006295

CERTIFICATION REPORT FOR SELECTED AREA 6 AND AREA 7 CONCRETE STRUCTURES AND CONCRETE IN THE RADON CONTROL SYSTEM AND SILO 3 PROJECT AREA

FERNALD CLOSURE PROJECT
FERNALD, OHIO

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U.S. DEPARTMENT OF ENERGY

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LIST OF ACRONYMS AND ABBREVIATIONS

ASCOC	area-specific constituent of concern
ASL	analytical support level
CDL	Certification Design Letter
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFD	cumulative frequency distribution
cm^2	square centimeters
COC	constituent of concern
CU	certification unit
DOE	U.S. Department of Energy
dpm	disintegrations per minute
EPA	U.S. Environmental Protection Agency
FCP	Fernald Closure Project
FRL	final remediation level
ft^2	square feet
HAMDC	highest allowable minimum detectable concentration
µg/kg	micrograms per kilogram
MARRISM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	minimum detectable concentration
MDL	minimum detection level
mg/kg	milligrams per kilogram
NRC	U.S. Nuclear Regulatory Commission
OEPA	Ohio Environmental Protection Agency
OSDF	On-Site Disposal Facility
OU	Operable Unit
PCB	polychlorinated biphenyl
pCi/g	picoCuries per gram
PSP	Project Specific Plan
PSPC	Position Sensitive Proportional Counter
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RCS	Radon Control System
ROD	Record of Decision
SARA	Superfund Amendment and Reauthorization Act
SCM	Surface Contamination Monitor
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SIMS	Survey Information Management System
TPU	total propagated uncertainty
UCL	upper confidence limit
V/FCN	Variance/Field Change Notice
V&V	verification and validation
VOC	volatile organic compound
VSL	Validation Support Level

EXECUTIVE SUMMARY

This Certification Report presents the information and data used by the U.S. Department of Energy (DOE) to determine that selected concrete in Area 6 and Area 7, including the Silo 3 Project Area, meet the final remediation levels (FRLs) established for soil and adopted for concrete. The concrete structures, rationale and strategy for concrete certification sampling was provided in two documents: 1) the Certification Design Letter (CDL) and Certification Project Specific Plan (PSP) for Selected Area 6 and Area 7 Concrete Structures (DOE 2006a) and the CDL and Certification PSP for Concrete in the Radon Control System and Silo 3 Project Area (DOE 2006b).

The concrete described in this report was certified by adopting applicable soil FRLs and the same statistical evaluation process applied to soil certification. In addition to the 16 random sample locations in each certification unit (CU), biased certification samples were collected from each CU based on real-time radiological scanning and visual inspection to ensure the concrete is below the soil FRLs for each area-specific constituent of concern (ASCOC). Following preliminary certification of the various concrete slabs, they were removed and relocated to the Southern Waste Units for beneficial reuse to stabilize a large eroded area and provide an ideal habitat for the endangered Cave Salamander and other amphibians and reptiles. The concrete slabs were protected from potential re-contamination after certification samples were collected until results were confirmed to have passed certification criteria at which time the concrete was removed and relocated for beneficial reuse.

This Certification Report includes details of the certification sampling, analysis, and validation that took place for selected concrete slabs in Area 6 and Area 7 including the Silo 3 Project Area. As stated in the CDL/PSPs regarding the potential for additions and deletions of concrete components from the plan, some areas originally identified for certification were removed from the scope of certification due to surface contamination levels and the feasibility of attaining certification for the concrete. The concrete removed from the scope of the CDL/PSPs was dispositioned to the On-Site Disposal Facility or an off-site permitted disposal facility.

Consistent with the Sitewide Excavation Plan (SEP, DOE 1998a) and the SEP Addendum (DOE 2001), certification sampling and real-time instrumentation was adopted for certification of concrete. In addition to the SEP certification standard approach, the certification of concrete included the use of a conservative biased sampling strategy based on alpha and beta radiation detection instrumentation capable of quickly scanning large surface areas while typically providing >95 percent coverage of the area. The concrete was also visually inspected to collect biased samples from areas that were likely to represent worst-case contamination levels. The sizes of the CUs were also substantially reduced compared to SEP requirements

for soil. As a result of these activities, it was determined that no further remediation was necessary prior to certification.

The concrete slabs represented in this report were sampled and statistical analysis was conducted to ensure the certification criteria were met. As discussed in the SEP, the certification criteria to be met are; 1) the average primary ASCOC concentrations within a CU are below FRLs at a 95 percent upper confidence level (UCL, 90 percent UCL for secondary ASCOCs), and 2) that no certification result is greater than twice the FRL (the hotspot criterion). Upon completion of final certification statistics, all concrete CUs presented herein pass the certification criteria.

On the basis of this reported information and supporting project files, DOE has determined that no additional remedial actions are required for the concrete under this Certification Report. The concrete from these areas will be considered certified when the U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency concur that certification criteria have been met.

1.0 INTRODUCTION

1.1 PURPOSE

This Certification Report presents the information and data used by the U.S. Department of Energy (DOE) to determine that selected concrete slabs in Areas 6 and Area 7, including the Silo 3 Project Area, meet established soil final remediation levels (FRLs), which have also been adopted for concrete. The concrete slabs to be certified clean are located in various areas around the Fernald Closure Project (FCP) as shown in Figure 1-1. On the basis of this reported information and supporting project files, DOE has determined that no additional remedial actions are required for the concrete structures specified in this plan and the concrete can be used for the intended beneficial reuse at the FCP.

1.2 BACKGROUND

In the Operable Unit (OU) 3 Record of Decision (ROD, DOE 1996a), it was assumed that all newly constructed facilities would be dismantled and disposed as clean debris in either the On-Site Disposal Facility (OSDF) or a qualified commercial disposal facility (e.g., local landfill) or, if contaminated, the debris would be disposed of in the OSDF or shipped to an off-site permitted disposal facility. As the design for the FCP's final land use infrastructure and institutional controls were being finalized, it became clear that selected concrete slabs and debris could serve a viable role in achieving the final land use configuration. Specifically, the certified concrete could be used to stabilize an area where soil erosion has occurred in the Southern Waste Units while providing an ideal habitat for the endangered Cave Salamander and other amphibians and reptiles through the beneficial reuse of properly placed layers of clean concrete debris. The approved plan for beneficial reuse of this concrete debris is summarized in the OU3 Fact Sheet entitled "The Fernald Closure Project Identifies Clean Buildings, Critical Structures, and Construction Materials for Beneficial Reuse Under Legacy Management" dated December 2006 (DOE 2006c).

In the OU5 Remedial Action Work Plan (RAWP, DOE 1996b), DOE agreed to prepare a Sitewide Excavation Plan (SEP, DOE 1998a) that defined the overall approach to cleaning up soil and at- and below-grade debris in accordance with the OU2 ROD (DOE 1995), OU3 ROD, and OU5 ROD (DOE 1996c). The concept of certifying the concrete slabs that were constructed for various remediation facilities was not addressed in the SEP, therefore the certification strategy and sampling requirements were documented in the two approved Certification Design Letter (CDL)/Certification Project Specific Plans (PSPs) developed for this purpose [the CDL and Certification PSP for Selected Area 6 and Area 7 Concrete Structures (DOE 2006a) and the CDL and Certification PSP for Concrete in the Radon Control System and Silo 3 Project Area (DOE 2006b)].

1.3 SCOPE AND DESCRIPTION

The scope of this Certification Report includes details of concrete certification sampling, analysis and validation that took place in portions of Area 6 and Area 7. The concrete slabs to be certified were reduced from the original scope proposed in the CDL/Certification PSP. Figure 1-1 depicts the final concrete slabs for certification as well as those areas of concrete initially identified in the CDL/Certification PSP that were ultimately removed for disposal (selected slabs and walls in the Silo 3 Facility) rather than attempt certification. The specific concrete area descriptions are as follows:

- Silo 3 Project Area - the total floor slab and pad surface area was approximately 34,600 square feet (ft^2) with the concrete thickness ranging from 1 to 4 feet. The slab areas consisted of an exterior slab used for staging of shipping containers, the slab beneath the former Cargo Bay Building and support pads for HVAC and electrical equipment.

- Radon Control System (RCS) ancillary slabs used for various tanks and electrical equipment, as well as the access road east of the RCS had a surface area of approximately 8,400 ft^2. A portion of the concrete from one certification unit (CU) within the RCS ancillary pads was did not undergo certification sampling and was removed as debris for disposal in the OSDF.

- Area 6 Locomotive Maintenance Building - floor slab was 4,500 ft^2 with concrete thickness ranging from 8 to 24 inches; contained an inspection pit measuring 55 feet in length and 5 feet deep.

- Area 7 Silos Trailer Parking Area and Miscellaneous Additional Slabs - five parallel pads covering 15,500 ft^2 with a thickness of 6 inches. All outbound shipping containers were decontaminated, surveyed and released prior to being staged in this facility. Variance/Field Change Notice (V/FCN) 20500-PSP-0011-01 documented the addition of a trailer parking strip located south of the former West Parking Lot and several small pads east of the Silos Trailer Parking Area. Variance 20500-PSP-0011-03 added several small slabs (referred to as Area 7H and 7K) located northwest of the former storm water retention basin that were used for the fire water tank and other small buildings. Refer to Appendix B for the variances referenced above.

- Area 7 Vitrification Pilot Plant Building - floor slab is approximately 15,000 ft^2 with thickness ranging from 1 to 2 feet. Variance 20500-PSP-0011-02 documented the addition of the remaining west slab of the former Vitrification Pilot Plant that had been covered with gravel.

- Area 7 Test Stand Building - floor slab is 2,500 ft^2 with thickness of 1 foot; above-grade building has been demolished and removed.

- Area 7 Silos Warehouse - concrete slab west of the Silos warehouse.

1.4 OBJECTIVES

The objectives of this Certification Report are:

- Summarize the precertification and remedial activities,

- Describe the radiological scanning analytical methods, data validation processes, data reduction and statistical processes used to support the certification process,

- Present certification sampling results for those CUs that passed the certification criteria,
- Present the statistical analysis showing that all CUs have passed the certification criteria, including FRL attainment and hotspot criteria, and
- Describe access controls implemented to prevent recontamination.

1.5 REPORT FORMAT

This Certification Report is presented in six sections with supporting documentation and data in the appendices. These sections are as follows:

Section 1.0	Introduction: Purpose, background, area description, scope, and objectives of the report
Section 2.0	Certification Approach: The approach for certification sampling and analysis
Section 3.0	Overview of Precertification and Field Activities: Concrete preparation, precertification scanning methodology, and changes to work scope
Section 4.0	Analytical Methodologies, Data Validation Processes and Data Reduction
Section 5.0	Certification Evaluation and Conclusions
Appendix A	Certification Samples, Analytical Results and Final Statistics Tables
Appendix B	V/FCNs for the CDL and Certification PSP for Area 6 and Area 7 and the CDL and Certification PSP for Concrete Structures in the Radon Control System and Silo 3 Project Area
Appendix C	Precertification Radiological Scan Maps and Results
Appendix D	Correction of 7-Day Radium-226 Results

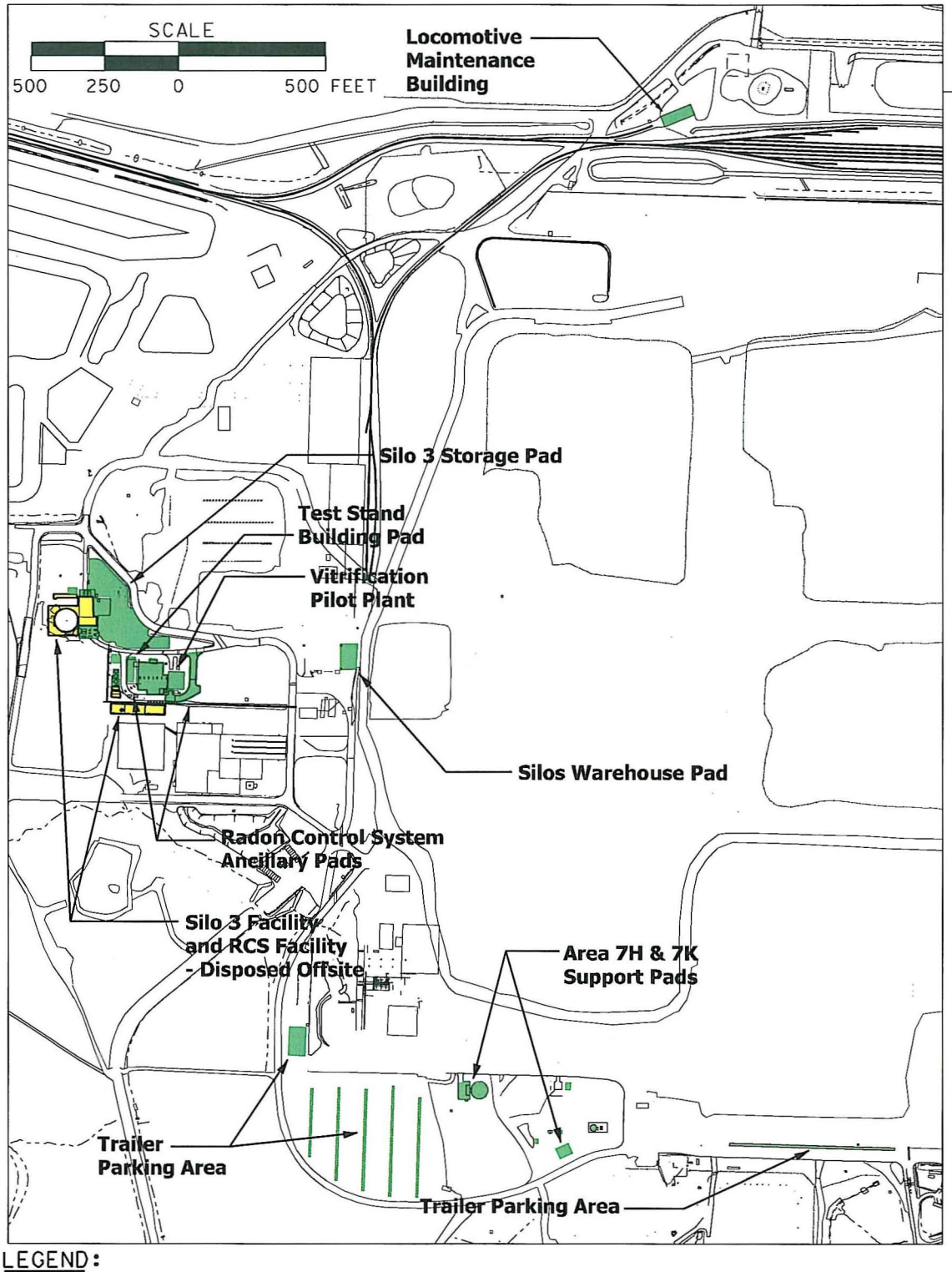

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FIGURE 1-1. SELECTED AREA 6 & 7 CONCRETE CERTIFICATION AREAS

2.0 CERTIFICATION APPROACH

2.1 CERTIFICATION STRATEGY

This section summarizes the area-specific constituent of concern (ASCOC) selection process and the certification approach, including CU and sampling design, and statistical analysis. The general certification strategy is described in Section 3.4 of the SEP, and the specific strategy for the concrete areas are described in the CDL and Certification PSP for Area 6 and Area 7 and the CDL and Certification PSP for Concrete Structures in the RCS and Silo 3 Project Area.

2.1.1 Area 6 and Area 7 ASCOC Selection Criteria

The selection of Area 6 and Area 7 ASCOCs for concrete was accomplished by reviewing the analytical data set for the source waste processed in or transported through the subject areas or buildings (e.g., waste pit contents transported in rail cars were applied to the Locomotive Maintenance Building) and comparing source data to the COCs for which a soil FRL has been established in Table 1-4 of the SEP (which is based on the OU5 ROD). The OU5 soil FRLs are being applied to the subject concrete to demonstrate that concrete meeting soil FRLs may safely remain at or below soil surface grade in a beneficial reuse application, like the surface soil that will remain for future land use. Additionally, process knowledge and the list of chemicals used in the building during remedial operations were reviewed and evaluated for the purpose of final ASCOC selection.

In the OU5 ROD and the SEP, there are 80 soil constituents of concern (COCs) with established FRLs. All of the constituents in the Silo 1 and 2 data and Waste Pit 4, 5 and 6 data were reviewed to determine the waste constituents that exceed their respective OU5 soil FRL.

In summary, the selection process for retaining ASCOCs (from the waste source data) involved the following criteria for concrete:

- The constituent is listed as a soil COC in the OU5 ROD;
- Analytical results indicate that a contaminant is present in the waste source (e.g., Silo 1 and 2 waste) above its respective soil FRL, and the above-FRL concentrations are not attributable to false positives or elevated detection limits;
- The constituent was used during the remedial action operations in the area of interest based on process knowledge [e.g., Superfund Amendment and Reauthorization Act (SARA) 312 reports] and a known or suspected spill or release of the constituent occurred during operations;
- Physical characteristics of the contaminant, such as degradation rate and volatility, indicate it is likely to persist in the concrete in the case of a spill or release;
- The contaminant is one of the sitewide primary COCs (total uranium, radium-226, radium-228, thorium-228, and thorium-232).

2.1.2 Area 6 ASCOC Selection

The ASCOC list in Table 2-1 was generated from the screening process described above using Table 2-7 of the SEP, process knowledge, review of SARA 312 reports and database logs used to report any spills. For each ASCOC returned from the above-FRL screening process, the justification for retention or elimination from the final list is provided in Table 2-1. The screening of COCs applicable to the waste pit material was previously completed for the Waste Pit 4, 5, and 6 CDL/Certification PSP (DOE 2006d). Therefore, the same list will be used for this Certification Report with modifications based on the recent certification sample results for some of the organic and metal ASCOCs applied to Waste Pits 4, 5 and 6.

The history of using lubricants, fuels, paint and antifreeze solutions along with visible oil stains on the concrete underlying the rails in the center of the building was cause for adding several organic compounds to the list. This data will determine if the concrete in this area of the floor slab exceeds applicable Resource Conservation and Recovery Act (RCRA) limits. Some of these organics had already been selected based on the utilization of the ASCOC list in the Waste Pits 4, 5 and 6 CDL. Table 2-2 includes the final ASCOC list applied to the Area 6 Locomotive Maintenance Building Pad.

2.1.3 Area 7 ASCOC Selection

The ASCOC list in Table 2-3 was generated from the screening process described above using Table 2-7 of the SEP and Silo 1 and 2 constituents detected above the established soil FRLs. Additionally, process knowledge of the operations, the SARA 312 inventory reports and database logs used to report any spills were reviewed and considered; no additional ASCOCs were required as a result of this review. Silo 1 and 2 constituents were applied due to the potential for silo wastes be a worst-case scenario for contamination of the subject areas. For each ASCOC returned from the above-FRL screening process, the justification for retention or elimination from the final list is provided in Table 2-3. Table 2-4 includes the final ASCOC list applied to the Area 7 Trailer Parking pads, Vitrification Pilot Plant Building floor slab and the Test Stand Building floor slab. The addition of other concrete slabs and pads as documented in Section 2.2.2 and Appendix C did not require any additional ASCOCs due to the historical clean use of these concrete areas.

2.1.4 ASCOC Selection for the RCS Support Area and Silo 3 Facilities Concrete

The selection of ASCOCs for the RCS support area and the Silo 3 remediation facility concrete structures was accomplished by reviewing the analytical data set for the source Silo 1 and 2 K-65 waste and the Silo 3 metal oxide waste processed within the Silo 3 facility, respectively. The source waste data was compared to the COCs for which a soil FRL has been established in Table 1-4 of the SEP (which is based on the OU5 ROD). Additionally, process knowledge and the list of chemicals used in the building during remedial operations were reviewed and evaluated for the purpose of final ASCOC selection.

The ASCOC lists in Table 2-5 and Table 2-7 was generated from the screening process described above using Table 2-7 of the SEP and Silo 1 and 2 waste and Silo 3 waste constituents (separately) detected above the established soil FRLs. Additionally, process knowledge of the operations, the SARA 312 inventory reports and database logs used to report any spills were reviewed and considered; no additional ASCOCs were required as a result of this review. For each ASCOC returned from the above-FRL screening process (performed separately for Silo 3 facilities and the RCS support area), the justification for retention or elimination from the final list is provided in Tables 2-5 and 2-7. Tables 2-6 and 2-8 includes the final ASCOC list to be applied to the RCS support area and the Silo 3 facilities, respectively.

2.2 CERTIFICATION DESIGN

The certification of concrete presents some unique circumstances and conditions that must form the basis for the certification strategy and design. Of paramount importance for ensuring the integrity of the certification process, is the precertification scanning methodology (Section 4.0) and the provision to collect biased samples based on the radiological surface scan results. The scanning method was used to locate the highest radiological surface contamination that is present in a given CU so that biased core samples can be collected for laboratory analysis. Figures 2-1 through 2-10 illustrate each CU with both random and biased sample locations. The following criteria were utilized to develop the overall design for each CU:

- First, the overall footprint or boundary of each building or facility area was used to form the boundary for a CU or group of CUs, dependent on the criteria below that were met for each area;
- If both concrete slabs (floors) and walls were present, each category was separated into distinct CUs. Note that no concrete walls were ultimately selected for certification.
- Concrete in waste process areas versus non-process areas were separated into distinct CUs (for the purposes of CU design, a waste process area is generally defined as an area with a relatively high potential for interim contamination due to waste handling operations and/or demolition). Note that no waste process area CUs identified in the scope of the CDL/PSP for the RCS and Silo 3 Project Area were ultimately certified for on-site beneficial reuse.

The following criteria were utilized to determine the number of samples for each CU:

- Sixteen (16) randomized sample locations were specified for each CU;
- In addition to the 16 or more random sample locations, biased samples were also added for each floor sump or pit present in each concrete slab CU;
- If floor cracks and joints were present, up to three biased samples were selected for each CU; and
- The three locations within each CU that have the highest alpha/beta results above background based on the radiological surface scan were sampled as biased samples.

- In one case, additional concrete slabs were identified for potential certification after approval of the CDL/PSP and these slabs were combined into an existing CU design and additional random samples (sub-CUs) beyond the initial 16 samples were collected (e.g., CU A7C-TP-C02). Other concrete slabs identified after approval of the CDL/PSP were incorporated by designing a specific CU comprising each concrete slab or group of pads (A7C-C05, A7C-HK-C01, and A7C-VP-C04).

Table 2-9 summarizes the actual samples collected from each Area 6 and Area 7 CU or subarea along with the number and sizes of CU areas.

2.2.1 Sample Selection Process

The selection of certification sampling locations was conducted according to Section 3.4.2 of the SEP to the extent of designing equally sized concrete sub-CUs and selecting all 16 samples in a given CU for laboratory analysis. The overall CU sizes applied to the various concrete slabs were significantly smaller than a Group 1 type CU applied to historically impacted soil areas. Each CU was first divided into 16 approximately equal sub-CUs. Sample locations were then generated by randomly selecting an easting and northing coordinate within the boundaries of each sub-CU, then testing those locations against the minimum distance criteria for the CU. If the minimum distance criteria were not met, an alternative random location was selected for that sub-CU, and all the locations were re-tested. This process continued, until all 16 random locations met the minimum distance criteria. The sub-CUs and all final sampling locations are shown on Figure 2-1 through 2-10. One sample location in the CU was designated with a "D," indicating a field duplicate sample collection location. Concrete core samples were collected for analysis from the surface to a depth of 1 inch.

Biased concrete samples were collected in each CU using the criteria below to ensure that the specific areas having the highest potential for contamination were sampled.

- Up to three locations within each CU that have alpha/beta results above background based on the real-time surface scan. If more than three 100 square centimeters (cm^2) areas exceed background, the highest three areas were sampled.
- Areas having surface cracks or joints were inspected to identify up to three core sample locations for each CU. At each sample location, a 0 to 1-inch surface sample and the bottom 1-inch interval of the crack/joint were collected. All surface cracks and joints were inspected to select up to three locations having the highest potential for downward migration of contaminants (inspections consisted of field screening for radiological and volatile organic contaminants with hand-held instruments if organic stains were observed). In the absence of any indications of contaminants based on the above approach, the low point along the surface crack/joint was sampled in an effort to capture the area with the highest potential for contaminant accumulation.
- If visible stains remained on the concrete after high-pressure water cleaning of the surface, the location having the highest potential for contamination was selected for a biased core sample (0 to 1 inch). This process was limited to the Area 6 Locomotive Maintenance pad since other Area 7 concrete slabs contained no significant organic or chemical-stained areas.

