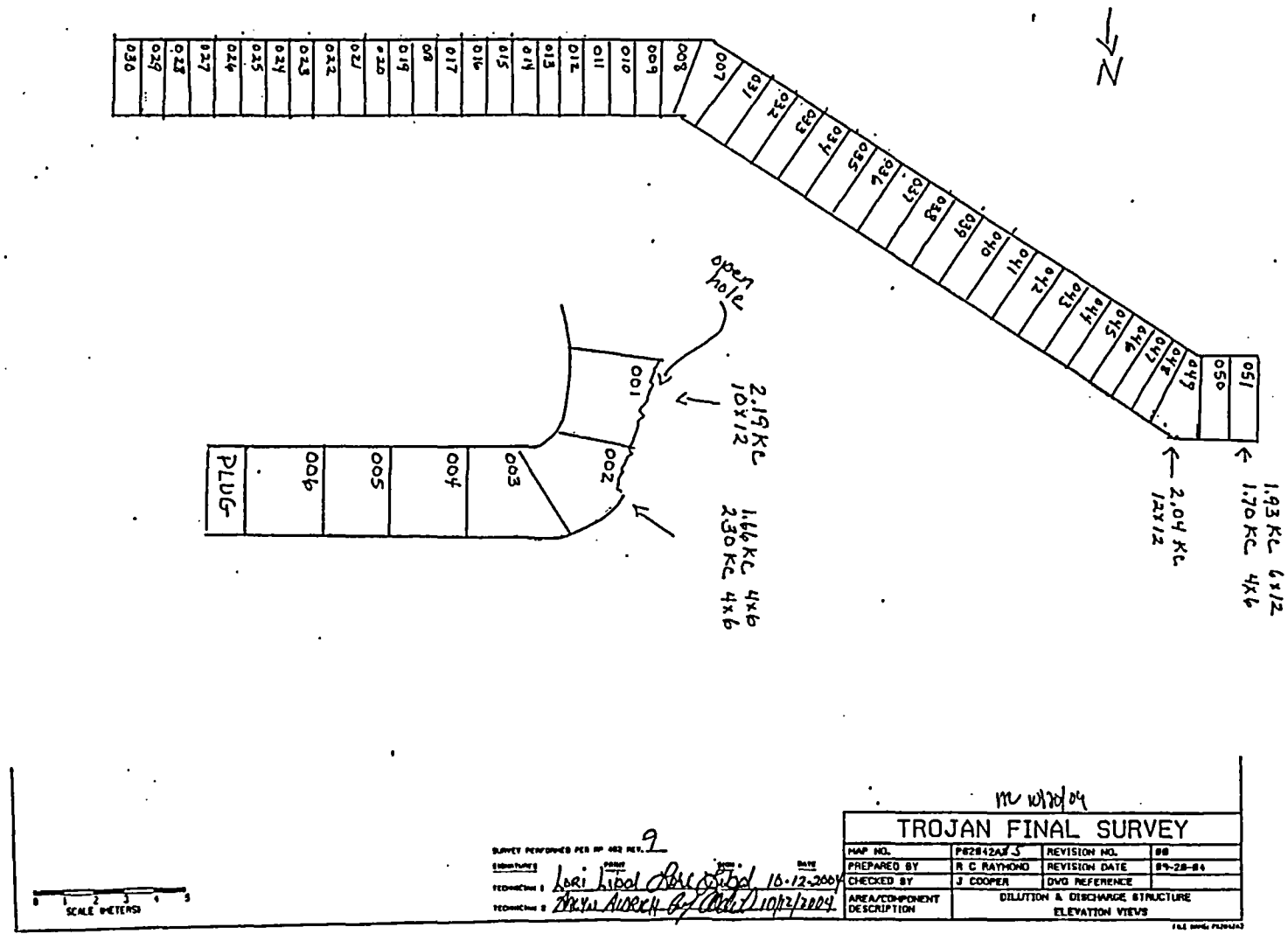


FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62042A
Survey Unit Name: Discharge and Dilution Structure Outfall Chamber and Pipe

Classification: Class 1
Size (m^2): 209

Scan Measurement Locations Map



FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Scan Measurement Data

Type 1 Error : 5.000e-002 Type 2 Error : 5.000e-002
Relative Shift : 3.000e+000

Measurement Type Code	# Of Meas.	Measurement Unit	DCGL	SGN	WRS
8	185	DPM/100 CM²	7.500e+003	-	-

Statistical Quantities

Measurement Name:

Minimum Value	:	6.842e+002
Maximum Value	:	4.830e+003
Range	:	4.146e+003
Median	:	1.068e+003
Std. Deviation	:	5.239e+002
Mean	:	1.181e+003
95% UCL	:	1.245e+003

Measurement Values

Location	Value	Location	Value	Location	Value
000001	1.128e+003	000018	1.547e+003	000035	8.785e+002
000002	1.386e+003	000019	1.410e+003	000036	1.170e+003
000003	1.209e+003	000020	4.523e+003	000037	7.929e+002
000004	8.463e+002	000021	1.073e+003	000038	9.448e+002
000005	4.830e+003	000022	1.132e+003	000039	8.868e+002
000006	1.125e+003	000023	9.641e+002	000040	1.509e+003
000007	3.041e+003	000024	1.294e+003	000041	1.176e+003
000008	9.568e+002	000025	3.417e+003	000042	1.102e+003
000009	7.855e+002	000026	1.584e+003	000043	9.816e+002
000010	8.499e+002	000027	8.361e+002	000044	1.049e+003
000011	8.131e+002	000028	8.150e+002	000045	8.988e+002
000012	7.505e+002	000029	8.103e+002	000046	8.831e+002
000013	8.776e+002	000030	7.487e+002	000047	8.417e+002
000014	8.067e+002	000031	1.068e+003	000048	1.085e+003
000015	8.831e+002	000032	8.619e+002	000049	9.006e+002
000016	8.057e+002	000033	1.631e+003	000050	1.081e+003
000017	1.124e+003	000034	9.733e+002	000051	7.984e+002