- One biased sample in the bottom of each floor sump or floor trench was collected (Test Stand pad, Locomotive Maintenance slab, Vitrification Pilot Plant slab, and the RCS ancillary pads).

2.2.2 Certification Sampling

Prior to initiating precertification scans or physical sampling, the concrete slabs and pads identified for certification were cleaned using a high-pressure water wash. Following the completion of the precertification scanning process (discussed in Section 4.0), physical sampling of the concrete at the defined random locations and sumps was performed as well as sampling at the biased locations generated from the precertification radiological scan. Sampling of the concrete involved coring into the concrete surface to a depth of 1 inch as specified in the concrete CDL/PSPs to collect a 1-inch thick by 3-inch diameter core for laboratory analysis for the COCs. All scanning and certification sampling was performed prior to any nearby demolition work being performed that may have the potential to contaminate the concrete. Once scanning and sampling were complete, the CUs were protected from all activities and traffic that could result in contamination of the surface prior its demolition and removal from the area for beneficial re-use.

Below is a summary of the sampling that was performed in each concrete CU proposed for certification covered under this report as well as a discussion of additional concrete slabs and pads identified after the approval of the two applicable concrete CDL/PSPs:

Area 6 Locomotive Maintenance Building Slab (CU A6C-C01)

Sixteen random samples and five biased samples (one sump location, one stained area, and three biased based on radiological scans) were collected for the Area 6 Locomotive Maintenance floor slab. This slab contained a center inspection pit measuring 55-foot (L) by 3.5-foot (W) by 5-foot (D) that was used to perform maintenance and inspections on the locomotives and rail cars. This pit area and the area within the rail lines contained some visible oil stains. After high-pressure water cleaning of these areas, a biased sample was collected from each of the two areas and analytical parameters included volatile organic compounds. This CU is depicted in Figure 2-1.

Area 7 Silos Trailer Parking Area (CU A7C-TP-C02)

Twenty-nine random samples and five biased samples were collected from the Area 7 Silos Trailer Parking are concrete slabs. In addition to the five parallel parking strips, additional concrete was added to this CU and documented in Variance 20500-PSP-0011-04. The additional slabs consisted of the truck scale pad to the north and miscellaneous pads to the west, including another long parking strip used for empty trailer staging near the former West Parking Lot. This CU is depicted in Figure 2-2.

Area 7 Test Stand Slab (CU A7C-TS-C01)

Sixteen random samples and five biased samples (including one sump, one surface crack location, and three samples based on radiological scans) were collected from this CU. This CU is depicted in Figure 2-3.

Vitrification Pilot Plant Building Slab (CU A7C-VP-C03 and A7C-VP-C04)

Sixteen random samples, two biased sump locations and three biased samples based on radiological scans were collected from CU A7C-VP-C03 (east side of Vitrification Pilot Plant slab). For CU A7C-VP-C04 (west side of the slab), 20 random samples, one biased sump location and three biased samples based on radiological scans were collected. More than 16 samples were designed for this latter CU due to the inclusion of 14 small support pads (approximately 6 feet by 3 feet each) west of the main slab. This CU (A7C-VP-C04) was added to the CDL/PSP via Variance 20500-PSP-0011-02. This CU is depicted in Figure 2-4 and 2-5.

Silo 3 Storage Pad (CU A7C-S3-C01)

Sixteen random samples and three biased samples based on radiological scans were collected from this CU. This CU is depicted in Figure 2-6.

Silo 3 Container Bay Slab and Support Pads (CU A7C-S3-C03)

Sixteen random samples and six biased samples based on radiological scans were collected from this CU. The additional three biased samples were collected due to one support pad (Silo 3 electrical building) being left in place with demolition work following the initial certification sampling effort on this pad. Therefore, the pad was re-cleaned following the demolition of nearby contaminated structures and re-sampled for both random samples and three new biased samples. This CU is depicted in Figure 2-7.

RCS Ancillary Support Pads and Road (CU A7C-RCS-C01)

Fourteen random samples, one biased sump location, and six biased samples based on radiological scans were collected from CU A7C-RCS-C01. Two of the 16 random locations were not collected due to the two specific concrete slabs (one served as a generator slab and another as an electrical building) being left in place during demolition therefore the concrete was later disposed of off site or in the OSDF as potentially contaminated debris. As noted above, a total of six biased samples, rather than the minimum required three, were collected based on radiological scans in this CU. This CU is depicted in Figure 2-8.

Area 7 Silos Warehouse Storage Pad (CU A7C-C05)

Sixteen random samples and three biased samples based on radiological scans were collected from this storage pad CU located west of the Silos Warehouse. This CU is depicted in Figure 2-9.

Area 7H and 7K Miscellaneous Pads (CU A7C-HK-C01)

Sixteen random samples and three biased samples based on radiological scans were collected from this CU. This CU was added to the CDL/PSP via Variance 20500-PSP-0011-03 and mainly consists of a slab used for a tension support structure, the fire water tank base and associated pump house pad, and other nearby smaller pads. This CU is located northwest of the former west storm water retention basins. This CU is depicted in Figure 2-10.

Prior to commencement of certification field activities, all sample locations were surveyed and field verified to make sure no surface obstacles prevented sample collection at the planned location. Locations were moved if a subsurface obstacle prevents sample collection.

2.2.3 Statistical Analysis

Two criteria must be met for each CU to pass certification. If the data distribution is normal or lognormal, the first criterion compares the 95 percent upper confidence limit (UCL) on the mean of each primary COC to its FRL, or the 90 percent UCL on the mean of each secondary ASCOC. On an individual CU basis, any ASCOC with the 95 percent UCL (for primary ASCOCs) or 90 percent UCL (for secondary ASCOCs) above the FRL results in that CU failing certification. If the data distribution is not normal or lognormal, the appropriate nonparametric approach discussed in Appendix G of the SEP will be used to evaluate the first criterion; the *a posteriori* test will be performed to determine whether the sample size is sufficient for a meaningful conclusion of this comparison. The second criterion is the hotspot criterion, which states that primary or secondary ASCOC results must not exceed two times the FRL. When the given UCL on the mean for each COC is less than its FRL and the hotspot criterion is met, the CU will be considered certified.

In the event that a CU passes the *a posteriori* test but fails certification, the following two scenarios will be evaluated: 1) localized contamination, and 2) widespread contamination. Details on the evaluation and responses to these possible outcomes are provided in Section 3.4.5 of the SEP.

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TABLE 2-1
ASCOC LIST FOR AREA 6 LOCOMOTIVE MAINTENANCE BUILDING FLOOR

ASCOC	Retained as ASCOC?	Justification	CU(s)
Radionuclides			
Total Uranium	Yes	Primary Radionuclide	1
Radium-226	Yes	Primary Radionuclide	1
Radium-228	Yes	Primary Radionuclide	1
Thorium-228	Yes	Primary Radionuclide	1
Thorium-232	Yes	Primary Radionuclide	1
Cesium-137	Yes	Above-FRL concentrations detected within Area 6	1
Technetium-99	Yes	Above-FRL concentrations detected within Area 6	1
Thorium-230	Yes	Above-FRL concentrations detected within Area 6	1
Organic			
1,1-Dichloroethene	Yes	Above-FRL concentrations detected within Waste Pits 5 and 6	1
1,2-Dichloroethene	Yes	Although this is not a COC for Area 6 as defined in the SEP nor was it identified in the characterization of the waste pit material, it was prevalent across the site and has been identified in some of the water monitoring wells in the Waste Pit area.	1
2-Butanone[a]	Yes	Component of material used in maintenance operations	1
4-Methyl-2-pentanone[b]	Yes	Component of material used in maintenance operations	1
Acetone	Yes	Component of material used in maintenance operations	1
Aroclor-1254	Yes	Above-FRL concentrations within Area 6	1
Aroclor-1260	Yes	Above-FRL concentrations within Area 6	1
Benzene	Yes	Component of material used in maintenance operations material	1
Bromodichloromethane	Yes	Above-FRL concentrations detected within Waste Pit 6	1
Dieldrin	Yes	Above-FRL concentrations within Area 6	1
Ethylbenzene	Yes	Component of material used in maintenance operations material	1
Tetrachloroethene	Yes	Above-FRL concentrations detected within Waste Pits 4 and 6	1
Toluene	Yes	Component of material used in maintenance operations material	1
Trichloroethene	Yes	Although this is not a COC for Area 6 as defined in the SEP nor was it identified in the characterization of the waste pit material, it was prevalent across the site and has been identified in some of the water monitoring wells in the Waste Pit area.	1

TABLE 2-1
ASCOC LIST FOR AREA 6 LOCOMOTIVE MAINTENANCE BUILDING FLOOR

ASCOC	Retained as ASCOC?	Justification	CU(s)
Organic (continued)			
Total Xylenes	Yes	Component of material used in maintenance operations material	1
Metals			
Arsenic	Yes	Above-FRL concentrations detected within Waste Pits 5 and 6	1
Beryllium	Yes	Above-FRL concentrations detected within Area 6	1
Lead	Yes	Component of material used in maintenance operations material	1

[a] Synonymous with methyl ethyl ketone
[b] Synonymous with methyl isobutyl ketone

TABLE 2-2
FINAL ASCOC LIST FOR AREA 6
LOCOMOTIVE MAINTENANCE BUILDING FLOOR

ASCOC	FRL
PRIMARY	
Total Uranium	82 mg/kg
Radium-226	1.7 pCi/g
Radium-228	1.8 pCi/g
Thorium-228	1.7 pCi/g
Thorium-232	1.5 pCi/g
SECONDARY	
Arsenic	12 mg/kg
Beryllium	1.5 mg/kg
Lead	400 mg/kg
Aroclor-1254	0.13 mg/kg
Aroclor-1260	0.13 mg/kg
Dieldrin	0.015 mg/kg
1,1-Dichloroethene	0.41 mg/kg
1,2-Dichloroethene	0.16 mg/kg
2-Butanone[a]	23.5 mg/kg
4-Methyl-2-pentanone	25,000 mg/kg
Acetone	43,000 mg/kg
Benzene	850 mg/kg
Bromodichloromethane	4.0 mg/kg
Ethylbenzene	5,100 mg/kg
Tetrachloroethene	3.6 mg/kg
Toluene	100,000 mg/kg
Total Xylenes	920,000 mg/kg
Trichloroethene	25 mg/kg
Cesium-137	1.4 pCi/g
Technetium-99	30.0 pCi/g
Thorium-230	280 pCi/g

[a] 2-Butanone (Methyl Ethyl Ketone) does not have an associated soil FRL. The Closure Plan Review Guidance for RCRA Facilities (OEPA 2004) (Table 1) has set the cleanup goal at 23.5 mg/kg.

mg/kg - micrograms per kilogram
pCi/g - picoCuries per gram

TABLE 2-3
ASCOC LIST FOR AREA 7 CONCRETE FLOORS/SLABS

ASCOC	Retained as ASCOC?	Justification	CU(s)
Radionuclides			
Total Uranium	Yes	Primary Radionuclide	All
Radium-226	Yes	Primary Radionuclide	All
Radium-228	Yes	Primary Radionuclide	All
Thorium-228	Yes	Primary Radionuclide	All
Thorium-232	Yes	Primary Radionuclide	All
Lead-210	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
PCBs			
Aroclor-1254	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Aroclor-1260	No	Only three out of 49 samples had above-FRL results in the Silo 1 and 2 waste residues. Based on these few detections, the constituent is not likely to be at above-FRL concentrations in the concrete floor slabs of the Area 7 support facilities.	
Dieldrin	No	Only one out of 49 samples had above-FRL results in the Silo 1 and 2 waste residues. Based on this single detection, the constituent is not likely to be at above-FRL concentrations in the concrete floor slabs of the Area 7 support facilities.	
N-nitrosodipropylamine	No	Only one out of 49 samples had above-FRL results in the Silo 1 and 2 waste residues. Based on this single detection, the constituent is not likely to be at above-FRL concentrations in the concrete floor slabs of the Area 7 support facilities.	
Metals			
Arsenic	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Beryllium	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Cobalt	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Lead	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Molybdenum	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All

PCBs - polychlorinated biphenyls

TABLE 2-4
FINAL ASCOC LIST FOR AREA 7 CONCRETE FLOORS/SLABS

ASCOC	FRL
PRIMARY	
Radium-226	1.7 pCi/g
Radium-228	1.8 pCi/g
Thorium-228	1.7 pCi/g
Thorium-232	1.5 pCi/g
Total Uranium	82 mg/kg
SECONDARY	
Lead-210	38 pCi/g
Aroclor-1254	0.13 mg/kg
Arsenic	12 mg/kg
Beryllium	1.5 mg/kg
Cobalt	740 mg/kg
Lead	400 mg/kg
Molybdenum	2,900 mg/kg

TABLE 2-5
ASCOC LIST FOR THE RCS SUPPORT AREA CONCRETE

ASCOC	Retained as ASCOC?	Justification	CU(s)
Radionuclides			
Total Uranium	Yes	Primary Radionuclide	All
Radium-226	Yes	Primary Radionuclide	All
Radium-228	Yes	Primary Radionuclide	All
Thorium-228	Yes	Primary Radionuclide	All
Thorium-232	Yes	Primary Radionuclide	All
Lead-210	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
PCBs			
Aroclor-1254	No	Above-FRL concentrations detected in Silos 1 and 2 waste, however this PCB is not expected to be present in the RCS Facility due to its immobility and improbability of transferring to the silos headspace gas phase (or the transfer tank area headspace) during RCS operation.	None
Aroclor-1260	No	Only three out of 49 samples had above-FRL results in the Silo 1 and 2 waste residues. Based on these few detections, the constituent is not likely to be at above-FRL concentrations in the concrete slabs and walls of the RCS facilities.	None
Dieldrin	No	Only one out of 49 samples had above-FRL results in the Silo 1 and 2 waste residues. Based on this single detection, the constituent is not likely to be at above-FRL concentrations in the concrete slabs and walls of the RCS facilities.	None
N-nitrosodipropylamine	No	Only one out of 49 samples had above-FRL results in the Silo 1 and 2 waste residues. Based on this single detection, the constituent is not likely to be at above-FRL concentrations in the concrete slabs and walls of the RCS facilities.	None
Metals			
Arsenic	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Beryllium	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Cobalt	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Lead	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All
Molybdenum	Yes	Above-FRL concentrations detected in Silos 1 and 2 waste	All

TABLE 2-6
FINAL ASCOC LIST FOR THE RCS SUPPORT AREA CONCRETE

ASCOC	FRL
PRIMARY	
Radium-226	1.7 pCi/g
Radium-228	1.8 pCi/g
Thorium-228	1.7 pCi/g
Thorium-232	1.5 pCi/g
Total Uranium	82 mg/kg
SECONDARY	
Lead-210	38 pCi/g
Arsenic	12 mg/kg
Beryllium	1.5 mg/kg
Cobalt	740 mg/kg
Lead	400 mg/kg
Molybdenum	2,900 mg/kg

TABLE 2-7
ASCOC LIST FOR THE SILO 3 FACILITIES CONCRETE

ASCOC	Retained as ASCOC?	Justification	CU(s)
Radionuclides			
Total Uranium	Yes	Primary Radionuclide	All
Radium-226	Yes	Primary Radionuclide	All
Radium-228	Yes	Primary Radionuclide	All
Thorium-228	Yes	Primary Radionuclide	All
Thorium-232	Yes	Primary Radionuclide	All
Thorium-230	Yes	Above-FRL concentrations detected in Silo 3 waste	All
Lead-210	Yes	Above-FRL concentrations detected in Silo 3 waste	All
Metals			
Arsenic	Yes	Above-FRL concentrations detected in Silos 3 waste	All
Beryllium	Yes	Above-FRL concentrations detected in Silos 3 waste	All
Chromium	Yes	Above-FRL concentrations detected in Silos 3 waste	All
Cobalt	Yes	Above-FRL concentrations detected in Silos 3 waste	All
Lead	Yes	Above-FRL concentrations detected in Silos 3 waste	All
Manganese	Yes	Above-FRL concentrations detected in Silos 3 waste	All

TABLE 2-8
FINAL ASCOC LIST FOR THE SILO 3 FACILITIES CONCRETE

ASCOC	FRL
PRIMARY	
Radium-226	1.7 pCi/g
Radium-228	1.8 pCi/g
Thorium-228	1.7 pCi/g
Thorium-232	1.5 pCi/g
Total Uranium	82 mg/kg
SECONDARY	
Thorium-230	280 pCi/g
Lead-210	38 pCi/g
Arsenic	12 mg/kg
Beryllium	1.5 mg/kg
Chromium	300 mg/kg
Cobalt	740 mg/kg
Lead	400 mg/kg
Manganese	4,600 mg/kg

TABLE 2-9
SUMMARY OF CONCRETE SLABS AND CERTIFICATION UNIT DESIGNS

CU Area	Surface Area (ft^2)	Number of CUs	Number of Samples	ASCOC Groups*
Area 6 Locomotive Building (slab) (CU A6C-C01)	4,500	1	16 random samples 3 locations biased to radiological scan results 1 crack/joint and 1 sump location	Radium, thorium, uranium isotopes, technetium-99, cesium-137, select metals, PCBs, and volatile organic compounds (VOCs)
Area 7 Trailer Parking Area and Support (pads) (CU A7C-TP-C02)	22,670	1	29 random samples 5 locations biased to radiological scan results	Radium, thorium, uranium isotopes, lead-210; select metals and 1 PCB
Area 7 Test Stand Building (pad) (CU A7C-TS-C01)	2,450	1	16 random samples 3 locations biased to radiological scan results 1 crack/joint and 1 sump location	Radium, thorium, uranium isotopes, lead-210; select metals and 1 PCB
Area 7 Silos Warehouse Storage Pad (CU A7C-C05)	5,280	1	16 random samples 3 locations biased to radiological scan results	Radium, thorium, uranium, lead-210, arsenic, beryllium, cobalt, lead, molybdenum
Area 7H and 7K Miscellaneous Support Pads (CU A7C-7HK-C01)	6,150	1	16 random samples 3 locations biased to radiological scan results	Radium, thorium, uranium, lead-210, arsenic, beryllium, cobalt, lead, molybdenum
Area 7 Vitrification Pilot Plant Building (CU A7C-VP-C03) (CU A7C-VP-C04)	15,000	2	36 random samples 6 locations biased to radiological scan results 2 sump locations	Radium, thorium, uranium isotopes, lead-210; select metals and 1 PCB
Silo 3 Facility (CU A7C-S3-C01) (CU A7C-S3-C03)	39,800	2	32 random samples 9 locations biased to radiological scan results	Radium, thorium, uranium, lead-210, arsenic, beryllium, cobalt, chromium, lead and manganese
Radon Control System Ancillary Pads and Road (CU A7C-RCS-C01)	8,950	1	14 random samples 6 locations biased to radiological scan results 1 sump location	Radium, thorium, uranium, lead-210, arsenic, beryllium, cobalt, chromium, lead and manganese

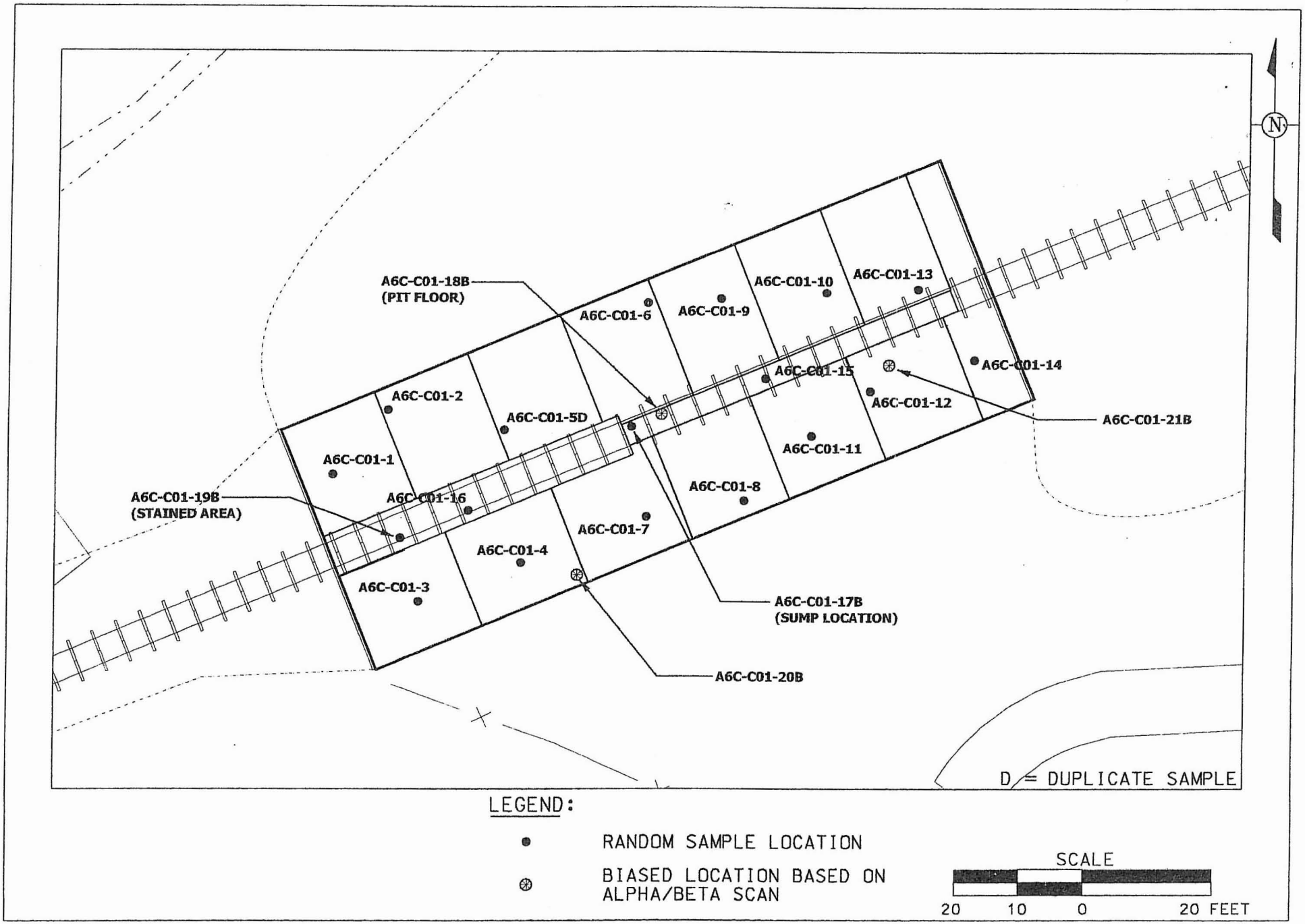

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FIGURE 2-1. AREA 6 LOCOMOTIVE MAINTENANCE BUILDING (FLOOR SLAB) CERTIFICATION SAMPLE LOCATIONS (A6C-C01)

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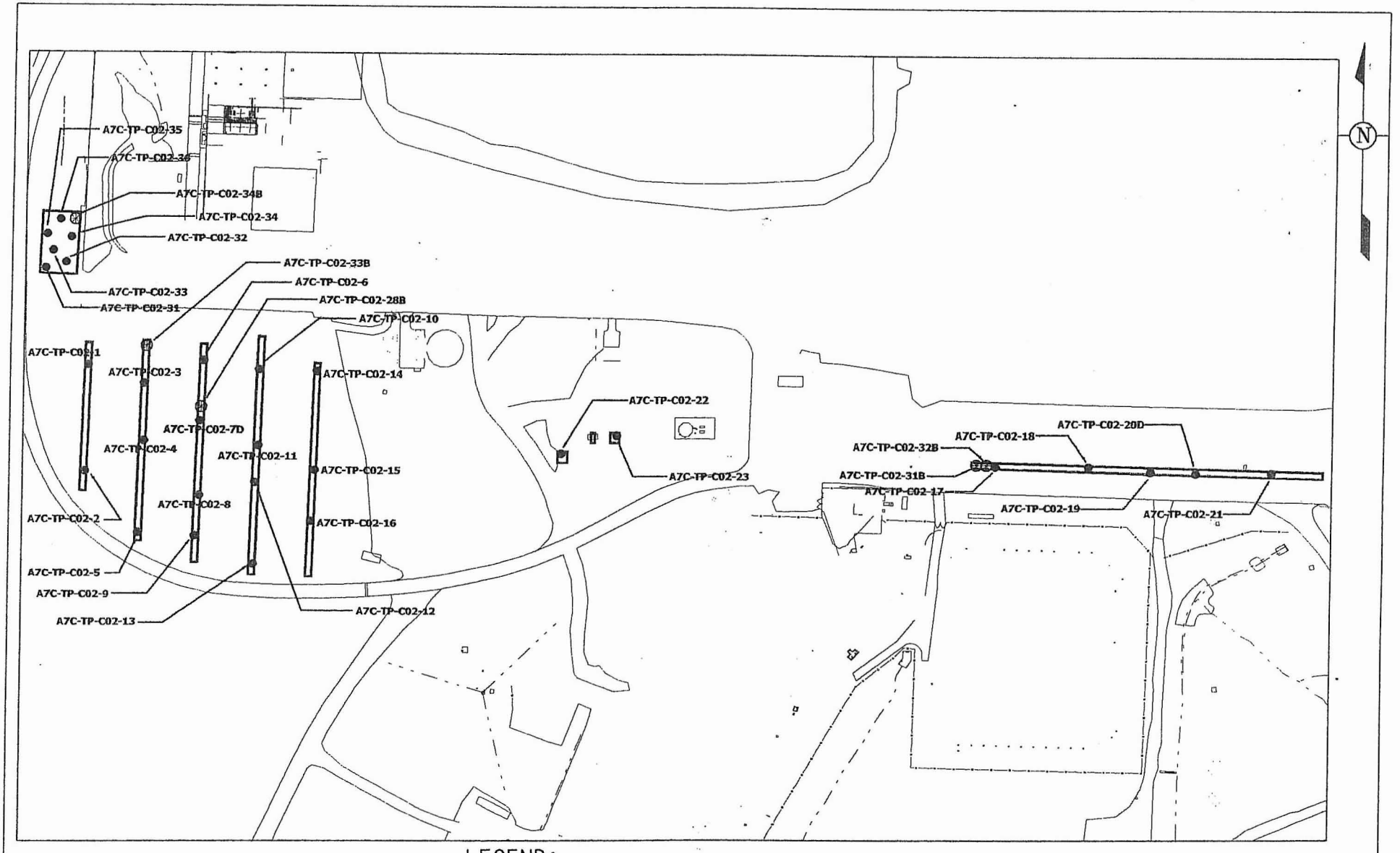

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FIGURE 2-2. AREA 7 TRAILER PARKING AREA AND SUPPORT PADS CERTIFICATION SAMPLE LOCATIONS (CU A7C-TP-C02)

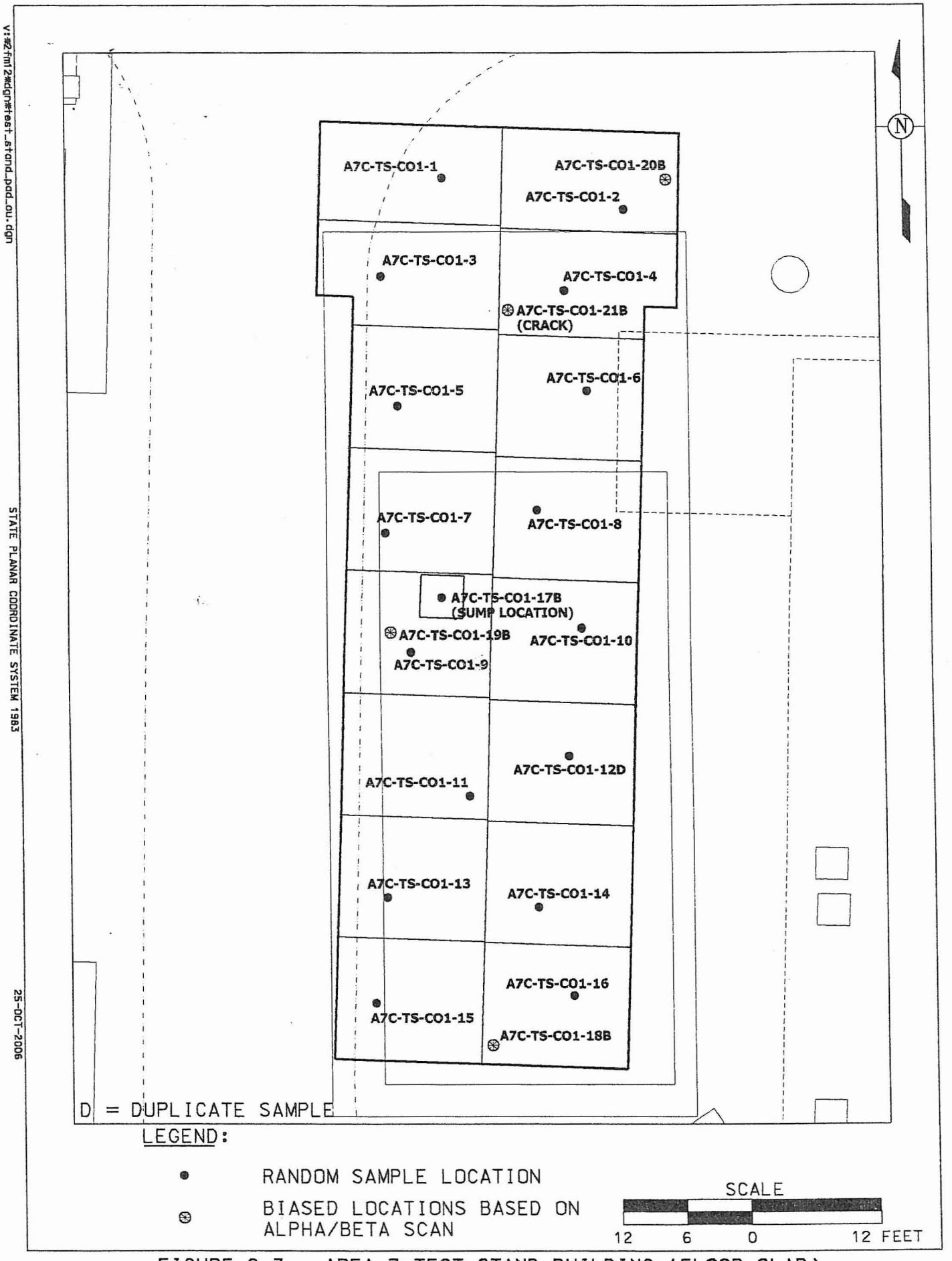

FIGURE 2-3. AREA 7 TEST STAND BUILDING (FLOOR SLAB) CERTIFICATION SAMPLE LOCATIONS (CU A7C-TS-CO1)

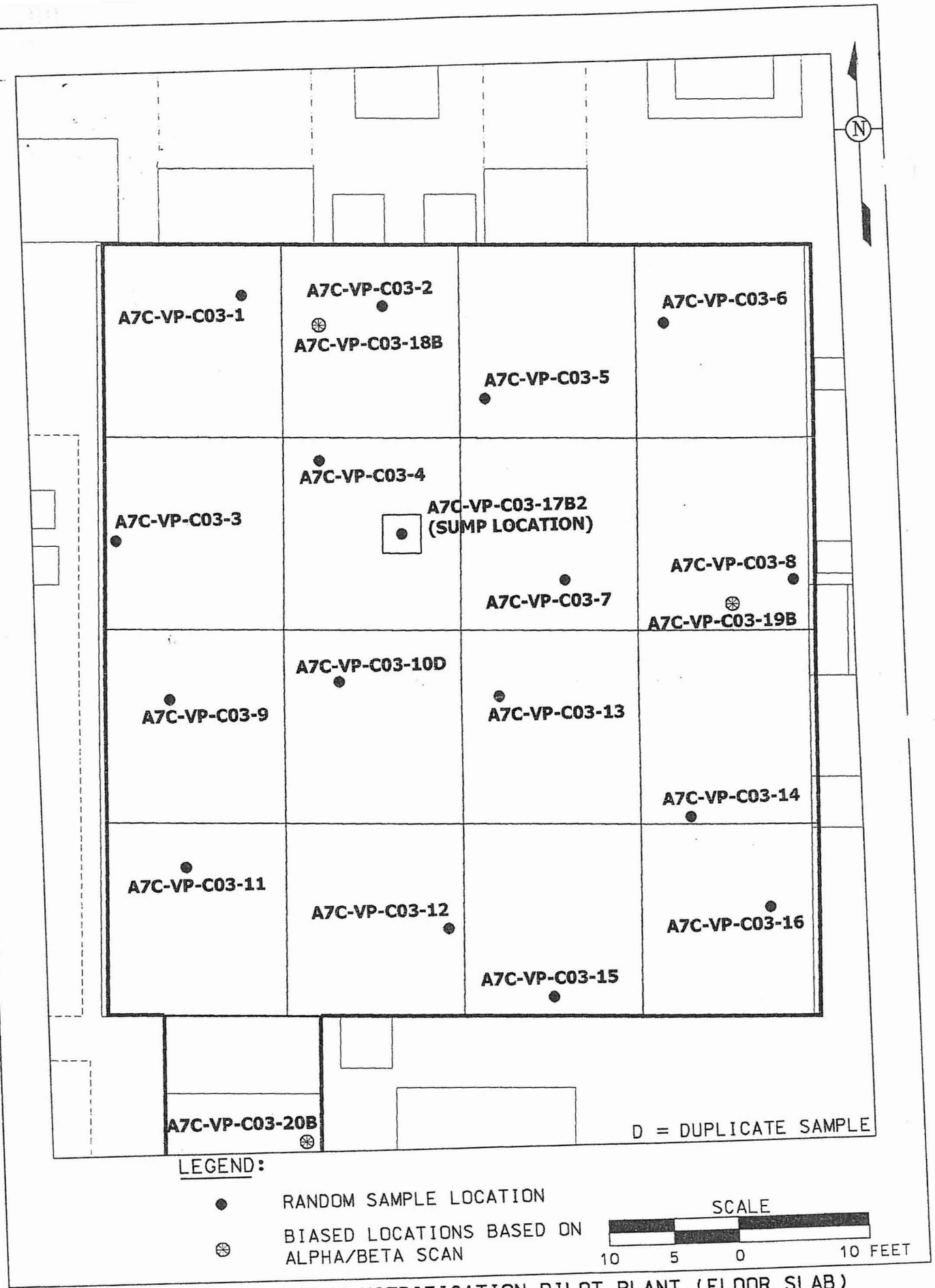

FIGURE 2-4. AREA 7 VITRIFICATION PILOT PLANT (FLOOR SLAB) CERTIFICATION SAMPLE LOCATIONS (CU A7C-VP-C03)

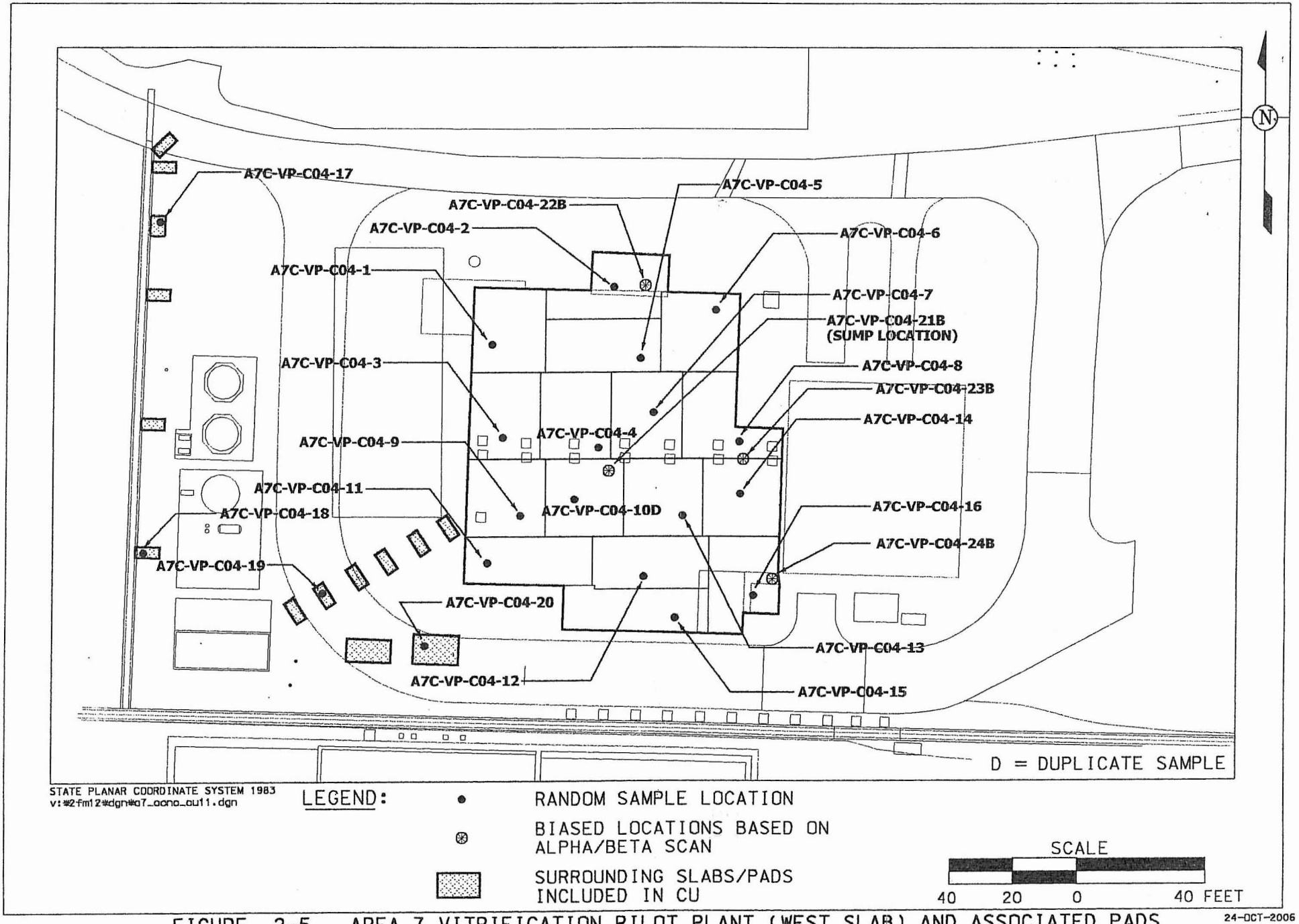

FIGURE 2-5. AREA 7 VITRIFICATION PILOT PLANT (WEST SLAB) AND ASSOCIATED PADS - CERTIFICATION SAMPLE LOCATIONS (CU A7C-VP-C04)

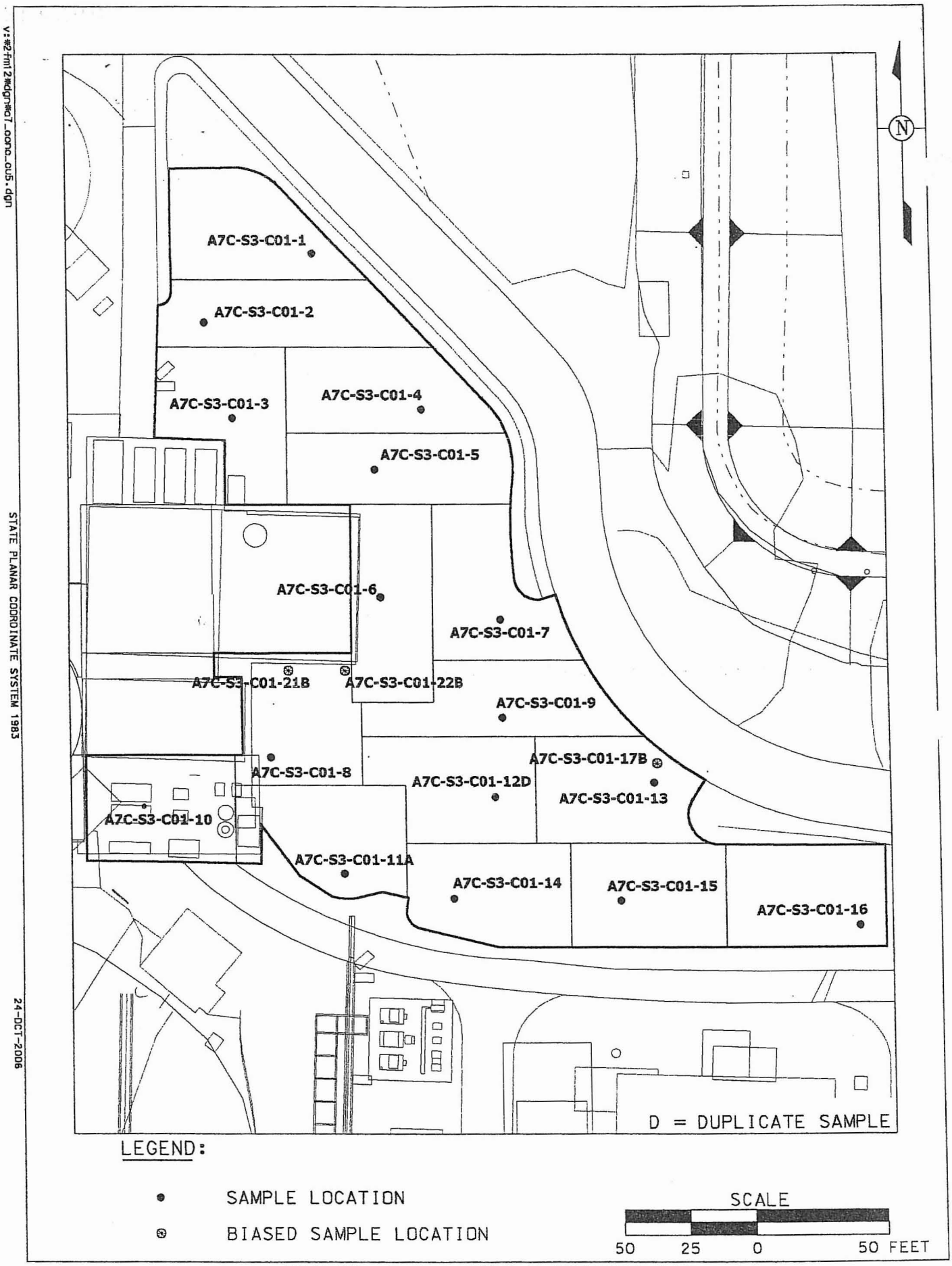

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FIGURE 2-6. SILO 3 STAGING PAD
- CERTIFICATION UNIT RANDOM SAMPLE LOCATIONS

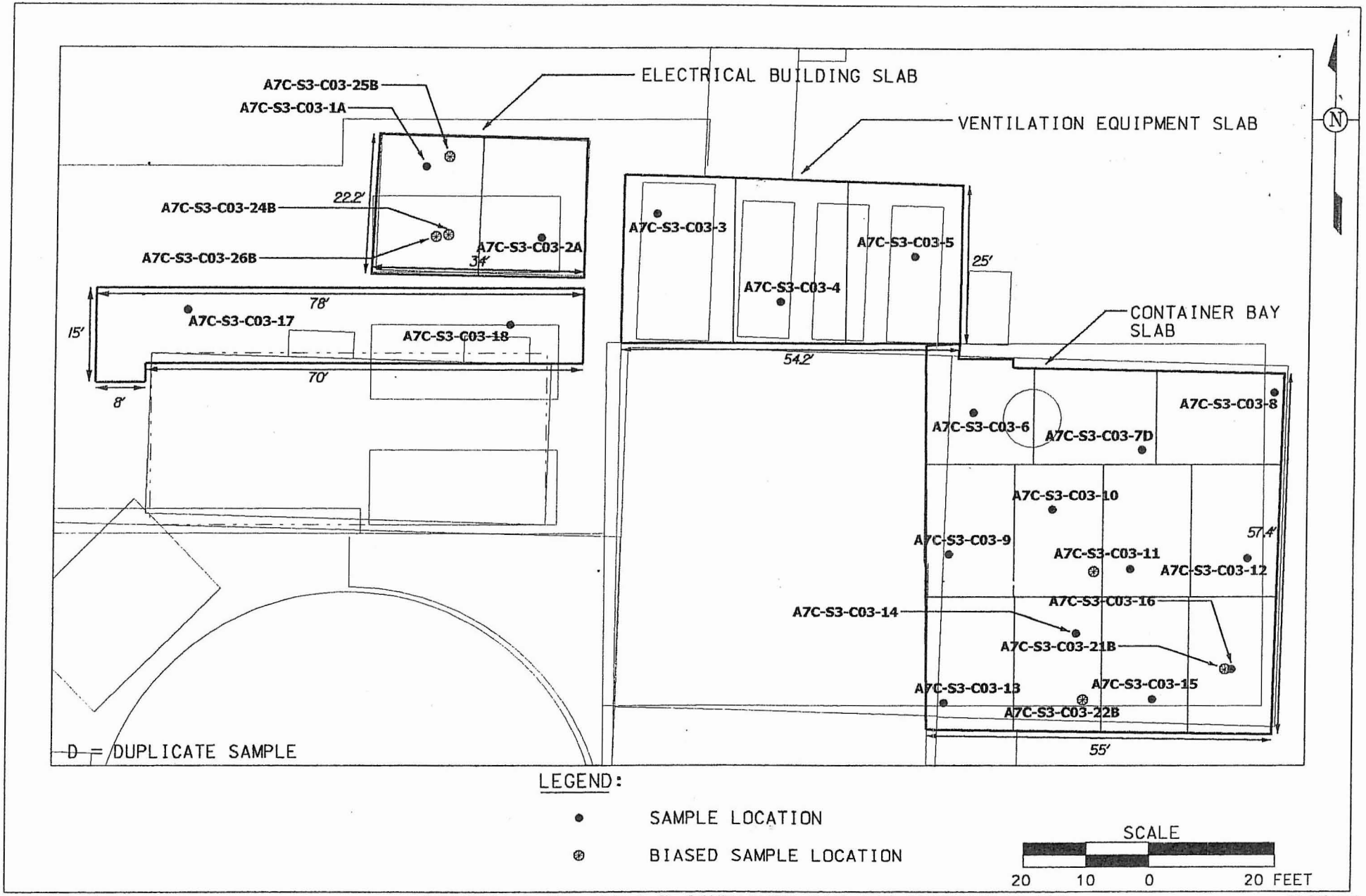

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FIGURE 2-7. SILO 3 CONTAINER BAY AND SUPPORT SLABS - CERTIFICATION UNIT RANDOM SAMPLE LOCATIONS