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

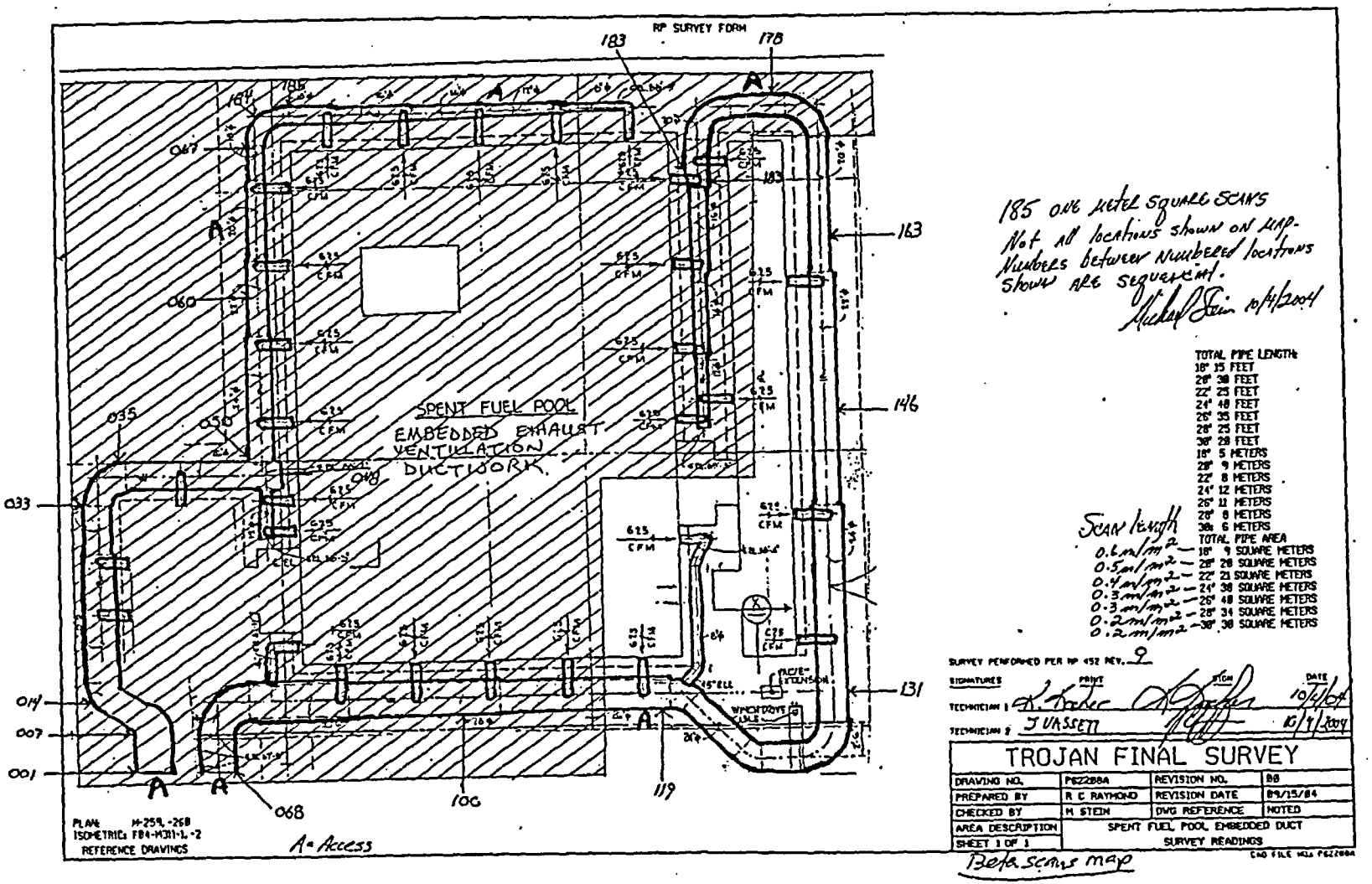
Classification: Class 1
Size (m^2): 192

Scan Measurement Data

Location	Value	Location	Value	Location	Value
000052	1.283e+003	000099	8.352e+002	000146	1.168e+003
000053	6.842e+002	000100	9.043e+002	000147	1.069e+003
000054	8.057e+002	000101	1.089e+003	000148	9.750e+002
000055	9.255e+002	000102	1.055e+003	000149	9.918e+002
000056	8.103e+002	000103	9.245e+002	000150	8.710e+002
000057	8.196e+002	000104	1.689e+003	000151	9.309e+002
000058	1.406e+003	000105	1.706e+003	000152	9.574e+002
000059	1.298e+003	000106	1.397e+003	000153	1.024e+003
000060	1.354e+003	000107	1.267e+003	000154	1.127e+003
000061	1.638e+003	000108	1.384e+003	000155	9.415e+002
000062	1.049e+003	000109	1.281e+003	000156	1.099e+003
000063	1.055e+003	000110	1.753e+003	000157	8.260e+002
000064	1.520e+003	000111	2.114e+003	000158	9.653e+002
000065	1.284e+003	000112	2.309e+003	000159	1.177e+003
000066	1.552e+003	000113	1.883e+003	000160	1.433e+003
000067	1.223e+003	000114	1.055e+003	000161	1.194e+003
000068	1.071e+003	000115	9.006e+002	000162	1.269e+003
000069	1.206e+003	000116	1.122e+003	000163	1.448e+003
000070	7.450e+002	000117	9.549e+002	000164	1.870e+003
000071	8.923e+002	000118	8.564e+002	000165	2.037e+003
000072	8.122e+002	000119	1.226e+003	000166	1.912e+003
000073	8.499e+002	000120	1.177e+003	000167	1.751e+003
000074	7.698e+002	000121	8.555e+002	000168	1.771e+003
000075	1.116e+003	000122	7.606e+002	000169	1.304e+003
000076	1.123e+003	000123	1.108e+003	000170	1.299e+003
000077	1.266e+003	000124	1.563e+003	000171	1.138e+003
000078	8.794e+002	000125	8.923e+002	000172	8.163e+002
000079	8.988e+002	000126	9.752e+002	000173	9.891e+002
000080	9.319e+002	000127	1.054e+003	000174	9.618e+002
000081	1.010e+003	000128	1.024e+003	000175	1.085e+003
000082	1.123e+003	000129	9.853e+002	000176	1.068e+003
000083	8.545e+002	000130	1.368e+003	000177	1.091e+003
000084	8.361e+002	000131	9.558e+002	000178	9.724e+002
000085	7.873e+002	000132	9.706e+002	000179	1.165e+003
000086	7.698e+002	000133	8.131e+002	000180	8.807e+002
000087	9.291e+002	000134	7.781e+002	000181	1.223e+003
000088	1.153e+003	000135	9.954e+002	000182	1.016e+003
000089	1.072e+003	000136	9.733e+002	000183	1.722e+003
000090	8.647e+002	000137	1.583e+003	000184	1.058e+003
000091	1.199e+003	000138	1.449e+003	000185	8.243e+002
000092	9.337e+002	000139	1.247e+003		
000093	8.251e+002	000140	1.217e+003		
000094	1.190e+003	000141	1.589e+003		
000095	1.169e+003	000142	1.367e+003		
000096	1.077e+003	000143	1.744e+003		
000097	8.306e+002	000144	1.814e+003		
000098	9.918e+002	000145	1.322e+003		

FINAL SURVEY RESULTS SUMMARY

Survey Unit ID Code: P62208A
Survey Unit Name: Spent Fuel Pool Ducting 18" Diameter and Larger

Classification: Class 1
Size (m^2): 192

Scan Measurement Locations Map