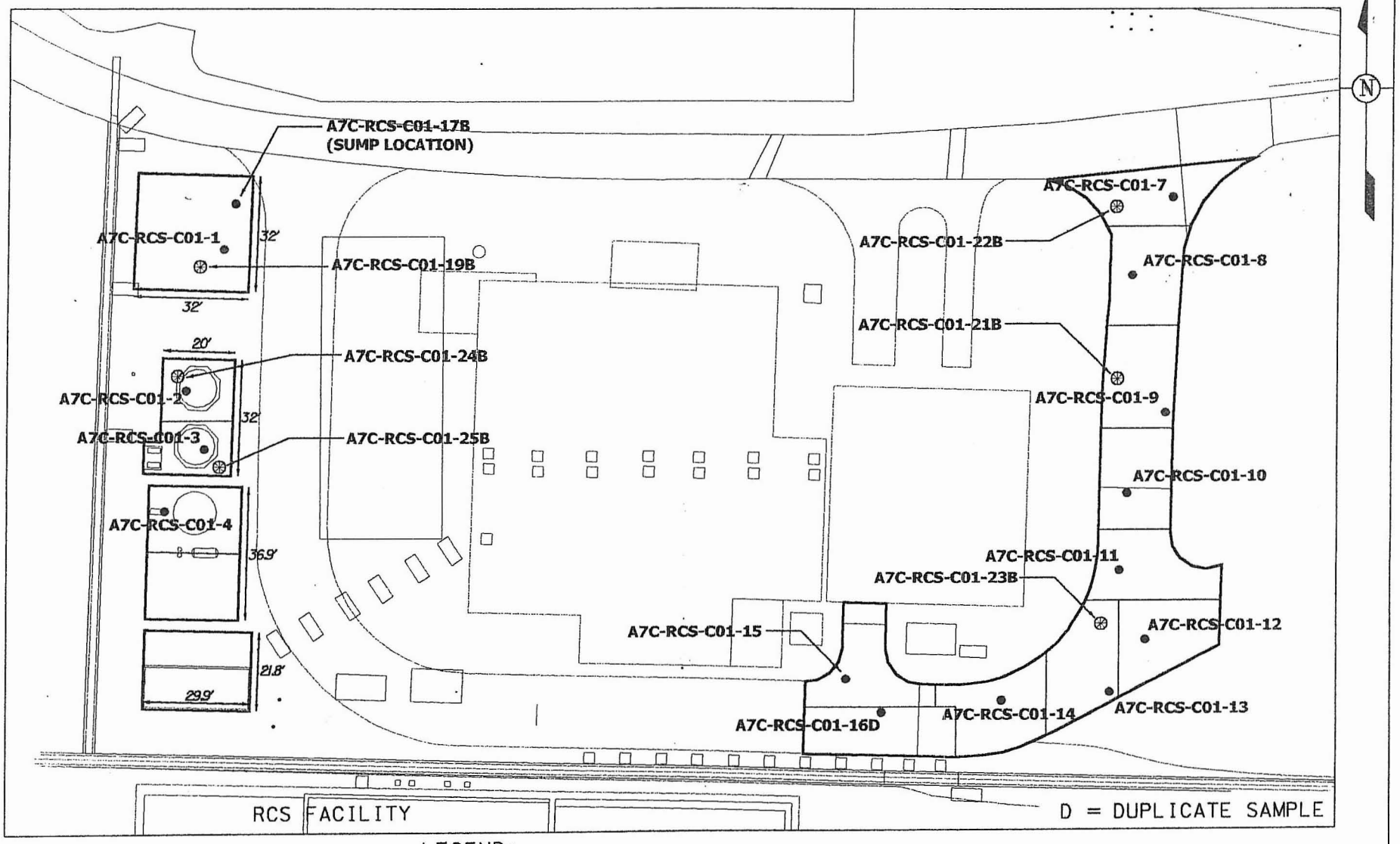

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FIGURE 2-8. RCS ANCILLARY PADS AND ROAD
– CERTIFICATION UNIT VDOM AND BIASED SAMPLE LOCATIONS

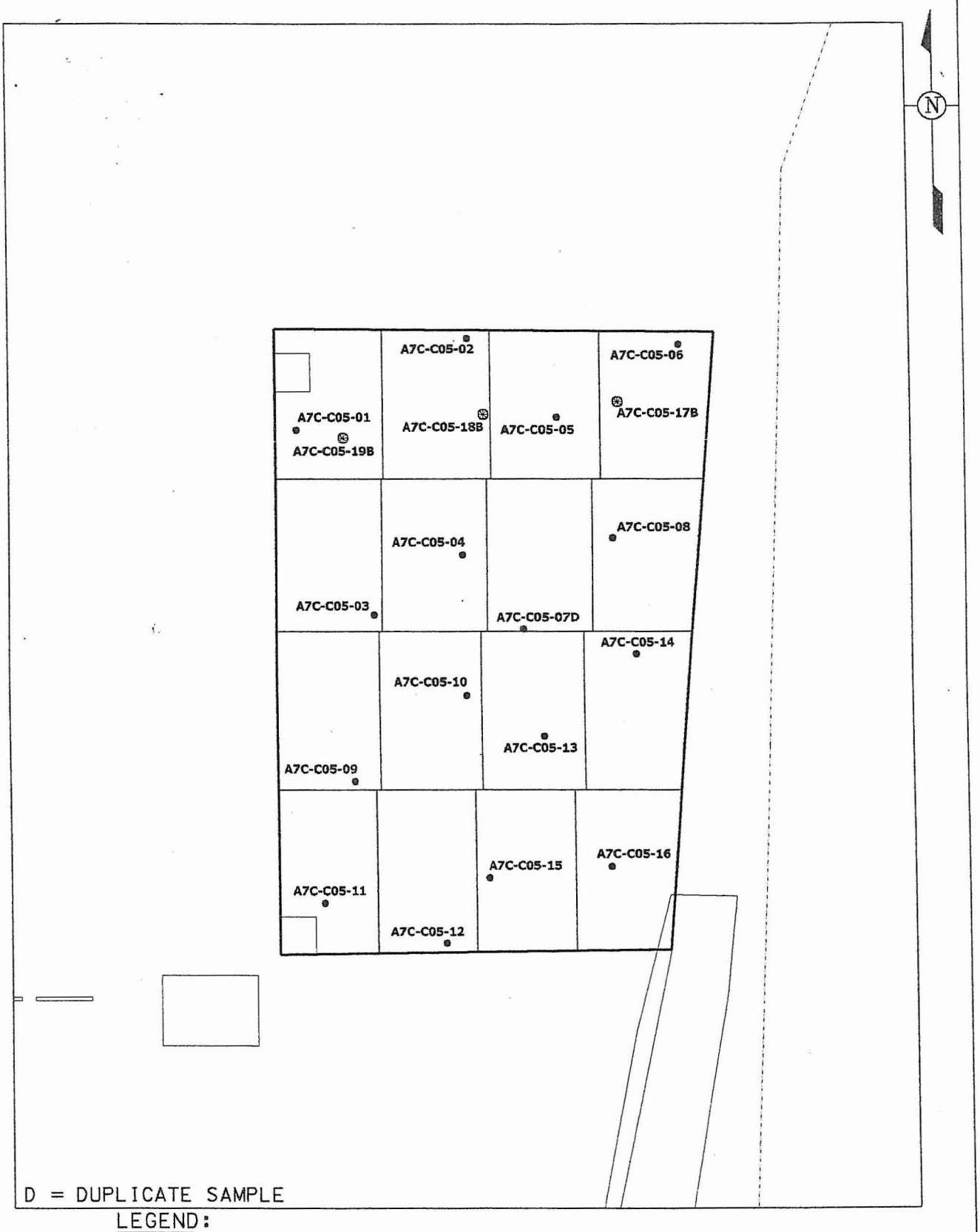

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FIGURE 2-9. AREA 7 SILOS WAREHOUSE STORAGE PAD - CERTIFICATION SAMPLE LOCATIONS (CU A7C-C05)

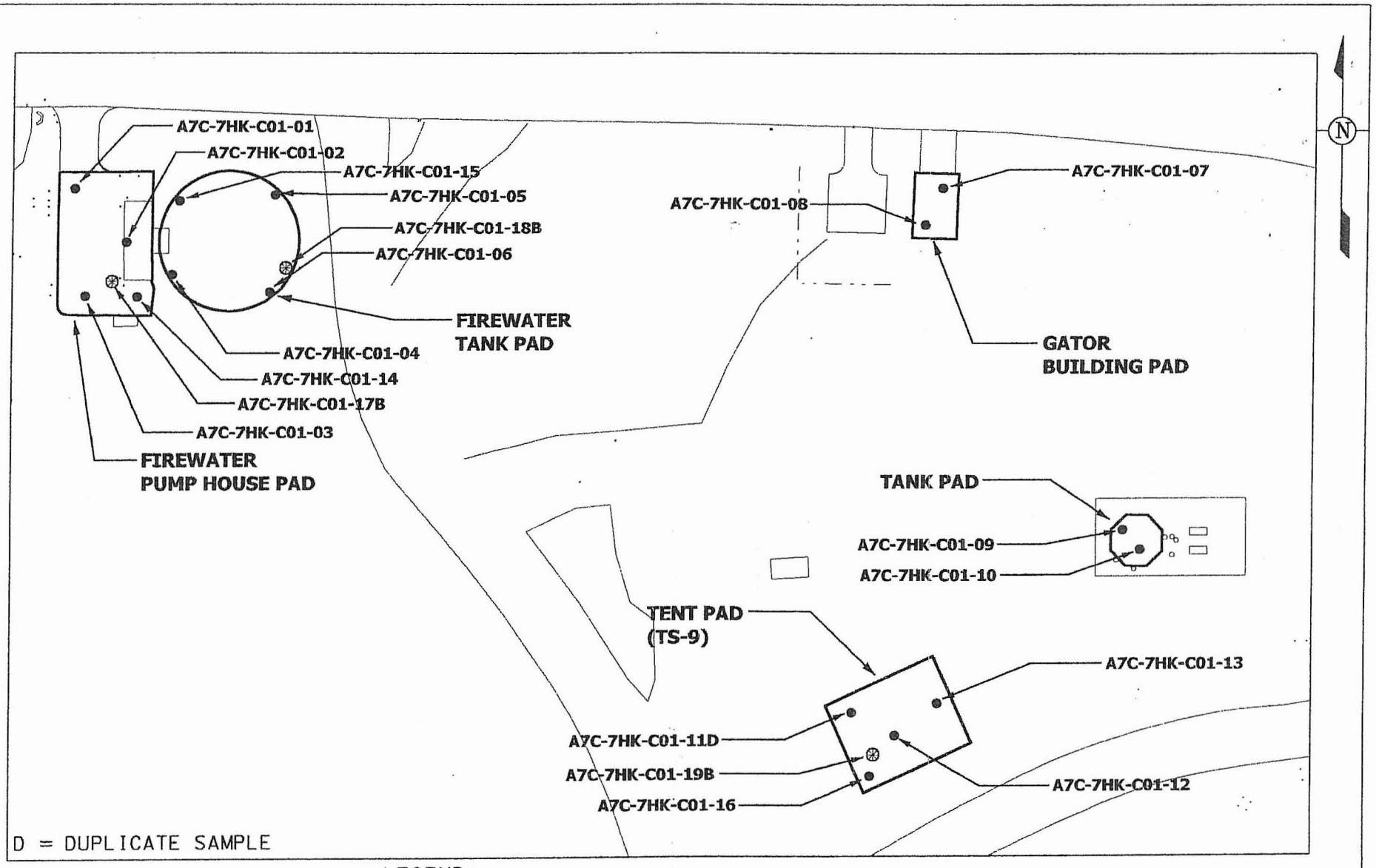

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FIGURE 2-10. AREA 7 MISCELLANEOUS SUPPORT PADS
– CERTIFICATION SAMPLE LOCATIONS (CU A7C-7HK-C01)

3.0 OVERVIEW OF PRECERTIFICATION AND FIELD ACTIVITIES

In accordance with the SEP, prior to conducting precertification and certification activities, the historical use of all concrete in the scope of this certification report was evaluated to verify that the concrete was not impacted to the extent that any associated FRLs would likely be exceeded upon certification sampling and analysis. The concrete proposed for certification in this report consists of concrete used for the construction of building slabs and pads to support remediation activities since the issuance of the RODs for the five OUs, primarily since 1995. The concrete addressed in this report was not used for operations involving processing or storage of radioactive materials or any significant amounts of process chemicals or hazardous materials.

3.1 AREA PREPARATION AND PRECERTIFICATION

The first step in preparing the concrete for certification involved a high-pressure water wash down of the areas to remove debris and foreign materials. In some cases, steel reinforcement bars or wire protruding from the concrete was removed to minimize the interference with radiological scanning equipment and maximize the surface area that could be scanned.

Concrete certified under this plan was scanned prior to the collection of physical samples using a real-time alpha/beta detection system, referred to as the Surface Contamination Monitor (SCM). The system was developed by Shonka Research Associates, Inc. as an innovative technology project for the DOE and U.S. Nuclear Regulatory Commission (NRC 1996, NUREG/CR-6450, DOE 1998b, and DOE 1999). All exposed surfaces accessible to the SCM were surveyed by Millenium Services, Inc., although some areas were inaccessible to the scanning system due to obstacles such as structural steel or concrete embedded fixtures. Analytical Support Level (ASL) A criteria, as defined in the Sitewide Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ, DOE 2003), is applicable to the survey work performed for this certification effort. Millenium's quality control practices and procedures follow the data quality objectives recommended in Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (NRC 2000, NUREG-1575/EPA 402-R-97-016 2000), and details are presented in the two referenced CDL/Certification PSPs that cover the concrete addressed in this report.

The SCM uses a 180-cm long by 10-cm wide position-sensitive gas-filled proportional counter that is segmented into 76 5-cm by 5-cm detectors (the system is described in detail in NUREG/CR-6450). Detector geometry and software reduction produce four hundred 25-cm^2 measurements per square meter of surface area scanned, and a proprietary averaging algorithm uses the 25-cm^2 areas to generate maps and statistical results reported as disintegrations per minute (dpm) for each 100-cm^2 area. All 100-cm^2 areas that exceed background can be identified and located for sampling, decontamination or removal. Additional details and

survey results are provided in Appendix C. Virtually no significant levels of contamination above background were detected for the concrete surfaces surveyed and reported in this report with the exception of a portion of CU A7C-S3-C03 (electrical building pad north of Silo 3). These results were expected as none of the concrete areas were used to process or treat any radioactive waste. Once the biased samples were identified from the radiological scan of a given CU, physical sampling of both the random and biased locations commenced. The status of the concrete area at this point was preserved by a barricade around the area to prevent contaminated equipment access, even though no contamination activities occurred nearby that would have likely presented a risk of contamination.

Laboratory results were reviewed to ensure that each CU passed the certification criteria prior to final placement of the concrete rubble generated from demolition of the slab or pad. The concrete rubble, or in some cases large sections of slabs, were placed in the Southern Waste Units erosion area to stabilize the area and create a habitat for various amphibians by placing the material in accordance with the plan approved by the regulatory agencies.

3.2 CHANGES TO SCOPE OF WORK

The scope of work for Area 6 and Area 7 Concrete Structures required five changes, which were documented with five V/FCNs (see Appendix B) and discussed in the following paragraphs.

Variance 20500-PSP-0011-01 documented the analysis of preliminary test samples from a contaminated portion of Area 7 concrete (in the Silos 1 and 2 Remediation Facility) to evaluate the correlation between field instrument readings and laboratory results. These samples were not collected for certification purposes.

Variance 20500-PSP-0011-02 documents the addition of a CU (A7C-VP-04) to encompass the concrete pad that supported the west side of the Vitrification Pilot Plant. This section of building foundation slab was discovered upon removal of gravel from the area.

Variance 20500-PSP-0011-03 documents the addition of a CU (A7C-7HK-C01) to encompass five concrete pads located in the former administrative area of the site located northwest of the former west storm water retention basin. The five concrete pads include the base of the existing fire water tank and pump house, a building pad used for clean equipment storage, a pad for a groundwater storage tank associated with South Plume Interim Treatment/Advanced Wastewater Treatment operations and a tent structure pad. Revision 1 of this variance documents the changes to the analytical turnaround time and radium-226 in-growth period for samples collected on or after August 8, 2006 as well as the relocation of three sample locations collected for the former groundwater storage tank due to the absence of a concrete slab beneath the former tank.

Variance 20500-PSP-0011-04 documents the addition of three additional areas of concrete to CU A7C-TP-C02): 1) a concrete slab in the empty trailer parking area located in the former West Parking Lot, 2) three small support pads, and 3) a slab used to support scale/weighing operations northwest of the Silos Trailer Staging Area. Thirteen random locations were sampled from these additional concrete areas.

Variance 20500-PSP-0011-05 documents the addition of an additional concrete pad located east of the Silos Warehouse (Building 94K) or future multi-use educational facility. Sixteen random concrete samples were collected in addition to three high-based samples based; a total of 19 samples were collected and analyzed for the constituents of concern.

The scope of work for RCS and Silo 3 Concrete Structures required changes, which were documented with four V/FCNs (see Appendix B) and discussed in the following paragraphs.

Variance 20500-PSP-0013-01 was not issued as a draft and then cancelled.

Variance 20500-PSP-0013-02 documents three changes including: the elimination of the sumps from the Silo 3 certification scope; elimination of three CUs (excavator room, RCS walls, and RCS slab and deck); and removal of a portion of the concrete in CU A7C-RCS-C01.

Variance 20500-PSP-0013-03 documents the resampling (two random locations plus biased locations) of CU A7C-S3-C03 due to the concrete of the electrical building being potentially contaminated after the initial certification effort.

Variance 20500-PSP-0013-04 documents the elimination of three CUs from the certification process due to the potential contamination levels and method of demolition. The cancelled CUs are A7C-S3-C02 (packaging room), A7C-S3-C04 (slab of tent structure surrounding Silo 3), and A7C-S3-C06 (excavator room slab).

4.0 ANALYTICAL METHODOLOGIES, DATA VALIDATION PROCESSES, AND DATA REDUCTION

4.1 ANALYTICAL METHODOLOGIES

All samples collected were sent off site for analysis. The laboratories complied with SCQ requirements. The SCQ is the source for analytical methodologies (Appendix G), data verification and validation, and analytical quality assurance/quality control requirements.

Laboratory analysis of certification samples was conducted using approved analytical methods, as discussed in Appendix H of the SEP. The minimum detection level (MDL) was set at 10 percent of the FRL and analyses were conducted to ASL D or E, where E is used if the MDL of 10 percent of the FRL is above the SCQ ASL detection level, but the analyses meet all other SCQ ASL D criteria. ASL D data packages were provided for all of the analytical data. All data were validated. Once data were validated as required, results were entered into the FCP Sitewide Environmental Database (SED). Final certification results are provided in Appendix A and a summary of the analytical methods follows:

4.1.1 Chemical Methods

Metals

Samples submitted for arsenic analysis were analyzed by inductively coupled plasma-mass spectrometry.

Samples submitted for barium, beryllium, chromium, lead, and selenium were analyzed by inductively coupled plasma-atomic emission spectroscopy.

Samples submitted for mercury analysis were analyzed by cold vapor atomic absorption.

Polychlorinated Biphenyl (PCBs)

Samples submitted for PCB analyses were analyzed by gas chromatography.

Volatile Organic Compounds (VOCs)

Samples submitted for VOC analyses were analyzed by gas chromatography/mass spectrometry.

4.1.2 Radiochemical Methods

The radiochemical analytical methods use performance-based specification criteria, including highest allowable minimum detectable concentration (HAMDC), matrix spike, ASCOC concentrations in method blank, percent recovery of tracer, matrix spike and laboratory control sample, and percent recovery for duplicate samples were specified for each analyte. Laboratories were required to meet these specifications for the following radionuclides:

Uranium-238

Samples are analyzed for uranium-238 progeny using multiple gamma rays, and the error-weighted average of the emission lines is used to report uranium-238 activity. The uranium-238 activity is used to calculate the total uranium value as follows:

Total Uranium (mg/kg) = 2.998544 (mg/pCi * g/kg) x Uranium-238 (pCi/g)

The validation qualifier assigned to the total uranium value is the same as the uranium-238 qualifier.

Radium-226

Following a 7-day in-growth for radon-222 (Appendix D), radium-226 progeny are measured using multiple gamma rays, and the error-weighted average of the emission lines is used to report radium-226 activity.

Radium-228 and Thorium-232

Samples are analyzed for radium-228 and thorium-232 progeny using multiple gamma rays, and the error-weighted average of the emission lines is used to report radium-228 and thorium-232 activities. The identical activity is reported for radium-228 and thorium-232, as they are assumed to be in secular equilibrium with the measured daughter.

Thorium-228

Thorium-228 is quantified by direct measurement of its gamma emission lines, and the error-weighted average of the emission lines is used to report the activity.

Cesium-137

Cesium-137 is quantified by direct measurement of its gamma emission lines, and the error-weighted average of the emission lines is used to report the activity.

Technetium-99

Following a chemical separation, technetium-99 is quantified using a liquid Scintillation counter.

Thorium-230

Thorium-230 is quantified by measuring its characteristic alpha emission energies and correcting the activity based on the yield of a thorium-229 tracer.

Lead-210

Lead-210 progeny are measured using multiple gamma rays, and the error-weighted average of the emission lines is used to report lead-210 activity.

4.2 DATA VERIFICATION AND VALIDATION

Data verification and validation (V&V) processes are used to examine the quality of field sampling and handling procedures, laboratory analysis and reporting, and non-conformance and discrepancy resolution. Analytical data are qualified to the appropriate data decision level by assessing the precision, accuracy, completeness, comparability, and representativeness of the measurements. The U.S. Environmental Protection Agency (EPA) National Functional Guidelines for Data Review (Inorganic Data) (EPA 1994), as adapted and approved by EPA Region V, as well as the Section 11.2 and Appendix D of the SCQ, are the appropriate V&V reference documents.

The V&V process evaluated the following parameters:

- Specific field forms for sample collection and handling
- Chain of Custody Forms
- Completeness of laboratory data package
- Holding times
- Instrument calibrations
- Calculation of results
- Laboratory/field duplicate precision
- Field/Laboratory Blank contamination
- Dry weight correction for solid samples
- Correct detection limits reported
- Recovery of laboratory control samples and compliance with established limits.

Parameters unique to the evaluation of radiochemical analyses include:

- Calibration data for specific gamma and alpha energies
- Background checks
- Relative error ratios
- Detector efficiencies
- Background count correction.

For this project, all sample data were reviewed and validated for the criteria noted above. Per project requirements specified in the SEP and Data Quality Objectives SL-052, a minimum 10 percent of the certification data were validated to Validation Support Level (VSL) D, and the remaining data were validated to VSL B. VSL D is a rigorous data review that includes the review process for VSL B plus a systematic review of the raw data and recalculation of all results.

Following V&V, qualifier codes are applied to the results to reflect the level of confidence assigned to a particular datum. These codes can include the following:

- No qualification; the positive result or detection limit is confident as reported

J Positive result is estimated or imprecise; data point is usable for decision-making purposes. Positive results less than the contract required reporting limit are also qualified in this manner

R Positive result or detection limit is considered unreliable; data point should not be used for decision-making purposes

U Undetected result at the stated limit of detection

UJ Undetected result; detection limit is considered estimated or imprecise; the data point is usable for decision-making purposes

N Positive result is tentatively identified - that is, there is some question regarding the actual identification and quantification of the result. Compound reported is best professional judgment of the interpretation of the supporting data, such as mass spectra. Caution must be exercised with the use of this data

NJ Positive result is tentatively estimated; detection limit is considered estimated or imprecise

NV Not validated. The results for this sample were not validated

Z This result, or detection limit in this analysis is not the best one to use; another analysis (e.g., the dilution or re-analysis) contains a more confident and usable result.

The V&V of the data set in this certification report did not identify any analytical problems. All the results are qualified as acceptable (-), estimated (J) and/or non-detects (U). No results were rejected.

4.3 DATA REDUCTION

Each sample used to support the certification decision was entered in the FCP SED with the following information:

Field Information

- Sample Identification Number - A unique number assigned to each discrete sample point
- Coordinate Information - Northing and Easting locations
- Certification Unit - Each sample is assigned to a CU.

Laboratory Information

For each sample result the following information is entered:

- Laboratory Result - The laboratory reported analytical value.

- Laboratory Qualifier - The qualifier reported from the lab. (Note: radiological non-detect values are assigned a U qualifier by Fluor, because the lab does not).

- Total Propagated Uncertainty (TPU) - This value represents the uncertainty associated with the reported radiological result. TPU includes the counting error, as well as uncertainty from other laboratory measurements and data reduction.

- Units - The units for the reported laboratory result.

Validation Information

- Validation Result - The result based on the validation process. During the validation process, sample results may be adjusted. If the laboratory result is less than the requested minimum detectable concentration (MDC), the validation result becomes the MDC.

- Validation TPU - The TPU based on the validation process.

- Validation Qualifier - The qualifier assigned as a result of the data validation process.

- Validation Units - The units reported by the laboratory, unless corrected by the validation process.

Using the information above, the following actions are taken for data reduction of each CU data set.

1. All the data for each CU are queried from SED.
2. The data from the validation fields are used in the statistical calculations
3. Data with a qualifier of R or Z are not used in the statistical calculations
4. The higher of the two duplicate results is used in the statistical calculations
5. One half of the non-detect (U or UJ) value is used in the statistical calculations.

5.0 CERTIFICATION EVALUATION AND CONCLUSIONS

Certification success or failure was based on sample data from each CU against criteria discussed in Section 2.2.3. Subsequent to any evaluation of preliminary data, full statistical analysis and evaluation was performed on all validated data. Final certification data are presented in Appendix A.

5.1 CERTIFICATION RESULTS AND EVALUATION

Below is a summary of the analytical results and statistical analyses of the data for each CU representing the selected areas concrete.

Each of the CUs passed all of the certification criteria discussed in Section 2.2.3. Final certification data are presented in Appendix A. The CUs summarized in this Certification Report are as follows:

- Area 6 Locomotive Maintenance Slab (CU A6C-C01)
- Area 7 Silos Trailer Parking Area (CU A7C-TP-C02)
- Area 7 Test Stand Slab (CU A7C-TS-C01)
- Area 7 Silos Warehouse Storage Pad (CU A7C-C05)
- Area 7H and 7K Miscellaneous Pads (CU A7C-HK-C01)
- Area 7 Vitrification Pilot Plant Building Slab (CU A7C-VP-C03 and A7C-VP-C04)
- Area 7 RCS Ancillary Support Pads and Road (CU A7C-RCS-C01)
- Area 7 Silo 3 Storage Pad (CU A7C-S3-C01)
- Silo 3 Container Bay Slab and Support Pads (CU A7C-S3-C03)

5.2 AREA 6 AND AREA 7 CONCRETE CERTIFICATION CONCLUSIONS

Based on the certification analytical results, precertification data, and statistical analysis, DOE has determined that the remedial objectives in the OU5 ROD and the requirements of the two applicable and referenced CDL/Certification PSPs have been achieved for the subject concrete described in this report. No remedial actions were required for this concrete beyond the initial wash-down process and no further actions are required. The concrete material was relocated to the soil erosion area of the Southern Waste Units after evaluating the analytical results and making a preliminary determination that the concrete passed the certification criteria. Final certification of the concrete is pending concurrence from the EPA and the Ohio Environmental Protection Agency (OEPA).

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APPENDIX A

CERTIFICATION SAMPLES, ANALYTICAL RESULTS AND FINAL STATISTICS TABLES

APPENDIX A
STATISTICAL ABBREVIATIONS AND SYMBOLS

The procedure used to determine if the data are to be assumed to be either normally distributed or lognormally distributed is outlined in Section G.2.3 of Appendix G to the SEP. The second paragraph under "Step 3: Perform the Shapiro-Wilk Test to evaluate if the data are normally or lognormally distributed" states that "If the Shapiro-Wilk Test indicates both normal and lognormal distributions fit the data, the distribution with the highest p-value will be used in the Student's t-Test (Section G.2.2.2) to make the certification decision." Therefore, the distribution testing procedure is not a matter of transforming the data and then testing for lognormality only when the normality assumption fails as the comment seems to imply. The method is to test both normality and lognormality and select the distribution that "best" fits the data as defined by the test yielding the higher p-value above a minimum acceptable value. The minimum acceptable p-value for acceptance of a distribution was set at 0.05.

Abbreviations:

W-Statistic Probability - Shapiro-Wilk probability of the "better" fit - either normal or lognormal (note: a value less than 0.05 indicates that neither normality nor lognormality could be accepted, but the highest p-value is still shown.)

t-Test (N) - indicates that the normal distribution is best fit to data with a p-value greater than or equal to 0.05.

t-Test (LN) - indicates that the lognormal distribution is best fit to data with a p-value greater than or equal to 0.05.

Sign Test - the Sign test was used because one of the following situations occurred:

1. there were greater than 50 percent non-detects,
2. between 15 and 50 percent non-detects and data not symmetrically distributed,
3. less than 15 percent non-detects, but fails Shapiro-Wilk test for both normality and lognormality and data not symmetrically distributed.

Wilcoxon SR - the Wilcoxon Signed Rank procedure was used because of one of the following situations:

1. between 15 and 50 percent non-detects and data symmetrically distributed,
2. less than 15 percent non-detects, but fails Shapiro-Wilk test for both normality and lognormality and data symmetrically distributed.

Note: Data was considered to be "symmetrically distributed" if the Standardized Skewness had an Absolute Value of less than or equal to 2.00 (i.e., between -2.00 and 2.00).

Number of NDs - number of non-detects.

@ - maximum result was below the FRL indicating that no statistical result needed to be reported.

ppendix A
A6C-C01

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Cesium-137	Technetium-99	Thorium-230	Arsenic	Beryllium
A6C-C01-1	0.383 -	0.260 -	0.235 J	0.260 -	1.810 U	0.082 U	1.820 U	0.428 J	6.200 J	0.200 -
A6C-C01-2	0.356 -	0.215 -	0.196 J	0.215 -	1.390 U	0.048 U	1.570 U	1.380 -	6.600 J	0.160 -
A6C-C01-3	0.392 -	0.254 -	0.243 -	0.254 -	2.420 J	0.043 U	1.050 U	0.316 U	6.000 -	0.170 -
A6C-C01-4	0.380 -	0.278 -	0.314 -	0.278 -	1.760 U	0.054 U	0.947 U	0.385 J	6.300 -	0.150 -
A6C-C01-5	0.420 -	0.240 -	0.227 J	0.240 -	1.580 J	0.069 U	1.720 U	0.640 U	6.700 J	0.200 -
A6C-C01-5-D	0.337 -	0.172 -	0.144 J	0.172 -	2.180 J	0.048 U	1.410 U	0.628 J	6.100 J	0.180 -
A6C-C01-6	0.430 -	0.231 -	0.211 -	0.231 -	1.450 U	0.042 U	1.850 U	0.457 U	6.300 -	0.170 J
A6C-C01-7	0.359 -	0.238 -	0.248 -	0.238 -	2.390 J	0.040 U	1.080 U	0.481 U	7.600 -	0.150 -
A6C-C01-8	0.338 -	0.197 -	0.184 -	0.197 -	1.820 J	0.045 U	0.955 U	0.604 J	6.700 -	0.170 -
A6C-C01-9	0.400 -	0.276 -	0.253 -	0.276 -	2.910 J	0.048 U	1.850 U	0.493 U	6.000 -	0.150 J
A6C-C01-10	0.382 -	0.269 -	0.251 -	0.269 -	2.000 J	0.039 U	1.800 U	0.758 J	5.500 -	0.190 J
A6C-C01-11	0.376 -	0.246 -	0.261 -	0.246 -	1.590 U	0.055 U	1.120 U	0.585 -	5.900 -	0.180 -
A6C-C01-12	0.299 J	0.245 -	0.238 -	0.245 -	0.974 J	0.037 U	0.862 U	0.833 J	6.600 -	0.180 -
A6C-C01-13	0.383 -	0.278 -	0.270 -	0.278 -	2.250 J	0.042 U	1.900 U	0.703 J	6.200 -	0.150 J
A6C-C01-14	0.383 J	0.254 -	0.248 -	0.254 -	1.810 U	0.045 U	0.795 U	0.631 J	7.000 -	0.230 -
A6C-C01-15	0.401 -	0.231 -	0.232 -	0.231 -	1.900 J	0.041 U	1.730 U	1.080 J	7.700 J	0.210 -
A6C-C01-16	0.394 -	0.211 -	0.201 -	0.211 -	1.780 U	0.077 U	1.260 U	1.080 -	6.800 -	0.110 J
A6C-C01-17B	0.364 -	0.242 -	0.234 -	0.242 -	1.550 J	0.033 U	1.650 U	0.744 J	3.400 J	0.100 J
A6C-C01-18B	0.702 -	0.298 -	0.288 -	0.298 -	2.120 J	0.054 U	1.480 U	0.692 -	6.800 J	0.240 -
A6C-C01-19B	0.352 -	0.194 -	0.185 -	0.194 -	1.610 U	0.038 U	1.610 U	0.522 -	8.600 -	0.240 -
A6C-C01-20B	0.393 -	0.278 -	0.267 -	0.278 -	1.920 J	0.027 U	1.810 U	0.461 J	7.400 -	0.230 -
A6C-C01-21B	0.361 -	0.213 -	0.234 -	0.213 -	1.680 U	0.037 U	1.850 U	0.785 -	9.200 -	0.260 -
Limit	1.7	1.8	1.7	1.5	82	1.4	30	280	12	1.5
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	pCi/g	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%
Max. Result	0.702	0.298	0.314	0.298	2.91	0.082 U	1.9 U	1.38	9.2	0.26
Max. >= Limit	No	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--	--
Sample Size	21	21	21	21	21	21	21	21	21	21
Nondetects	0	0	0	0	9	21	21	4	0	0
% Nondetects	0%	0%	0%	0%	43%	100%	100%	19%	0%	0%
Est. Mean*	--	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--	--	--	--	--

Appendix A
A6C-C01

Sample ID	Lead	Aroclor-1254	Aroclor-1260	Dieldrin	1,1-Dichloroethene	1,2-Dichloroethene	2-Butanone	4-Methyl-2-pentanone
A6C-C01-1	9.900 J	3.500 U	3.500 U	1.400 U	1.100 U	1.08 U	5.400 U	5.400 U
A6C-C01-2	10.400 J	3.500 U	3.500 U	1.400 U	1.100 U	1.08 U	5.400 U	5.400 U
A6C-C01-3	12.300 J	3.500 U	3.500 U	1.400 U	1.000 U	1.03 U	5.200 U	5.200 U
A6C-C01-4	10.400 J	3.500 U	3.500 U	1.400 U	1.100 U	1.06 U	5.300 U	5.300 U
A6C-C01-5	11.100 J	3.500 U	3.500 U	1.400 U	1.000 U	1.04 U	5.200 U	5.200 U
A6C-C01-5-D	10.400 J	3.500 U	3.500 U	1.400 U	1.100 U	1.06 U	5.300 U	5.300 U
A6C-C01-6	9.400 J	12.200 J	6.200 J	1.400 U	1.000 U	1.04 U	5.200 U	5.200 U
A6C-C01-7	11.700 J	3.500 U	3.500 U	1.400 U	1.100 U	1.07 U	5.400 U	5.400 U
A6C-C01-8	9.800 J	3.500 U	3.500 U	1.400 U	1.100 U	1.07 U	5.300 U	5.300 U
A6C-C01-9	9.300 J	3.500 U	3.500 U	1.400 U	1.000 U	1.04 U	5.200 U	5.200 U
A6C-C01-10	9.200 J	3.500 U	3.500 U	1.400 U	1.000 U	1.03 U	5.200 U	5.200 U
A6C-C01-11	11.200 J	3.500 U	3.500 U	1.400 U	1.000 U	1.03 U	5.200 U	5.200 U
A6C-C01-12	9.500 J	3.500 U	3.500 U	1.400 U	1.100 U	1.06 U	5.300 U	5.300 U
A6C-C01-13	9.500 J	3.500 U	3.500 U	1.400 U	1.100 U	1.06 U	5.300 U	5.300 U
A6C-C01-14	10.800 J	3.500 U	3.500 U	1.400 U	1.100 U	1.06 U	5.300 U	5.300 U
A6C-C01-15	10.900 J	3.500 U	3.500 U	1.400 U	1.100 U	1.06 U	5.300 U	5.300 U
A6C-C01-16	10.900 J	3.500 U	3.500 U	1.400 U	1.000 U	1.03 U	5.200 U	5.200 U
A6C-C01-17B	4.750 J	5.000 U	5.000 U	1.400 U	1.100 U	1.06 U	5.300 U	5.300 U
A6C-C01-18B	11.100 J	3.600 U	3.600 U	1.400 U	1.100 U	1.06 U	5.300 U	5.300 U
A6C-C01-19B	17.300 J	3.500 U	3.500 U	1.400 U	1.100 U	1.05 U	5.200 U	5.200 U
A6C-C01-20B	11.800 J	3.500 U	3.500 U	1.400 U	1.100 U	1.06 U	5.300 U	5.300 U
A6C-C01-21B	13.600 J	3.500 U	3.500 U	1.400 U	1.100 U	1.07 U	5.400 U	5.400 U
Limit	400	130	130	15	410	160	23,500	2,500,000
Units	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	17.3	12.2	6.2	1.4 U	1.1 U	1.08 U	5.4 U	5.4 U
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--
Sample Size	21	21	21	21	21	21	21	21
Nondetects	0	20	20	21	21	21	21	21
% Nondetects	0%	95%	95%	100%	100%	100%	100%	100%
Est. Mean*	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--

ppendix A
A6C-C01

Sample ID	Acetone	Benzene	Bromodichloromethane	Ethylbenzene	Tetrachlorothene	Toluene	Trichloroethene	Xylenes, Total
A6C-C01-1	5.400 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-2	5.400 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-3	7.700 J	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U
A6C-C01-4	5.300 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-5	5.200 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U
A6C-C01-5-D	5.400 J	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-6	11.300 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U
A6C-C01-7	5.400 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-8	5.300 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-9	13.500 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U
A6C-C01-10	11.400 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U
A6C-C01-11	5.200 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U
A6C-C01-12	5.300 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-13	22.600 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-14	5.300 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-15	46.200 J	1.100 U	1.100 UJ	1.100 U	1.100 U	1.200 J	1.100 U	1.100 U
A6C-C01-16	8.800 J	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U	1.000 U
A6C-C01-17B	22.800 U	1.100 U	1.100 UJ	1.100 U	1.100 U	1.100 U	1.100 U	1.100 U
A6C-C01-18B	5.300 U	1.100 U	1.100 U	1.100 U	1.100 U	1.600 J	1.100 U	1.100 U
A6C-C01-19B	30.100 J	1.100 U	1.100 U	2.300 J	1.100 UJ	1.100 U	1.100 U	15.100 J
A6C-C01-20B	6.100 J	1.100 U	1.100 U	1.100 UJ	1.100 UJ	13.800 J	1.100 U	2.300 J
A6C-C01-21B	9.500 J	1.100 U	1.100 U	1.100 UJ	1.100 UJ	1.100 U	1.100 U	1.100 UJ
Limit	43,000,000	850,000	4,000	5,100,000	3,600	100,000,000	25,000	920,000,000
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	46.2	1.1 U	1.1 U	2.3	1.1 U	13.8	1.1 U	15.1
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--
Sample Size	21	21	21	21	21	21	21	21
Nondetects	14	21	21	20	21	18	21	19
% Nondetects	67%	100%	100%	95%	100%	86%	100%	90%
Est. Mean*	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--	--	--

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Arsenic	Beryllium	Cobalt	Lead	Molybdenum	Aroclor-1254
A7C-TP-C02-1	0.601 -	0.338 -	0.325 -	0.338 -	2.54 J	0.744 U	1.7 -	1.1 -	3 J	4 J	1.6 J	3.5 U
A7C-TP-C02-2	0.488 -	0.272 -	0.28 -	0.272 -	1.85 J	0.456 U	1.5 -	1.1 -	3 J	3.8 J	1.7 J	3.5 U
A7C-TP-C02-3	0.477 -	0.278 -	0.3 -	0.278 -	1.28 J	0.652 U	2.6 -	1.1 -	3.5 J	4 J	1.5 J	3.5 U
A7C-TP-C02-4	0.593 -	0.313 -	0.319 -	0.313 -	2.04 -	0.472 U	1.7 -	0.97 -	3 J	3.8 J	1.7 J	3.5 U
A7C-TP-C02-5	0.530 -	0.382 -	0.371 -	0.382 -	3.71 J	1.28 U	1.9 -	1.1 -	3.2 J	4.1 J	1.4 J	3.5 U
A7C-TP-C02-6	0.525 J	0.365 -	0.368 -	0.365 -	2.3 J	0.928 J	2.4 -	1.1 -	3.5 J	4.4 J	1.4 J	3.5 U
A7C-TP-C02-7	0.470 J	0.262 -	0.263 -	0.262 -	1.56 -	2.5 U	3 -	0.92 -	3.8 J	4.7 J	1.3 J	3.5 U
A7C-TP-C02-7-D	0.518 J	0.233 -	0.253 -	0.233 -	2.04 J	2.57 U	2.3 -	1 -	3.8 J	4.5 J	1.4 J	3.5 U
A7C-TP-C02-8	0.477 J	0.235 -	0.227 -	0.235 -	1.67 -	2.08 U	2.5 -	1.1 -	4.2 J	4.7 J	1.5 J	3.5 U
A7C-TP-C02-9	0.436 J	0.265 -	0.278 -	0.265 -	1.39 J	2.14 U	2.7 -	0.94 -	3.6 J	4.5 J	1.2 J	3.5 U
A7C-TP-C02-10	0.484 J	0.262 -	0.257 -	0.262 -	1.91 J	1.5 U	3.1 -	1.3 -	4 J	5.1 J	1.7 J	3.5 U
A7C-TP-C02-11	0.484 J	0.235 -	0.236 -	0.235 -	0.972 U	2.23 U	2.8 -	1.1 -	4.1 J	4.9 J	1.6 J	3.5 U
A7C-TP-C02-12	0.463 J	0.378 -	0.39 -	0.378 -	0.931 U	1.72 U	2.8 -	1.1 -	3.7 J	4.7 J	1.4 J	3.5 U
A7C-TP-C02-13	0.451 J	0.285 -	0.283 -	0.285 -	1.16 J	2.26 U	2.3 -	1 -	3.5 J	4.3 J	1.8 J	3.5 U
A7C-TP-C02-14	0.484 J	0.318 -	0.31 -	0.318 -	1.77 J	0.342 U	2.3 -	1.1 -	3.7 J	4.1 J	1.1 J	3.5 U
A7C-TP-C02-15	0.550 -	0.278 -	0.273 -	0.278 -	2.17 -	0.412 J	2.9 -	0.82 -	2.8 J	3.8 J	0.91 J	3.5 U
A7C-TP-C02-16	0.541 -	0.305 -	0.296 -	0.305 -	2.1 -	1.75 U	2.7 -	1 -	3.4 J	4.1 J	0.95 J	3.5 U
A7C-TP-C02-17	0.603 -	0.299 -	0.294 -	0.299 -	2.49 J	6.25 UJ	3.7 -	0.94 -	3.1 J	4.7 J	1.3 J	3.5 U
A7C-TP-C02-18	0.618 -	0.332 -	0.331 -	0.332 -	1.78 J	5.04 UJ	4 -	1 -	3.6 J	5.2 J	1.6 J	3.5 U
A7C-TP-C02-19	0.521 -	0.318 -	0.343 -	0.318 -	2.82 J	4.61 UJ	3.7 -	1 -	3.7 J	5 J	1.3 J	3.5 U
A7C-TP-C02-20	0.464 -	0.251 -	0.254 -	0.251 -	1.64 U	4.36 UJ	4.7 -	0.84 -	3.1 J	4.6 J	1.3 J	3.5 U
A7C-TP-C02-20-D	0.503 -	0.246 -	0.245 -	0.246 -	2.79 J	4.1 UJ	3.9 -	0.91 -	8.3 J	4.9 J	1.4 J	3.5 U
A7C-TP-C02-21	0.497 -	0.274 -	0.276 -	0.274 -	2.24 U	4.35 UJ	6.8 -	0.8 -	3.5 J	3.9 J	1.3 J	3.5 U
A7C-TP-C02-22	0.939 J	1.040 -	1.07 -	1.04 -	30.3 -	1.36 J	2.1 -	0.61 -	3.1 J	4 J	1.2 J	3.5 U
A7C-TP-C02-23	0.524 J	0.393 -	0.414 -	0.393 -	2.28 J	0.865 U	4.1 -	0.37 -	3.6 J	5.4 J	1.6 J	3.5 U
A7C-TP-C02-28B	0.426 -	0.283 -	0.285 -	0.283 -	1.39 J	1.64 U	3.1 -	0.89 -	3.6 J	4.4 J	1.4 J	3.5 UJ
A7C-TP-C02-31	0.661 -	0.351 -	0.324 -	0.351 -	5.11 J	1.12 J	5.7 -	0.61 -	4.8 J	6.6 J	2.6 J	3.5 U
A7C-TP-C02-31B	0.51 -	0.274 -	0.29 -	0.274 -	2.18 -	0.355 U	3.9 -	1.2 -	3.9 J	5 J	1.4 J	3.5 U
A7C-TP-C02-32	0.69 -	0.282 -	0.295 -	0.282 -	2.9 J	0.509 J	4.8 -	0.52 -	4.3 J	5.6 J	2.7 J	3.5 U
A7C-TP-C02-32B	0.511 -	0.281 -	0.282 -	0.281 -	1.59 J	0.408 J	3.4 -	0.94 -	3.2 J	4.3 J	2.1 J	3.5 U
A7C-TP-C02-33	0.677 -	0.319 -	0.312 -	0.319 -	3.43 J	0.652 U	5.5 -	0.59 -	4.8 J	6.9 J	2.3 J	3.5 U
A7C-TP-C02-33B	0.526 -	0.323 -	0.295 -	0.323 -	1.21 U	0.535 U	3.2 -	0.96 -	4 J	4.2 J	1.5 J	3.6 U
A7C-TP-C02-34	0.616 -	0.235 -	0.231 -	0.235 -	2.35 -	0.385 J	3.7 J	0.44 -	4.4 J	3.8 J	1.9 J	3.5 UJ
A7C-TP-C02-34B	0.632 -	0.299 -	0.299 -	0.299 -	1.87 J	3.02 U	4.3 -	0.53 -	4.2 J	5 J	2 J	3.5 U
A7C-TP-C02-35	0.8 -	0.4 -	0.418 -	0.4 -	2.2 U	6.78 UJ	6 -	0.69 -	4.8 J	7 J	2.5 J	3.5 U
A7C-TP-C02-36	0.589 -	0.293 -	0.305 -	0.293 -	1.96 J	2.47 U	5.4 -	0.65 -	5.1 J	7.4 J	2.3 J	3.3 U
Limit	1.7	1.8	1.7	1.5	82	38	12	1.5	740	400	2900	130
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	95%	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max. Result	0.939	1.04	1.07	1.04	30.3	1.36	6.8	1.3	8.3	7.4	2.7	3.6 U
Max. >= Limit	No	No	No	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--	--	--	--
Sample Size	34	34	34	34	34	34	34	34	34	34	34	34
Nondetects	0	0	0	0	5	27	0	0	0	0	0	34
% Nondetects	0%	0%	0%	0%	15%	79%	0%	0%	0%	0%	0%	100%
Est. Mean*	--	--	--	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--	--	--	--	--	--	--

ppendix A
A7C-TS-C01

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Arsenic	Beryllium
A7C-TS-C01-1	0.459 -	0.317 J	0.320 J	0.317 J	1.150 U	2.610 U	4.800 -	0.610 -
A7C-TS-C01-2	0.558 -	0.344 J	0.342 J	0.344 J	2.100 U	0.576 U	4.700 -	0.730 -
A7C-TS-C01-3	0.470 -	0.320 J	0.318 J	0.320 J	2.030 J	0.621 U	5.000 -	0.700 -
A7C-TS-C01-4	0.485 -	0.365 J	0.376 J	0.365 J	2.120 J	0.617 J	5.600 -	0.730 -
A7C-TS-C01-5	0.606 -	0.344 J	0.358 J	0.344 J	1.990 J	1.180 J	4.100 -	0.650 -
A7C-TS-C01-6	0.471 -	0.429 J	0.441 J	0.429 J	1.730 U	3.690 U	4.300 -	0.670 -
A7C-TS-C01-7	0.498 -	0.421 J	0.420 J	0.421 J	4.040 J	0.902 U	4.800 -	0.660 -
A7C-TS-C01-8	0.564 -	0.324 J	0.300 J	0.324 J	2.250 J	0.557 U	4.900 -	0.840 -
A7C-TS-C01-9	0.577 -	0.428 J	0.437 J	0.428 J	3.520 J	0.596 U	5.000 -	0.690 -
A7C-TS-C01-10	0.509 -	0.394 J	0.384 J	0.394 J	2.120 J	0.572 U	5.100 -	0.760 -
A7C-TS-C01-11	0.596 -	0.481 J	0.489 J	0.481 J	2.730 J	1.410 J	4.800 -	0.780 -
A7C-TS-C01-12	0.556 -	0.389 J	0.387 J	0.389 J	1.920 J	0.858 J	4.700 -	0.730 -
A7C-TS-C01-12-D	0.647 -	0.339 J	0.340 J	0.339 J	3.880 J	3.130 U	5.300 -	0.660 -
A7C-TS-C01-13	0.510 -	0.423 J	0.415 J	0.423 J	2.630 J	0.853 U	5.200 -	0.640 -
A7C-TS-C01-14	0.544 -	0.409 J	0.426 J	0.409 J	2.440 J	0.433 U	3.600 -	0.530 -
A7C-TS-C01-15	0.470 -	0.309 J	0.316 J	0.309 J	2.860 J	0.597 U	5.100 -	0.670 -
A7C-TS-C01-16	0.471 -	0.350 J	0.365 J	0.350 J	2.200 J	2.870 U	5.100 -	0.670 -
A7C-TS-C01-17B	0.360 -	0.306 -	0.299 -	0.306 -	3.400 -	0.613 U	2.900 -	0.370 -
A7C-TS-C01-18B	0.509 -	0.387 -	0.388 -	0.387 -	2.970 J	3.760 U	4.700 -	0.890 -
A7C-TS-C01-19B	0.442 -	0.420 -	0.426 -	0.420 -	2.080 J	0.514 J	4.100 -	0.640 -
A7C-TS-C01-20B	0.465 -	0.294 -	0.294 -	0.294 -	2.070 J	2.950 U	4.200 -	0.630 -
A7C-TS-C01-21B	0.540 -	0.319 -	0.317 -	0.319 -	2.410 J	3.700 U	4.700 -	0.810 -
Limit	1.7	1.8	1.7	1.5	82	38	12	1.5
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%
Max. Result	0.647	0.481	0.489	0.481	4.04	1.88	5.6	0.89
Max. >= Limit	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--
Sample Size	21	21	21	21	21	21	21	21
Nondetects	0	0	0	0	3	16	0	0
% Nondetects	0%	0%	0%	0%	14%	76%	0%	0%
Est. Mean*	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--

Appendix A
A7C-TS-C01

Sample ID	Cobalt	Lead	Molybdenum	Aroclor-1254
A7C-TS-C01-1	19.300 J	4.000 J	3.400 J	3.300 U
A7C-TS-C01-2	8.900 J	5.300 J	1.600 J	3.300 U
A7C-TS-C01-3	5.500 J	6.000 J	1.600 J	3.300 U
A7C-TS-C01-4	8.700 J	6.200 J	1.700 J	3.300 U
A7C-TS-C01-5	4.800 J	5.000 J	1.400 J	3.300 U
A7C-TS-C01-6	5.000 J	5.300 J	1.400 J	3.300 U
A7C-TS-C01-7	6.000 J	5.400 J	1.400 J	3.300 U
A7C-TS-C01-8	6.200 J	5.500 J	1.700 J	3.300 U
A7C-TS-C01-9	5.200 J	5.700 J	1.600 J	3.300 U
A7C-TS-C01-10	5.200 J	5.700 J	1.900 J	3.300 U
A7C-TS-C01-11	6.400 J	5.700 J	1.900 J	3.300 U
A7C-TS-C01-12	6.600 J	5.600 J	1.800 J	3.300 U
A7C-TS-C01-12-D	6.500 J	5.300 J	1.900 J	3.300 U
A7C-TS-C01-13	7.800 J	5.500 J	1.800 J	4.200 J
A7C-TS-C01-14	9.500 J	4.700 J	1.500 J	3.300 U
A7C-TS-C01-15	13.400 J	6.200 J	1.700 J	3.300 U
A7C-TS-C01-16	11.500 J	6.200 J	1.800 J	3.300 U
A7C-TS-C01-17B	2.400 J	1.500 J	1.800 J	3.600 U
A7C-TS-C01-18B	8.800 J	5.800 J	1.700 J	3.500 U
A7C-TS-C01-19B	10.000 J	4.700 J	1.400 J	3.500 U
A7C-TS-C01-20B	5.200 J	4.600 J	1.400 J	3.500 U
A7C-TS-C01-21B	16.500 J	5.600 J	1.900 J	3.600 U
Limit	740	400	2900	130
Units	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%
Max. Result	19.3	6.2	3.4	4.2
Max. >= Limit	No	No	No	No
W-statistic Prob. #	--	--	--	--
Test Procedure	--	--	--	--
Sample Size	21	21	21	21
Nondetects	0	0	0	20
% Nondetects	0%	0%	0%	95%
Est. Mean*	--	--	--	--
UCL	--	--	--	--
Prob. > Limit	--	--	--	--
Pass / Fail	--	--	--	--
a posteriori Sample	--	--	--	--
Size calculation	--	--	--	--

ppendix A
A7C-C05

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Arsenic	Beryllium	Cobalt
A7C-C05-1	0.591981 -	0.417 -	0.408 -	0.417 -	2.27 -	0.438 U	6.9 J	1.1 J	15.2 J
A7C-C05-2	0.53196 -	0.345 -	0.351 -	0.345 -	1.76 -	2.59 U	6.2 J	1.1 J	9.1 J
A7C-C05-3	0.466674 -	0.351 -	0.355 -	0.351 -	1.9 -	0.536 J	6.7 J	0.79 J	8.5 J
A7C-C05-4	0.517218 -	0.374 -	0.39 -	0.374 -	1.65 J	0.593 J	4.7 J	0.53 J	4.8 J
A7C-C05-5	0.556179 -	0.268 -	0.259 -	0.268 -	2.44 J	0.441 U	6.2 J	0.96 J	9.5 J
A7C-C05-6	0.534066 -	0.34 -	0.337 -	0.34 -	1.74 J	0.373 U	6.2 J	1 J	6.9 J
A7C-C05-7	0.457197 -	0.295 -	0.274 -	0.295 -	2.99 J	0.558 U	8.5 J	0.95 J	8.1 J
A7C-C05-7-D	0.509847 -	0.32 -	0.298 -	0.32 -	2.21 -	0.293 U	6.3 J	0.72 J	5.6 J
A7C-C05-8	0.475098 -	0.28 -	0.264 -	0.28 -	2.65 J	0.529 U	6.5 J	1 J	6.8 J
A7C-C05-9	0.486681 -	0.35 -	0.357 -	0.35 -	1.68 -	0.35 U	8.2 J	0.83 J	26.1 J
A7C-C05-10	0.44772 -	0.37 -	0.372 -	0.37 -	2.2 J	0.611 U	7.9 J	0.9 J	7.3 J
A7C-C05-11	0.459303 -	0.382 -	0.387 -	0.382 -	2.16 -	0.304 U	7.9 J	0.79 J	5.5 J
A7C-C05-12	0.478257 -	0.332 -	0.324 -	0.332 -	1.52 J	0.536 U	7.6 J	0.87 J	6.3 J
A7C-C05-13	0.522483 -	0.419 -	0.444 -	0.419 -	1.39 J	0.469 U	7 J	0.77 J	6.5 J
A7C-C05-14	0.549861 -	0.296 -	0.308 -	0.296 -	2.98 -	0.589 J	6.7 J	0.78 J	6.6 J
A7C-C05-15	0.477204 -	0.346 -	0.344 -	0.346 -	1.46 J	0.49 J	5.1 J	0.67 J	6.7 J
A7C-C05-16	0.46878 -	0.424 -	0.432 -	0.424 -	2.46 -	0.496 U	7.9 J	0.92 J	8.4 J
A7C-C05-17B	0.534066 -	0.354 -	0.368 -	0.354 -	1.66 J	0.318 U	6.3 J	1.2 -	6.6 J
A7C-C05-18B	0.508794 -	0.3 -	0.303 -	0.3 -	2.35 J	0.797 J	7.1 J	1.2 -	7 J
A7C-C05-19B	0.488787 -	0.302 -	0.316 -	0.302 -	1.52 -	0.393 J	7.3 J	1.1 -	6.9 J
Limit	1.7	1.8	1.7	1.5	82	38	12	1.5	740
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	0 .591981	0 .424	0 .444	0 .424	2.99	0 .797	8.5	1.2	26.1
Max. >= Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	19	19	19	19	19	19	19	19	19
Nondetects	0	0	0	0	0	13	0	0	0
% Nondetects	0%	0%	0%	0%	0%	68%	0%	0%	0%
Est. Mean*	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--	--	--	--

006295

Appendix A
A7C-C05

Sample ID	Lead	Molybdenum
A7C-C05-1	6.9 J	2.1 J
A7C-C05-2	6.3 J	1.9 J
A7C-C05-3	6.1 J	1.5 J
A7C-C05-4	4 J	1.2 J
A7C-C05-5	6.5 J	1.7 J
A7C-C05-6	6.3 J	1.8 J
A7C-C05-7	6.4 J	2 J
A7C-C05-7-D	5.1 J	1.6 J
A7C-C05-8	6.1 J	1.7 J
A7C-C05-9	6.5 J	1.8 J
A7C-C05-10	6.6 J	1.8 J
A7C-C05-11	6 J	2 J
A7C-C05-12	6.8 J	1.8 J
A7C-C05-13	5.6 J	1.6 J
A7C-C05-14	5.4 J	1.7 J
A7C-C05-15	4.8 J	1.2 J
A7C-C05-16	6.3 J	1.8 J
A7C-C05-17B	6.9 J	1.9 J
A7C-C05-18B	7.2 J	2.1 J
A7C-C05-19B	6.7 J	1.9 J
Limit	400	2900
Units	mg/kg	mg/kg
Conf. Level	90%	90%
Max. Result	7.2	2.1
Max. >= Limit	No	No
W-statistic Prob. #	--	--
Test Procedure	--	--
Sample Size	19	19
Nondetects	0	0
% Nondetects	0%	0%
Est. Mean*	--	--
UCL	--	--
Prob. > Limit	--	--
Pass / Fail	--	--

a posteriori Sample	--	--
Size calculation	--	--

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Arsenic	Beryllium	Cobalt	Lead	Molybdenum
A7C-7HK-C01-1	0.523536 -	0.172 -	0.156 -	0.172 -	2.77 -	0.514 U	6 J	0.29 J	9.3 J	7.1 J	6.6 J
A7C-7HK-C01-2	0.573027 -	0.195 -	0.215 -	0.195 -	2.56 -	0.564 J	5 J	0.26 J	8.9 J	6.9 J	6.2 J
A7C-7HK-C01-3	0.485628 -	0.188 -	0.178 -	0.188 -	0.995 U	0.334 U	4.1 J	0.21 J	6.7 J	5.5 J	4 J
A7C-7HK-C01-4	0.457197 -	0.164 -	0.139 -	0.164 -	1.4 J	0.556 U	3.5 J	0.22 J	8.6 J	2.9 J	0.7 J
A7C-7HK-C01-5	0.469833 -	0.232 -	0.232 -	0.232 -	1.8 J	0.698 J	2.4 J	0.15 J	3 J	2 J	0.7 J
A7C-7HK-C01-6	0.461409 -	0.269 -	0.28 -	0.269 -	1.71 -	0.661 J	4.9 J	0.26 J	15.3 J	4.1 J	0.81 J
A7C-7HK-C01-7	0.687 J	0.398 -	0.399 -	0.398 -	1.52 U	0.689 U	4.7 -	0.7 -	4.2 J	4.6 J	2.2 J
A7C-7HK-C01-8	0.624 J	0.215 -	0.209 -	0.215 -	2.04 -	0.343 J	3.2 -	0.51 -	3.6 J	4 J	1.9 J
A7C-7HK-C01-9	0.622 J	0.234 -	0.24 -	0.234 -	2.33 -	0.313 J	4.7 -	0.55 -	5.1 J	4.6 J	2.4 J
A7C-7HK-C01-10	0.706 J	0.257 -	0.248 -	0.257 -	1.8 J	0.788 J	5 -	0.76 -	4.6 J	4.9 J	2.5 J
A7C-7HK-C01-11	0.596 -	0.323 -	0.32 -	0.323 -	2.55 U	0.801 J	4.9 -	0.73 -	3.5 J	5.9 J	1.6 J
A7C-7HK-C01-11-D	0.548 -	0.346 -	0.332 -	0.346 -	2.11 J	2.43 U	5.1 -	0.74 -	3.8 J	5.8 J	1.9 J
A7C-7HK-C01-12	0.624 -	0.323 -	0.328 -	0.323 -	2.25 -	0.298 U	2.2 -	0.53 -	2.7 J	3.7 J	0.84 J
A7C-7HK-C01-13	0.625 -	0.31 -	0.316 -	0.31 -	2.34 J	0.697 J	2.3 -	0.56 -	2.5 J	3.8 J	1.1 J
A7C-7HK-C01-14	0.538278 -	0.258 -	0.249 -	0.258 -	1.71 J	0.342 U	5.1 J	0.26 J	8.8 J	6.1 J	5.3 J
A7C-7HK-C01-15	0.42666 -	0.258 -	0.259 -	0.258 -	1.36 J	0.614 U	13.4 J	0.29 J	16 J	5 J	0.86 J
A7C-7HK-C01-16	0.654 -	0.248 -	0.253 -	0.248 -	2.91 -	0.678 J	2.5 -	0.52 -	2.7 J	3.6 J	0.92 J
A7C-7HK-C01-17B	0.545649 -	0.278 -	0.286 -	0.278 -	1.25 J	0.455 J	5.8 J	0.3 -	7.2 J	7.1 J	6.2 J
A7C-7HK-C01-18B	0.449826 -	0.327 -	0.323 -	0.327 -	1.74 J	0.62 J	6.3 J	0.31 -	5.1 J	4.9 J	1.2 J
A7C-7HK-C01-19B	0.570921 -	0.225 -	0.233 -	0.225 -	1.66 -	0.179 U	2.2 J	0.66 J	3.1 J	3.7 J	0.83 J
Limit	1.7	1.8	1.7	1.5	82	38	12	1.5	740	400	2900
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max. Result	0 .706	0 .398	0 .399	0 .398	2.91	0 .801	13.4	0 .76	16	7.1	6.6
Max. > Limit	No	No	No	No	No	No	Yes	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	6.4% (LN)	--	--	--	--
Test Procedure	--	--	--	--	--	--	Lognormal	--	--	--	--
Sample Size	19	19	19	19	19	19	19	19	19	19	19
Nondetects	0	0	0	0	2	8	0	0	0	0	0
% Nondetects	0%	0%	0%	0%	11%	42%	0%	0%	0%	0%	0%
Est. Mean*	--	--	--	--	--	--	4.647	--	--	--	--
UCL	--	--	--	--	--	--	5.457	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	pass	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--	2 Pass	--	--	--	--

ppendix A
A7C-VP-C03

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210
A7C-VP-C03-1	0.545 -	0.248 J	0.248 J	0.248 J	2.120 -	3.410 U
A7C-VP-C03-2	0.471 -	0.193 J	0.196 J	0.193 J	2.580 -	1.970 U
A7C-VP-C03-3	0.538 -	0.207 J	0.209 J	0.207 J	1.620 -	0.377 J
A7C-VP-C03-4	0.599 -	0.279 J	0.290 J	0.279 J	3.580 -	2.930 U
A7C-VP-C03-5	0.659 -	0.257 J	0.249 J	0.257 J	2.430 -	3.490 U
A7C-VP-C03-6	0.596 -	0.272 -	0.282 -	0.272 -	3.770 J	0.649 U
A7C-VP-C03-7	0.514 -	0.193 -	0.208 -	0.193 -	1.960 J	2.990 U
A7C-VP-C03-8	0.560 -	0.236 -	0.219 -	0.236 -	1.950 J	0.742 U
A7C-VP-C03-9	0.595 -	0.230 J	0.217 J	0.230 J	4.030 J	1.190 J
A7C-VP-C03-10	0.517 -	0.157 J	0.162 J	0.157 J	2.320 -	1.700 U
A7C-VP-C03-10-D	0.492 -	0.139 J	0.133 J	0.139 J	2.810 -	0.670 U
A7C-VP-C03-11	0.558 -	0.171 J	0.176 J	0.171 J	1.470 U	3.660 U
A7C-VP-C03-12	0.471 -	0.196 -	0.180 -	0.196 -	1.070 U	2.480 U
A7C-VP-C03-13	0.555 -	0.223 -	0.229 -	0.223 -	1.580 J	3.260 U
A7C-VP-C03-14	0.564 -	0.228 -	0.229 -	0.228 -	2.080 J	5.090 J
A7C-VP-C03-15	0.511 -	0.182 -	0.170 -	0.182 -	1.790 J	0.517 J
A7C-VP-C03-16	0.658 -	0.255 -	0.249 -	0.255 -	3.950 J	1.040 U
A7C-VP-C03-17B2	0.597 -	0.491 J	0.498 J	0.491 J	2.650 J	1.090 J
A7C-VP-C03-18B	0.562 -	0.232 J	0.258 J	0.232 J	3.890 J	3.510 U
A7C-VP-C03-19B	0.599 -	0.257 J	0.257 J	0.257 J	2.140 J	0.422 J
A7C-VP-C03-20B	0.525 -	0.249 J	0.248 J	0.249 J	1.930 J	0.526 U
Limit	1.7	1.8	1.7	1.5	82	38
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%
Max. Result	0.659	0.491	0.498	0.491	4.03	5.09
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	20	20	20	20	20	20
Nondetects	0	0	0	0	2	14
% Nondetects	0%	0%	0%	0%	10%	70%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--
Size calculation	--	--	--	--	--	--

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Appendix A
A7C-VP-C03

Sample ID	Arsenic	Beryllium	Cobalt	Lead	Molybdenum	Aroclor-1254
A7C-VP-C03-1	4.100 -	0.160 -	4.800 J	4.600 J	0.780 J	10.000 U
A7C-VP-C03-2	3.900 -	0.160 -	5.000 J	4.500 J	0.960 J	3.300 U
A7C-VP-C03-3	4.200 -	0.210 -	6.000 J	5.100 J	0.880 J	3.300 U
A7C-VP-C03-4	4.100 -	0.190 -	5.600 J	5.400 J	0.860 J	3.300 U
A7C-VP-C03-5	3.900 -	0.180 -	4.300 J	4.700 J	0.770 J	3.300 U
A7C-VP-C03-6	3.900 -	0.180 -	4.200 J	5.000 J	0.940 J	3.300 U
A7C-VP-C03-7	4.300 -	0.180 -	4.600 J	4.500 J	0.890 J	10.000 U
A7C-VP-C03-8	4.200 -	0.200 -	4.200 J	5.000 J	0.850 J	3.300 U
A7C-VP-C03-9	4.000 -	0.200 -	5.100 J	4.800 J	0.750 J	3.300 U
A7C-VP-C03-10	4.400 -	0.190 -	5.800 J	4.900 J	0.870 J	3.300 U
A7C-VP-C03-10-D	4.400 -	0.200 -	5.000 J	5.100 J	0.820 J	3.300 U
A7C-VP-C03-11	4.400 -	0.170 -	5.900 J	4.600 J	0.800 J	3.300 U
A7C-VP-C03-12	4.100 -	0.190 -	4.500 J	4.900 J	0.890 J	3.300 U
A7C-VP-C03-13	4.700 -	0.180 -	5.100 J	5.600 J	0.850 J	3.300 U
A7C-VP-C03-14	4.400 -	0.190 -	4.800 J	5.000 J	0.900 J	3.300 U
A7C-VP-C03-15	5.400 -	0.210 -	5.700 J	5.200 J	0.880 J	3.300 U
A7C-VP-C03-16	16.500 -	0.210 -	4.500 J	6.200 J	0.970 J	3.300 U
A7C-VP-C03-17B2	11.900 -	0.650 -	7.700 J	12.100 J	1.300 U	3.600 U
A7C-VP-C03-18B	5.600 -	0.210 -	6.100 J	7.000 J	1.100 U	3.500 U
A7C-VP-C03-19B	5.200 -	0.200 -	5.800 J	6.400 J	0.860 J	3.500 U
A7C-VP-C03-20B	4.500 -	0.570 -	3.400 J	2.600 J	1.800 J	3.500 U
Limit	12	1.5	740	400	2900	130
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	16.5	0.650	7.7	12.1	1.8	10 U
Max. >= Limit	Yes	No	No	No	No	No
W-statistic Prob. #	< 0.01% (LN)	--	--	--	--	--
Test Procedure	Median (Sign)	--	--	--	--	--
Sample Size	20	20	20	20	20	20
Nondetects	0	0	0	0	2	20
% Nondetects	0%	0%	0%	0%	10%	100%
Est. Mean*	4.350	--	--	--	--	--
UCL	4.500	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	Pass	--	--	--	--	--
a posteriori Sample	4	--	--	--	--	--
Size calculation	Pass	--	--	--	--	--

ppendix A
A7C-VP-C04

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210
A7C-VP-C04-1	0.557 J	0.203 J	0.185 J	0.203 J	1.800 J	2.370 U
A7C-VP-C04-2	0.493 J	0.175 J	0.167 J	0.175 J	1.090 U	2.440 U
A7C-VP-C04-3	0.461 J	0.208 J	0.224 J	0.208 J	1.290 U	2.540 U
A7C-VP-C04-4	0.545 J	0.220 J	0.235 J	0.220 J	2.260 -	3.090 U
A7C-VP-C04-5	0.453 J	0.236 J	0.286 J	0.236 J	1.830 J	1.330 U
A7C-VP-C04-6	0.508 J	0.192 J	0.205 J	0.192 J	1.080 J	2.200 J
A7C-VP-C04-7	0.527 J	0.174 J	0.181 J	0.174 J	1.860 -	3.250 U
A7C-VP-C04-8	0.463 J	0.152 J	0.154 J	0.152 J	1.490 -	1.800 U
A7C-VP-C04-9	0.505 J	0.121 J	0.119 J	0.121 J	2.210 -	1.760 U
A7C-VP-C04-10	0.474 J	0.208 J	0.212 J	0.208 J	1.460 J	1.470 U
A7C-VP-C04-10-D	0.577 J	0.269 J	0.285 J	0.269 J	2.600 -	2.290 U
A7C-VP-C04-11	0.625 J	0.197 J	0.199 J	0.197 J	0.833 U	1.610 U
A7C-VP-C04-12	0.519 J	0.259 J	0.276 J	0.259 J	2.220 -	0.290 U
A7C-VP-C04-13	0.436 J	0.170 J	0.169 J	0.170 J	1.610 -	0.847 U
A7C-VP-C04-14	0.508 J	0.193 J	0.192 J	0.193 J	2.230 -	0.443 U
A7C-VP-C04-15	0.503 J	0.190 J	0.195 J	0.190 J	1.470 -	0.613 J
A7C-VP-C04-16	0.482 J	0.176 J	0.183 J	0.176 J	1.390 J	2.300 U
A7C-VP-C04-17	0.583 J	0.322 J	0.325 J	0.322 J	2.070 -	0.877 U
A7C-VP-C04-18	0.589 J	0.255 J	0.270 J	0.255 J	2.980 J	0.624 U
A7C-VP-C04-19	0.506 J	0.234 J	0.248 J	0.234 J	2.230 -	0.400 U
A7C-VP-C04-20	0.524 -	0.266 -	0.273 -	0.266 -	2.410 -	1.250 U
A7C-VP-C04-21B	0.461 -	0.166 -	0.159 -	0.166 -	1.160 U	3.580 U
A7C-VP-C04-22B	0.447 -	0.216 -	0.216 J	0.216 -	2.790 J	2.260 U
A7C-VP-C04-23B	0.500 -	0.248 -	0.245 J	0.248 -	3.410 -	2.550 U
A7C-VP-C04-24B	0.478 -	0.260 -	0.250 J	0.260 -	1.490 U	3.210 U
Limit	1.7	1.8	1.7	1.5	82	38
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g
Conf. Level	95%	95%	95%	95%	95%	90%
Max. Result	0.625	0.322	0.325	0.322	3.41	2.2
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	24	24	24	24	24	24
Nondetects	0	0	0	0	5	22
% Nondetects	0%	0%	0%	0%	21%	92%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--

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Appendix A
A7C-VP-C04

Sample ID	Arsenic	Beryllium	Cobalt	Lead	Molybdenum	Aroclor-1254
A7C-VP-C04-1	7.200 J	0.280 J	6.600 J	12.000 J	0.980 J	3.500 U
A7C-VP-C04-2	4.000 J	0.170 J	4.000 J	7.600 J	0.590 J	3.500 U
A7C-VP-C04-3	4.500 J	0.160 J	3.900 J	7.600 J	0.630 J	3.500 U
A7C-VP-C04-4	6.600 J	0.250 J	6.000 J	7.600 J	0.890 J	3.500 U
A7C-VP-C04-5	8.400 J	0.430 J	7.700 J	10.900 J	1.500 J	3.500 U
A7C-VP-C04-6	6.700 J	0.250 J	5.900 J	10.300 J	0.930 J	3.500 U
A7C-VP-C04-7	2.600 J	0.170 J	3.700 J	4.200 J	0.810 J	3.500 U
A7C-VP-C04-8	3.200 J	0.160 J	3.600 J	4.400 J	0.600 J	3.500 U
A7C-VP-C04-9	2.500 J	0.310 J	2.300 J	1.300 J	4.400 J	3.500 U
A7C-VP-C04-10	5.000 J	0.220 J	4.200 J	7.900 J	0.700 J	3.500 U
A7C-VP-C04-10-D	7.100 J	0.250 J	6.200 J	11.500 J	1.200 J	3.500 U
A7C-VP-C04-11	6.200 J	0.200 J	4.900 J	7.200 J	1.100 J	3.500 U
A7C-VP-C04-12	6.400 J	0.240 J	5.700 J	7.000 J	2.100 J	3.500 U
A7C-VP-C04-13	6.000 J	0.220 J	6.300 J	6.500 J	1.000 J	3.500 U
A7C-VP-C04-14	5.000 J	0.220 J	5.100 J	6.500 J	0.780 J	3.500 U
A7C-VP-C04-15	5.500 J	0.240 J	5.400 J	6.600 J	0.990 J	3.500 U
A7C-VP-C04-16	6.100 J	0.210 J	5.600 J	10.000 J	0.950 J	3.500 U
A7C-VP-C04-17	2.700 J	0.280 J	3.200 J	3.900 J	1.500 J	3.500 U
A7C-VP-C04-18	3.300 J	0.370 J	3.400 J	5.100 J	1.000 J	3.500 U
A7C-VP-C04-19	5.500 J	1.200 J	3.300 J	5.400 J	1.700 J	3.500 U
A7C-VP-C04-20	6.900 -	0.530 -	4.500 J	6.400 J	2.400 J	3.500 U
A7C-VP-C04-21B	6.000 -	0.200 -	5.600 J	57.400 J	2.200 J	3.500 U
A7C-VP-C04-22B	3.400 -	0.250 -	3.000 J	3.400 J	0.830 J	3.500 U
A7C-VP-C04-23B	4.600 -	0.180 -	4.400 J	5.400 J	0.800 J	3.500 U
A7C-VP-C04-24B	4.300 -	0.390 -	3.200 J	4.300 J	1.500 J	3.500 U
Limit	12	1.5	740	400	2900	130
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
Conf. Level	90%	90%	90%	90%	90%	90%
Max. Result	8.4	1.2	7.7	57.4	4.4	3.5 U
Max. >= Limit	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--
Sample Size	24	24	24	24	24	24
Nondetects	0	0	0	0	0	24
% Nondetects	0%	0%	0%	0%	0%	100%
Est. Mean*	--	--	--	--	--	--
UCL	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--

ppendix A
A7C-RCS-C01

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Arsenic	Beryllium	Cobalt	Lead	Molybdenum
A7C-RCS-C01-1	0.491 -	0.37 -	0.37 -	0.37 -	2.88 -	7 J	7.5 -	0.55 -	15.5 J	5.1 J	2 J
A7C-RCS-C01-2	0.519 -	0.322 -	0.325 -	0.322 -	1.4 J	0.474 U	4.3 J	0.84 -	23 J	5 J	1.5 J
A7C-RCS-C01-3	0.526 -	0.448 -	0.448 -	0.448 -	2.33 -	0.69 J	4.7 J	0.9 -	8.9 J	5.5 J	1.6 J
A7C-RCS-C01-4	0.519 -	0.451 -	0.474 -	0.451 -	4.06 -	0.653 U	6.5 J	0.56 -	8.4 J	6.4 J	1.6 J
A7C-RCS-C01-7	0.728 -	0.272 -	0.264 -	0.272 -	2.25 -	3.35 U	4.8 -	0.45 -	23.4 J	4.2 J	2.4 J
A7C-RCS-C01-8	0.645 -	0.241 -	0.245 -	0.241 -	2.15 -	1.4 U	4.5 -	0.56 -	9.1 J	3.7 J	2.1 J
A7C-RCS-C01-9	0.687 -	0.298 -	0.301 -	0.298 -	2.75 -	2.61 U	5 -	0.53 -	12.7 J	4.3 J	2.5 J
A7C-RCS-C01-10	0.731 -	0.158 -	0.16 -	0.158 -	3.06 -	3.08 U	5.5 -	0.6 -	21.4 J	4.6 J	2.4 J
A7C-RCS-C01-11	0.621 -	0.235 -	0.239 -	0.235 -	2.76 -	5.93 J	5 -	0.5 -	16.3 J	3.8 J	2.1 J
A7C-RCS-C01-12	0.692 -	0.245 -	0.253 J	0.245 -	2.86 -	3.09 U	3.7 -	0.48 -	4.2 J	4.4 J	1.9 J
A7C-RCS-C01-13	0.715 -	0.313 -	0.339 J	0.313 -	3.13 J	0.628 U	4.6 -	0.5 -	4.5 J	4.7 J	2 J
A7C-RCS-C01-14	0.602 -	0.326 -	0.303 J	0.326 -	1.22 U	0.821 J	4.2 -	0.51 -	4.4 J	4.5 J	2.2 J
A7C-RCS-C01-15	0.512 -	0.25 -	0.236 J	0.25 -	1.46 J	0.842 J	4.8 -	0.56 -	3.5 J	2.5 J	1.9 J
A7C-RCS-C01-16	0.533 -	0.153 -	0.146 J	0.153 -	2.21 J	2.86 U	4.2 -	0.5 -	3.1 J	2.2 J	1.8 J
A7C-RCS-C01-16-D	0.607 -	0.205 -	0.216 J	0.205 -	1.45 U	3.24 U	4.7 -	0.56 -	3.6 J	2.8 J	1.8 J
A7C-RCS-C01-17B	0.467 -	0.285 -	0.297 -	0.285 -	2.06 J	3.29 U	7.7 -	0.61 -	11.6 J	5.4 J	2 J
A7C-RCS-C01-19B	0.414 -	0.336 -	0.339 -	0.336 -	1.77 J	2.73 J	8.6 -	0.58 -	9.4 J	5.7 J	2.2 J
A7C-RCS-C01-21B	0.655 -	0.132 -	0.126 J	0.132 -	2.03 J	0.616 U	4.2 -	0.45 -	4.7 J	4.8 J	2 J
A7C-RCS-C01-22B	0.639 -	0.265 -	0.262 J	0.265 -	2.43 -	2.18 U	4.2 -	0.5 -	4.3 J	4.3 J	2.1 J
A7C-RCS-C01-23B	0.501 -	0.181 -	0.184 J	0.181 -	2.22 -	4.93 J	3.1 -	0.47 -	4.2 J	4.4 J	1.9 J
A7C-RCS-C01-24B	0.569 -	0.357 -	0.339 -	0.357 -	1.5 U	3.72 U	5.5 -	0.48 -	4.1 J	6.5 J	1.3 J
A7C-RCS-C01-25B	0.414 -	0.268 -	0.286 -	0.268 -	2.13 -	0.473 J	4.5 -	0.43 -	3.2 J	4.4 J	1.6 J
Limit	1.7	1.8	1.7	1.5	82	38	12	1.5	740	400	2900
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%
Max. Result	0 .731	0 .451	0 .474	0 .451	4.06	7	8.6	0 .9	23.4	6.5	2.5
Max. >= Limit	No	No	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--	--	--
Sample Size	21	21	21	21	21	21	21	21	21	21	21
Nondetects	0	0	0	0	2	13	0	0	0	0	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	9.5%	61.9%	0.0%	0.0%	0.0%	0.0%	0.0%
Est. Mean*	--	--	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--	--	--	--	--	--

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.ppendix A
A7C-S3-C01

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Thorium-230	Arsenic	Beryllium
A7C-S3-C01-1	0.755 -	0.246 -	0.252 -	0.246 -	2.8 -	3.5 U	0.914 J	2.5 J	0.42 -
A7C-S3-C01-2	0.686 -	0.238 -	0.222 -	0.238 -	3.13 -	0.881 J	0.678 U	2.4 J	0.6 -
A7C-S3-C01-3	0.574 -	0.232 -	0.25 -	0.232 -	2.55 -	0.55 U	1.39 J	2.6 J	0.51 -
A7C-S3-C01-4	0.67 -	0.287 -	0.298 -	0.287 -	2.73 -	0.481 J	0.523 J	2.3 J	0.43 -
A7C-S3-C01-5	0.688 -	0.25 -	0.255 -	0.25 -	1.8 J	0.833 J	0.557 J	2.6 J	0.46 -
A7C-S3-C01-6	0.594 -	0.312 -	0.314 -	0.312 -	2.91 J	2.38 U	0.645 U	3.6 J	0.62 -
A7C-S3-C01-7	0.634 -	0.246 -	0.255 -	0.246 -	2 J	2.36 U	0.862 J	3.4 J	0.54 -
A7C-S3-C01-8	0.398 J	0.271 -	0.272 -	0.271 -	2.32 -	1.92 U	0.582 U	6.4 -	0.68 -
A7C-S3-C01-9	0.718 -	0.3 -	0.336 -	0.3 -	1.59 U	1.21 J	0.814 J	2.7 J	0.53 -
A7C-S3-C01-10	0.847 -	0.342 -	0.34 -	0.342 -	3.23 J	0.739 J	0.878 -	3.3 J	0.83 J
A7C-S3-C01-11	0.648 -	0.245 -	0.243 -	0.245 -	2.47 -	1.19 U	0.743 J	2.6 J	0.51 -
A7C-S3-C01-11A	0.643 -	0.237 -	0.239 J	0.237 -	1.77 J	0.381 J	0.579 J	4.1 -	0.46 J
A7C-S3-C01-12	0.55 -	0.25 J	0.267 J	0.25 J	2.02 -	2.88 U	0.54 J	4.2 J	0.6 -
A7C-S3-C01-12-D	0.606 -	0.164 J	0.182 J	0.164 J	1.36 J	2.99 U	0.699 -	3.8 J	0.63 -
A7C-S3-C01-13	0.616 -	0.289 J	0.293 J	0.289 J	1.64 J	2.6 U	0.903 -	4.4 J	0.54 -
A7C-S3-C01-14	0.706 -	0.264 J	0.272 J	0.264 J	2.5 J	3.05 U	0.636 -	3.7 J	0.54 -
A7C-S3-C01-15	0.63 -	0.253 J	0.267 J	0.253 J	1.6 U	3.7 U	1.06 -	4.3 J	0.47 -
A7C-S3-C01-16	0.669 -	0.264 -	0.271 -	0.264 -	3.33 -	2.25 U	0.92 J	2.4 J	0.54 -
A7C-S3-C01-17B	0.584 -	0.23 -	0.239 -	0.23 -	2.36 -	1.51 U	0.831 J	4 J	0.56 -
A7C-S3-C01-20B	0.597 -	0.312 -	0.312 -	0.312 -	2.08 J	0.662 J	1.25 -	5.8 -	0.6 -
A7C-S3-C01-21B	0.616 -	0.329 -	0.333 -	0.329 -	2.23 -	2.04 U	0.82 -	4.8 -	0.71 -
A7C-S3-C01-22B	0.707 -	0.273 -	0.277 J	0.273 -	1.89 -	0.454 J	0.671 U	7 J	0.46 -
Limit	1.7	1.8	1.7	1.5	82	38	280	12	1.5
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%
Max. Result	0 .847	0 .342	0 .34	0 .342	3.33	1.21	1.39	7	0 .83
Max. >= Limit	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	21	21	21	21	21	21	21	21	21
Nondetects	0	0	0	0	2	13	4	0	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	9.5%	61.9%	19.0%	0.0%	0.0%
Est. Mean*	--	--	--	--	--	--	--	--	--
UCL	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--
Pass / Fail	--	--	--	--	--	--	--	--	--
a posteriori Sample Size calculation	--	--	--	--	--	--	--	--	--

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Appendix A
A7C-S3-C01

Sample ID	Chromium	Cobalt	Lead	Manganese
A7C-S3-C01-1	30 -	11.8 J	4.9 J	362 J
A7C-S3-C01-2	37 -	8.2 J	6.1 J	514 -
A7C-S3-C01-3	35 -	12.8 J	6.1 J	461 -
A7C-S3-C01-4	29.7 J	19.6 J	5.3 J	814 -
A7C-S3-C01-5	34.2 -	21.1 J	5.4 J	417 J
A7C-S3-C01-6	38.4 -	20.9 J	6.5 J	490 -
A7C-S3-C01-7	39.4 -	23.2 J	9 J	462 -
A7C-S3-C01-8	16.1 J	4.1 J	5.2 J	295 J
A7C-S3-C01-9	36.4 -	10 J	6.4 J	589 -
A7C-S3-C01-10	19.1 J	4.5 J	5.3 J	452 J
A7C-S3-C01-11	37.1 -	22.5 J	6.3 J	489 -
A7C-S3-C01-11A	31.1 J	4.6 J	5.4 J	485 -
A7C-S3-C01-12	40.8 J	16.6 J	6.6 J	665 J
A7C-S3-C01-12-D	44 J	10 J	6.4 J	524 J
A7C-S3-C01-13	33.6 J	17.1 J	6 J	539 J
A7C-S3-C01-14	38.1 J	17.5 J	5.8 J	489 J
A7C-S3-C01-15	28.9 J	6.7 J	6.3 J	542 J
A7C-S3-C01-16	28 J	98.4 J	5.2 J	398 J
A7C-S3-C01-17B	37 J	70.3 J	7.4 J	528 -
A7C-S3-C01-20B	14.8 J	4.7 J	5.6 J	331 J
A7C-S3-C01-21B	16.8 J	4.9 J	24.8 J	257 J
A7C-S3-C01-22B	29.6 J	3.9 J	5.5 J	457 J
Limit	300	740	400	4600
Units	mg/kg	mg/kg	mg/kg	mg/kg
Conf. Level	90%	90%	90%	90%
Max. Result	44	98.4	24.8	814
Max. >= Limit	No	No	No	No
W-statistic Prob. #	--	--	--	--
Test Procedure	--	--	--	--
Sample Size	21	21	21	21
Nondetects	0	0	0	0
% Nondetects	0.0%	0.0%	0.0%	0.0%
Est. Mean*	--	--	--	--
UCL	--	--	--	--
Prob. > Limit	--	--	--	--
Pass / Fail	--	--	--	--
a posteriori Sample	--	--	--	--
Size calculation	--	--	--	--

ppendix A
A7C-S3-C03

Sample ID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Thorium-230	Arsenic	Beryllium	Chromium	Cobalt	Lead	Manganese
A7C-S3-C03-1	0.697 -	0.337 -	0.329 -	0.337 -	2.3 -	3.12 U	0.911 J	9.7 -	1 -	18.5 J	4.9 J	14.9 J	253 J
A7C-S3-C03-1A	0.794157 -	0.309 -	0.302 -	0.309 -	2.79 -	0.636 J	1.11 J	9.1 J	0.84 -	16.2 J	4.9 J	15.6 J	237 J
A7C-S3-C03-2	0.838 -	0.338 -	0.336 -	0.338 -	2.78 -	0.968 J	0.559 J	8.3 -	0.81 -	14.9 J	4.6 J	12.5 J	327 J
A7C-S3-C03-2A	0.770991 -	0.327 -	0.313 -	0.327 -	2.48 J	0.793 J	0.772 J	8.8 J	0.88 -	17.4 J	5.5 J	15 J	357 J
A7C-S3-C03-3	0.57 -	0.376 -	0.383 -	0.376 -	1.87 J	1.57 U	0.672 J	5.5 -	0.74 -	14.4 J	4.6 J	6.6 J	260 J
A7C-S3-C03-4	0.678 -	0.364 -	0.373 -	0.364 -	1.21 U	2.68 U	1.26 J	5.5 -	0.68 -	13.7 J	4.9 J	6.8 J	276 J
A7C-S3-C03-5	0.602 -	0.315 -	0.31 -	0.315 -	2.22 J	3.74 U	1.25 J	3.7 -	0.55 -	11.3 J	3.9 J	5.2 J	276 J
A7C-S3-C03-6	0.722 -	0.35 -	0.346 -	0.35 -	3.31 -	3.37 U	1.08 J	2.5 -	0.95 -	18.5 J	3.4 J	4.1 J	425 J
A7C-S3-C03-7	0.564 -	0.25 -	0.255 -	0.25 -	1.44 U	2.58 U	0.943 J	2.5 -	0.53 -	10.9 J	3.8 J	5.2 J	197 J
A7C-S3-C03-7-D	0.621 -	0.267 -	0.261 -	0.267 -	1.29 J	1.73 U	4 J	3.2 -	0.64 -	11.5 J	4.2 J	5.8 J	228 J
A7C-S3-C03-8	0.59 -	0.327 -	0.324 -	0.327 -	2.24 -	0.568 U	1.25 J	4.6 -	0.85 -	15.2 J	5.3 J	7.6 J	247 J
A7C-S3-C03-9	0.601 -	0.333 -	0.343 -	0.333 -	1.76 J	2.32 U	1.1 J	1.8 -	0.98 -	19.2 J	3.8 J	4.2 J	430 J
A7C-S3-C03-10	0.721 -	0.421 -	0.445 -	0.421 -	3.37 U	0.898 U	0.684 J	4.8 -	0.79 -	16.3 J	5.5 J	7.6 J	277 J
A7C-S3-C03-11	0.622 -	0.352 -	0.328 -	0.352 -	2.76 -	0.444 U	1.07 J	5.2 -	0.59 -	12.7 J	4.3 J	6.7 J	199 J
A7C-S3-C03-12	0.692 -	0.455 -	0.446 -	0.455 -	2.57 -	0.372 U	0.717 J	4.1 -	0.75 -	14.9 J	5 J	7.9 J	251 J
A7C-S3-C03-13	0.821 -	0.306 -	0.312 -	0.306 -	2.41 -	3.19 U	0.852 J	4.2 -	0.76 -	14.4 J	5 J	7.7 J	248 J
A7C-S3-C03-14	0.602 -	0.368 -	0.361 -	0.368 -	1.18 J	2.46 U	2.2 J	4.4 -	0.7 -	14.2 J	5.2 J	7.2 J	346 J
A7C-S3-C03-15	0.689 -	0.559 -	0.575 -	0.559 -	3.2 -	1.07 U	1.18 J	4.9 -	0.74 -	14.5 J	5.3 J	7.6 J	253 J
A7C-S3-C03-16	0.599 -	0.361 -	0.365 -	0.361 -	1.62 U	2.91 U	0.775 J	4.2 -	0.79 -	15.1 J	5.7 J	7.6 J	297 J
A7C-S3-C03-17	0.654 -	0.367 -	0.37 -	0.367 -	3.77 J	0.856 U	1.04 J	6.7 -	0.59 -	13.8 J	8.8 J	6.4 J	235 J
A7C-S3-C03-18	0.586 -	0.353 -	0.352 -	0.353 -	2.43 -	0.699 J	0.469 J	5.1 -	0.46 -	10.5 J	3.5 J	5.2 J	165 J
A7C-S3-C03-19B	0.532 -	0.271 -	0.284 -	0.271 -	2.26 -	1.56 U	1.79 J	4.5 -	0.79 -	14.9 J	4.4 J	6.3 J	263 J
A7C-S3-C03-21B	0.614 -	0.324 -	0.325 -	0.324 -	2.13 -	2.24 J	0.721 -	2.9 -	0.44 -	14.6 J	4.7 J	6.7 J	253 J
A7C-S3-C03-22B	0.577 -	0.216 -	0.224 -	0.216 -	2.42 -	0.646 J	0.755 -	3.5 -	0.49 -	31.4 -	4.5 J	5.5 J	487 J
A7C-S3-C03-23B	0.563 -	0.343 -	0.345 -	0.343 -	3.67 J	1.1 J	0.915 -	3.1 -	0.57 -	36.1 -	4.5 J	6.6 J	1480 J
A7C-S3-C03-24B	3.40665 -	0.307 -	0.298 -	0.307 -	2.48 J	4.23 -	1.5 J	7.4 J	0.73 -	15.3 J	4.2 J	14.6 J	228 J
A7C-S3-C03-25B	1.63761 -	0.311 -	0.31 -	0.311 -	2.27 -	1.46 -	0.934 J	9.8 J	0.88 -	17.4 J	5 J	17.8 J	255 J
A7C-S3-C03-26B	1.22694 -	0.282 -	0.273 -	0.282 -	1.59 J	1.41 -	1.04 J	9.9 J	0.93 -	18.5 J	7.5 J	16.3 J	281 J
Limit	1.70	1.8	1.7	1.5	82	38	280	12	1.5	300	740	400	4600
Units	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg	pCi/g	pCi/g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Conf. Level	95%	95%	95%	95%	95%	90%	90%	90%	90%	90%	90%	90%	90%
Max. Result	3.40665	0 .559	0 .575	0 .559	3.77	4.23	4	9.9	1	36.1	8.8	17.8	1480
Max. >= Limit	Yes	No	No	No	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	< 0.01% (LN)	--	--	--	--	--	--	--	--	--	--	--	--
Test Procedure	Median (Sign)	--	--	--	--	--	--	--	--	--	--	--	--
Sample Size	27	27	27	27	27	27	27	27	27	27	27	27	27
Nondetects	0	0	0	0	3	17	0	0	0	0	0	0	0
% Nondetects	0.0%	0.0%	0.0%	0.0%	11.1%	63.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Est. Mean*	0.654	--	--	--	--	--	--	--	--	--	--	--	--
UCL	0.721	--	--	--	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--	--	--	--	--
Pass / Fail	Pass	--	--	--	--	--	--	--	--	--	--	--	--
a posteriori Sample	5	--	--	--	--	--	--	--	--	--	--	--	--
Size calculation	Pass	--	--	--	--	--	--	--	--	--	--	--	--

APPENDIX B

V/FCNs FOR THE CDL AND CERTIFICATION PSP FOR SELECTED AREA 6 AND AREA 7 CONCRETE STRUCTURES AND THE CDL AND CERTIFICATION PSP FOR CONCRETE IN THE RADON CONTROL SYSTEM AND SILO 3 PROJECT AREA

VARIANCE/FIELD CHANGE NOTICE LOG FOR CERTIFICATION DESIGN LETTER AND CERTIFICATION PROJECT SPECIFIC PLAN FOR SELECTED AREA 6 AND AREA 7 CONCRETE STRUCTURES

Variance No.	Variance Date	Variance Description	Significant? (Y or N)	Date Signed	Date Distributed	EPA/OEPA Approval
Revision 1						
20500-PSP-0011-01	1/19/06	Documents the collection of concrete samples from two locations in the Silos 1 & 2 Remediation Facility.	N	3/9/06	3/14/06	N/A
20500-PSP-0011-02	3/27/06	Documents the collection of additional CU to certify concrete slab that supported west side of Vitrification Pilot Plant.	Y	3/31/06	4/3/06	Disapproved 4/18/06
20500-PSP-0011-03	Original 5/15/06 Revised 8/8/06	Documents the collection of additional CU to certify concrete slab that supported various clean operation structures near the former Administrative Area. Revised to include analytical turnaround time and radium-226 in-growth period for samples collected on or after 8/8/06. Also revised to include revised locations and coordinates for three moved sample locations due to absence of concrete slab beneath the former tank.	Y	5/18/06 & 8/14/06	5/22/06 & 8/17/06	Approved Original 5/18/06
20500-PSP-0011-04	5/31/06	Documents revised CU A7C-TP-C02 to include collection of three additional areas of concrete.	Y	6/9/06	6/12/06	6/5/06
20500-PSP-0011-05	8/9/06	Documents certification of an additional concrete pad located east of Silos Warehouse or future multi-use education facility for South Field placement or erosion control re-use.	Y	8/10/06	8/23/06	8/22/06

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VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20500-PSP-0011-01
WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0011 Rev. 0		Page: 1 of 2
PROJECT TITLE: PSP for Selected Area 6 and Area 7 Concrete Structures		Date: 3/06/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

1. This V/FCN documents the collection of concrete samples from two locations in the Silos 1 & 2 Remediation Facility. One sample (represented by two cores for sufficient volume) was collected from a concrete surface that was contaminated with silo material and wiped clean of loose contamination. The other sample (also represented by to cores) was collected from concrete that had been contaminated with silo material and has been washed to remove the contamination. Each sample consists of two cores and will be analyzed for rads (TAL B), metals (TAL D), and PCBs (TAL G).

The Sampling, Analytical Requirements, and TALs are listed on Attachment 1.

The sample ID for the contaminated sample is A7C-RF-CON^RMP and the sample ID for the decontaminated sample is A7C-RF-DECON^RMP.

Where:

A7C = Sample collected from Remediation Area 7 concrete surface (C)
RF = Silo 1 and 2 Remediation Facility
CON = Contaminated; DECON = Decontaminated
R = radiological analysis; M = metals analysis; P = PCB analysis.

Silos 1 & 2 material data will be used for shipping these samples.

Surveying required: No
Field QC samples required: No
Field data validation required: Yes
Analytical data validation required: Yes, VSL D
Offsite data package requirements: ASL D/E

Justification:
Samples are being collected to determine the levels of contamination in the concrete prior to washing the contaminated concrete and following decontamination of the concrete. Per Section 1.3 of the PSP, the collection of physical samples will be documented with a V/FCN.

REQUESTED BY: Greg Lupton Date: 3/06/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Franke	3/9/06	X	PROJECT MANAGER: J.D. Chiou	3/9/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	3/9/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul McSwigan	3/10/06		RTIMP Manager	
	WAO		X	Sampling Manager: T. Burbage	3/9/06
VARIANCE/FCN APPROVED [X]YES [ ]NO			REVISION REQUIRED: [ ]YES [x]NO		

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ATTACHMENT 1
SAMPLING, ANALYTICAL REQUIREMENTS, AND TALs

Analyte	Method	ASL	Sample Matrix	Preservative	TAT	Container	Sample Volume/Mass
Rads (TAL B)	Gamma Spec	D/E	Concrete	Cool to 4 degrees	4 days PEDD 30 days final	Glass with teflon-lined lid	450 g
Metals (TAL D)	ICP or ICP/MS				10 days final		
PCBs (TAL G)	GC						

TAL 20500-PSP-0011-B

Component	FRL (pCi/g)	MDL (pCi/g)	Method
Total uranium	82	8.2	gamma spec
Radium-226	1.7	0.17	gamma spec
Radium-228	1.8	0.18	gamma spec
Thorium-228	1.7	0.17	gamma spec
Thorium-232	1.5	0.15	gamma spec
Lead-210	38	3.8	liquid scintillation or gamma spec

TAL 20500-PSP-0011-D

Component	FRL (mg/kg)	MDL (mg/kg)	Method
Arsenic	12	1.2	ICP or ICP/MS
Beryllium	1.5	0.15	ICP or ICP/MS
Cobalt	740	74	ICP or ICP/MS
Lead	400	40	ICP or ICP/MS
Molybdenum	2,900	290	ICP or ICP/MS

TAL 20500-PSP-0011-G

Component	FRL (mg/kg)	MDL (mg/kg)	Method
Aroclor-1254	0.13	0.013	GC

VARIANCE / FIELD CHANGE NOTICE

Significant? (Yes or No): Yes

V/F: 20500-PSP-0011-02

WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-00011 Rev. 1

PROJECT TITLE: Certification Design Letter and Certification PSP for Selected Area 6 and Area 7 Concrete Structures

Date: 3/27/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the following change to the CDL/PSP:

An additional certification unit will be added to the CDL/PSP to certify the concrete slab that supported the west side of the Vitrification Pilot Plant (Figure 4-5). This slab was previously covered with gravel following the demolition of the above-grade structure in 2001. The gravel has recently been removed and the slab is ready for precertification scanning and certification sampling. In addition to the Vitrification Pilot Plant west slab, several other small component slabs have been added to this certification unit with the total number of random samples at 20 locations to accommodate these small support slabs. These smaller slabs supported electrical panels and pipe stands; all of these will be scanned for precertification purposes. The coordinates for the random locations are attached as Table B-2. Per the PSP, three biased samples will be collected from the concrete locations having the highest alpha/beta results based on the precertification scan. Additionally, selected sumps and crack/joint locations will be sampled using the guidelines of the PSP. These biased locations will be documented in the final certification report.

The sample locations will be identified using the PSP guidelines (Section 4.3.3) with the addition of the following CU identifier: A7C-VP-C04-*xx* where "*xx*" is the sequential sample ID using the attached Figure 4-5 and Table B-2. The random locations will be surveyed prior to sampling; biased locations will be surveyed after sampling.

Historical data for shipping: 2.0 pCi/g Radium-226 and 5.3 mg/kg total uranium from concrete cores collected from the Vitrification Plant east slab.

Justification:
The gravel covered west portion of the Vitrification Pilot Plant was not included in the initial submittal of the PSP/CDL and requires certification prior to demolition, removal and placement for onsite beneficial re-use.

REQUESTED BY: Mike Frank Date: 3/27/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Piske	3/28/06	X	PROJECT MANAGER: J.D. Chou	3/28/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	3/28/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McGuigan	3/28/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage	3/31/06

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ATTACHMENT 1
SAMPLING, ANALYTICAL REQUIREMENTS, AND TALs

Analyte	Method	ASL	Sample Matrix	Preservative	TAT	Container	Sample Volume/Mass
Rads (TAL B [Pb-210])	GPC, LSC, or Gamma Spec	D/E	Concrete	Cool to 4 degrees	10 days	Plastic Jar	405 g
Rads (TAL B)	Gamma Spec				10 day PEDD 30 days final		
Metals (TAL D)	ICP or ICP/MS				10 days final		
PCBs (TAL G)	GC						

TAL 20500-PSP-0011-B

Component	FRL (pCi/g)	MDL (pCi/g)	Method
Total uranium	82	8.2	Gamma Spec
Radium-226	1.7	0.17	Gamma Spec
Radium-228	1.8	0.18	Gamma Spec
Thorium-228	1.7	0.17	Gamma Spec
Thorium-232	1.5	0.15	Gamma Spec
Lead-210	38	3.8	GPC, LSC, or Gamma Spec

TAL 20500-PSP-0011-D

Component	FRL (mg/kg)	MDL (mg/kg)	Method
Arsenic	12	1.2	ICP or ICP/MS
Beryllium	1.5	0.15	ICP or ICP/MS
Cobalt	740	74	ICP or ICP/MS
Lead	400	40	ICP or ICP/MS
Molybdenum	2,900	290	ICP or ICP/MS

TAL 20500-PSP-0011-G

Component	FRL (mg/kg)	MDL (mg/kg)	Method
Aroclor-1254	0.13	0.013	GC

TABLE B-2
Certification Unit Sample Identifiers and Locations for CU A7C-VP-C04

CU	Location	Depth	Sample ID	TAL	North-83	East-83
4 (A7)	4-1	0"-1"	A7C-VP-C04-1^RMP	B,D,G	480601.4	1347276.2
	4-2	0"-1"	A7C-VP-C04-2^RMP	B,D,G	480619.1	1347314.2
	4-3	0"-1"	A7C-VP-C04-3^RMP	B,D,G	480572.5	1347279.7
	4-4	0"-1"	A7C-VP-C04-4^RMP	B,D,G	480569.3	1347309.8
	4-5	0"-1"	A7C-VP-C04-5^RMP	B,D,G	480597.1	1347322.7
	4-6	0"-1"	A7C-VP-C04-6^RMP	B,D,G	480612.0	1347345.9
	4-7	0"-1"	A7C-VP-C04-7^RMP	B,D,G	480580.1	1347326.9
	4-8	0"-1"	A7C-VP-C04-8^RMP	B,D,G	480571.2	1347353.7
	4-9	0"-1"	A7C-VP-C04-9^RMP	B,D,G	480548.3	1347285.4
	4-10	0"-1"	A7C-VP-C04-10^RMP	B,D,G	480553.3	1347302.4
			A7C-VP-C04-10^RMP-D	B,D,G	480553.3	1347302.4
	4-11	0"-1"	A7C-VP-C04-11^RMP	B,D,G	480533.3	1347275.2
	4-12	0"-1"	A7C-VP-C04-12^RMP	B,D,G	480529.1	1347324.3
	4-13	0"-1"	A7C-VP-C04-13^RMP	B,D,G	480548.1	1347336.2
	4-14	0"-1"	A7C-VP-C04-14^RMP	B,D,G	480555.0	1347354.0
	4-15	0"-1"	A7C-VP-C04-15^RMP	B,D,G	480516.3	1347334.0
	4-16	0"-1"	A7C-VP-C04-16^RMP	B,D,G	480523.2	1347358.4
	4-17	0"-1"	A7C-VP-C04-17^RMP	B,D,G	480639.5	1347171.8
	4-18	0"-1"	A7C-VP-C04-18^RMP	B,D,G	480536.8	1347167.4
	4-19	0"-1"	A7C-VP-C04-19^RMP	B,D,G	480524.1	1347223.5
	4-20	0"-1"	A7C-VP-C04-20^RMP	B,D,G	480507.9	1347255.6

Examples for Biased Samples:

A7C-VP-C04-21^RMP	First biased sample collected based on a alpha/beta scan or the location of a crack/joint.
A7C-VP-C04-23B^2-RMP	Biased sample collected from the bottom of a crack/joint (e.g., any interval that represents the bottom of a crack/joint in the concrete)

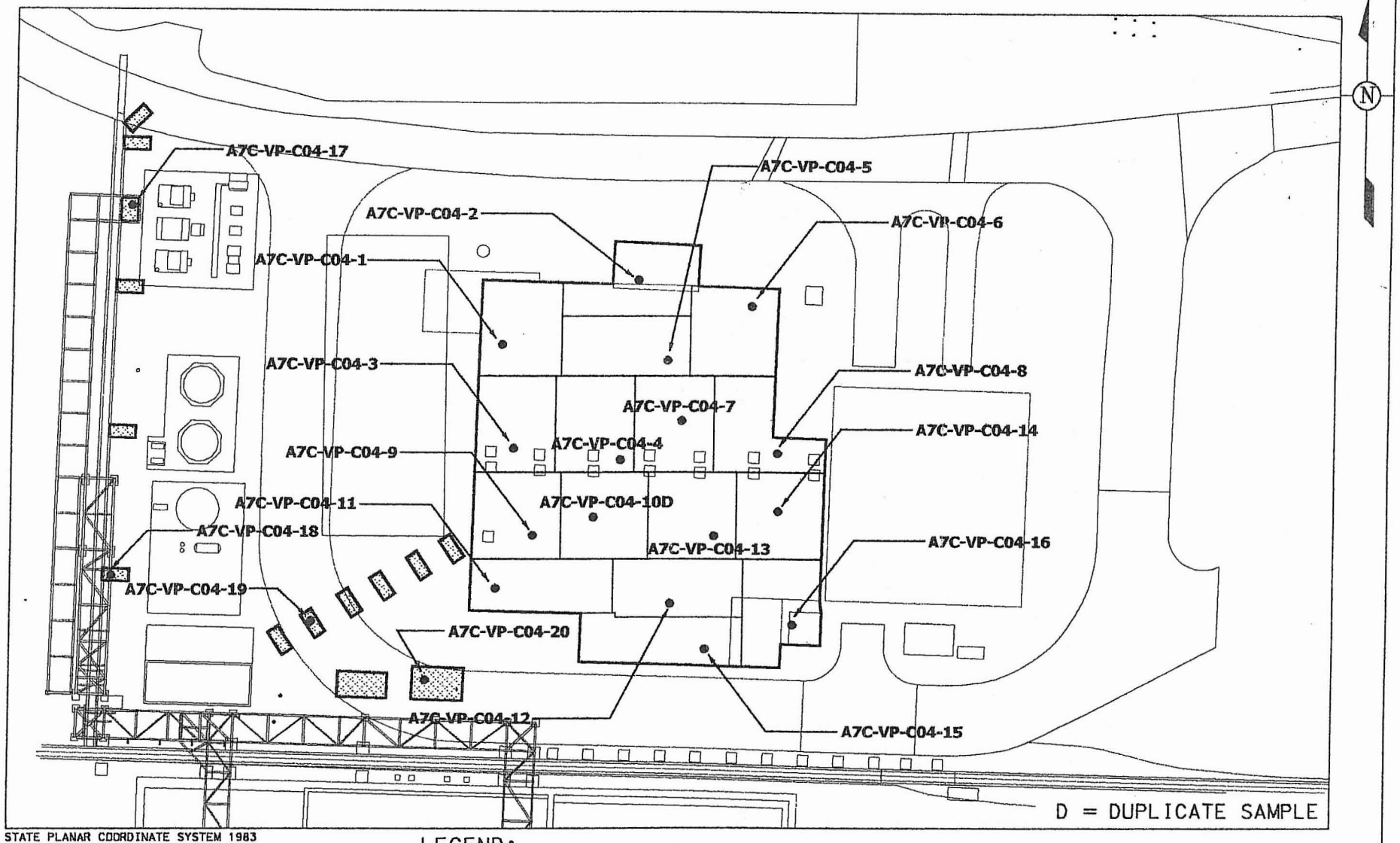


FIGURE 4-5. AREA 7 VITRIFICATION PILOT PLANT(WEST SLAB) AND ASSOCIATED PADS - CERTIFICATION UNIT RANDOM SAMPLE LOCATIONS

28-MAR-2006

VARIANCE / FIELD CHANGE NOTICE

Significant? (Yes or No): Yes

V/F: 20500-PSP-0011-03 *(Rev. 1)*

WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-00011 Rev. 1

Page: 1 of 4

PROJECT TITLE: Certification Design Letter and Certification PSP for Selected Area 6 and Area 7 Concrete Structures

Date: 8/08/06

V IANCE / FIELD CHANGE NOTICE (Include justification):

Revision 1 of this variance includes changes to the analytical turn-around time and Ra-226 in-growth period for samples collected on or after 8/08/06 as well as the relocation of three sample locations. See Attachment 1 for analytical changes. Figure 4-6 and Table B-3 includes the revised locations and coordinates for the three moved sample locations. The sample locations had to be moved due to the absence of a concrete slab beneath the former tank (only a perimeter base/footer).

This Variance/Field Change Notice (V/FCN) documents the following change to the CDL/PSP:

An additional certification unit will be added to the CDL/PSP to certify the concrete slabs that supported various clean operation structures in Area 7 near the former administrative area of the site. Figure 4-6 illustrates five concrete pads and sample locations in the scope of this variance. These pads are located northwest of the west storm water retention basin and west of the former medical trailer. The pads include the base for the existing fire water tank and pump house, a building pad used for clean equipment storage, a pad for a groundwater storage tank associated with SPIT/AWWT operations and a tent structure pad still in use. Precertification scanning and sampling will not be initiated until the pads are no longer in use for operations or tank structures.

The coordinates for the 16 random locations are attached as Table B-3. Additionally, a minimum of three biased locations based on an alpha/beta scan of the concrete surfaces will be selected (three maximum scan result locations) and sampled as described in the PSP. Also, any concrete sumps located on these five pads will be sampled as a potentially high-bias location. Therefore, if at least one sump exists on these pads, a total of 20 samples will be collected from this CU (16 random locations, 3 high-biased from the scan, and 1 sump location). The biased locations will be documented in the final certification report.

The sample locations will be identified using the PSP guidelines (Section 4.3.3) with the addition of the following CU identifier: A7C-7HK-C01-*xx* where "*xx*" is the sequential sample ID using the attached Figure 4-6 and Table B-3 addendum. The random locations will be surveyed prior to sampling; biased locations will be surveyed after sampling.

Historical data for shipping: 0.5 pCi/g Radium-226 and 12 mg/kg total uranium from concrete cores collected from other Area 6 and 7 concrete.

Justification:

The described concrete slabs are suitable for beneficial re-use at the Fernald site, primarily as fill for the erosion area in the Southfield. These concrete slabs were previously not available for precertification scanning and sampling.

REQUESTED BY: Mike Frank Date: 8/08/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Frisk	8-9-06	X	PROJECT MANAGER: J.D. Chiou	10 Aug 06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Aduiz	10 Aug 06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McLaughlin	8/14/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage	Aug 10, 2006

VARIANCE/FCN APPROVED [X]YES [ ]NO REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ATTACHMENT 1
SAMPLING, ANALYTICAL REQUIREMENTS, AND TALs

Analyte	Method	ASL	Sample Matrix	Preservative	TAT	Container	Sample Volume/Mass
Rads (TAL B [Pb-210])	GPC, LSC, or Gamma Spec	D/E	Concrete	Cool to 4 degrees	10 days	Plastic Jar	405 g
Rads (TAL B)	Gamma Spec				10 day EDD* 14 days final		
Metals (TAL D)	ICP or ICP/MS				10 days final		

TAL 20500-PSP-0011-B (11 samples)

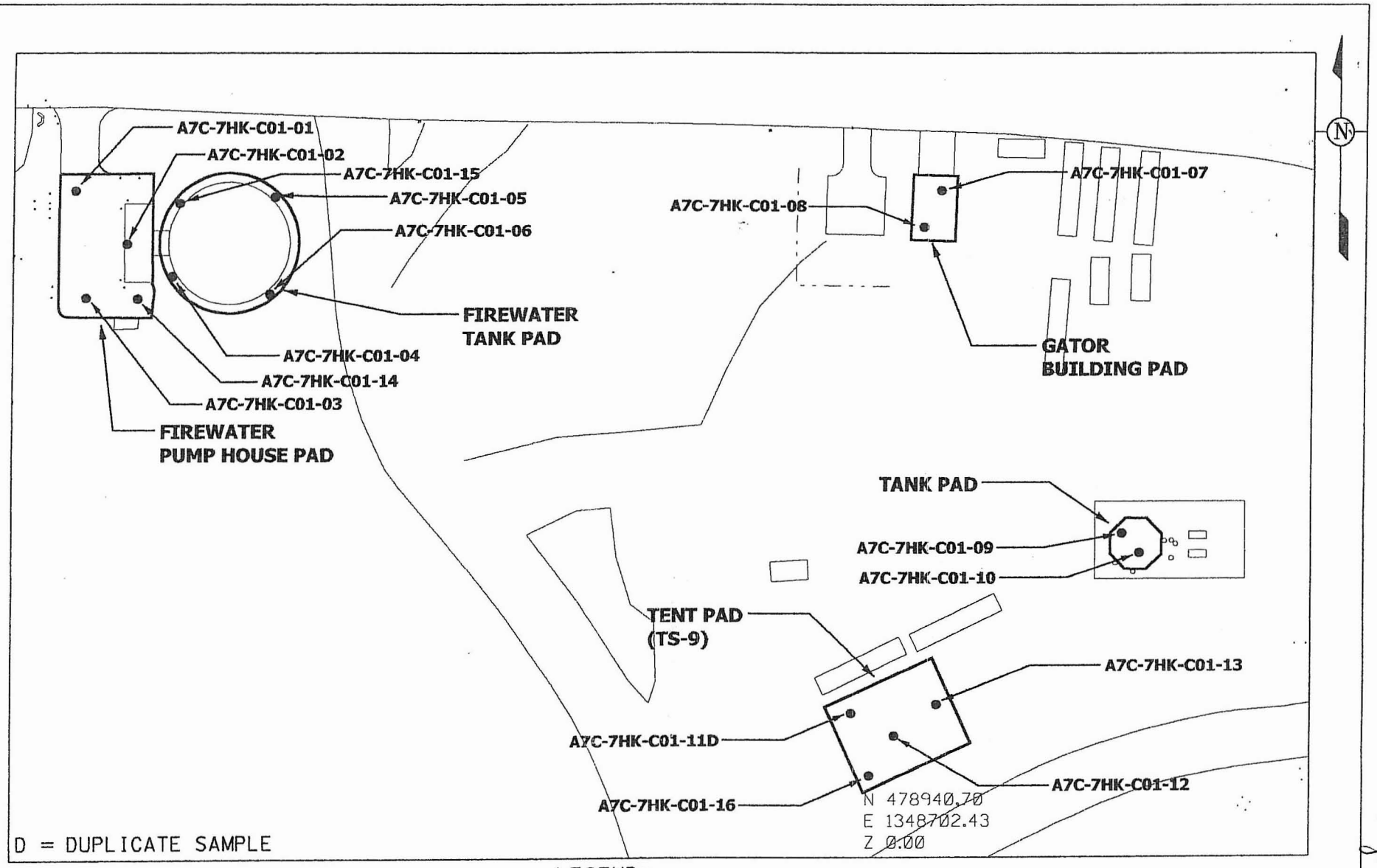
Component	FRL	MDL	Method
Total uranium (mg/kg)	82	8.2	Gamma Spec
Radium-226 (pCi/g)	1.7	0.3	Gamma Spec
Radium-228 (pCi/g)	1.8	0.3	Gamma Spec
Thorium-228 (pCi/g)	1.7	0.3	Gamma Spec
Thorium-232 (pCi/g)	1.5	0.3	Gamma Spec
Lead-210 (pCi/g)	38	3.8	GPC, LSC, or Gamma Spec

TAL 20500-PSP-0011-D (11 samples)

Component	FRL (mg/kg)	MDL (mg/kg)	Method
Arsenic	12	1.2	ICP or ICP/MS
Beryllium	1.5	0.15	ICP or ICP/MS
Cobalt	740	74	ICP or ICP/MS
Lead	400	40	ICP or ICP/MS
Molybdenum	2,900	290	ICP or ICP/MS

* Note: All samples are to be prepared for analysis (including homogenization) and radiological samples shall be sealed to begin the in-growth period for radium analysis. A 10-day turnaround time (TAT) is required for all analyses and data reporting. Therefore, a 7-day in-growth for all gamma analyses is required, with the electronic data deliverable (EDD) being reported 10 days after laboratory receipt and the final data package being reported 14 days after laboratory receipt.

Once all the radium-226 data (from the 7-day in-growth) for a CU have been evaluated by the Characterization Lead, the laboratory shall be notified to recount the sample with the highest result for radium-226 following a 21-day in-growth. The recount data shall be reported in 25 days (certificates of analysis and electronic data deliverable). All gamma analyses will have an identifier from the lab indicating whether the result represents a 7-day or 21-day in-growth. Samples with a 7-day in-growth will be denoted by a "7DAY" suffix while the sample chosen as a 21-day in-growth will be denoted by a "21DAY" suffix within the EDD.



LEGEND:

● RANDOM SAMPLE LOCATION

SCALE

60 30 0 60 FEET

DRAFT

v:\2fm12\dgn\a7_conc_cu12.dgn
STATE PLANAR COORDINATE SYSTEM 1983

08-AUG-2006

FIGURE 4-6. AREA 7 MISCELLANEOUS SUPPORT PADS - CERTIFICATION UNIT RANDOM SAMPLE LOCATIONS (Rev. 1 8-8-06 MF)

006295 Page 3 of 4

TABLE B-3

Certification Unit Sample Identifiers and Locations for CU A7C-7HK-C01 (see note 1)

Depth	Sample ID	TAL	North-83	East-83
0"-1"	A7C-7HK-C01-1^RM	B,D	479190.1	1348361.9
0"-1"	A7C-7HK-C01-2^RM	B,D	479168.6	1348380.6
0"-1"	A7C-7HK-C01-3^RM	B,D	479144.6	1348366.0
0"-1"	A7C-7HK-C01-4^RM	B,D	479153.7	1348404.9
0"-1"	A7C-7HK-C01-5^RM	B,D	479187.2	1348443.1
0"-1"	A7C-7HK-C01-6^RM	B,D	479148.0	1348442.5
0"-1"	A7C-7HK-C01-14^RM	B,D	479143.8	1348388.1
0"-1"	A7C-7HK-C01-15^RM	B,D	479184.8	1348407.7
0"-1"	A7C-7HK-C01-20B^RM	B,D	TBD (see note 2)	TBD
0"-1"	A7C-7HK-C01-21B^RM	B,D	TBD	TBD

Note 1: Other samples in this CU (-07 through -13 and -16 plus three biased locations) were previously collected and analyzed.

Note 2: Two biased sample coordinates to be surveyed following determination of high-bias locations.

Ohio EPA

State of Ohio Environmental Protection Agency

Southwest District Office

401 East Fifth Street
Dayton, Ohio 45402-2911

TELE: (937) 285-6357 FAX: (937) 285-6404

Bob Taft, Governor
Maureen O'Connor, Lt. Governor
Christopher Jones, Director

006295

MEMO

TO: J.D. Chiou, Fluor

FROM: Michelle Waller, Ohio EPA/OFFO

DATE: May 18, 2006

SUBJECT: **V/FCN 20500-PSP-0011-03** for *CDL and Certification PSP for Selected Area 6 and Area 7 Concrete Structures*

This V/FCN requests the addition of a certification unit to this CDL/PSP. The CU covers five concrete slabs in Area 7 near the former administrative area of the site. Ohio EPA approves of this variance.

Q:\femp\ou5\A6\area6wastepitsandgeneralarea\pspExcvCntrl&PrecertVFCN2.wpd

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): Yes	V/F: 20500-PSP-0011-04
WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-00011 Rev. 1		Page: 1 of 6
PROJECT TITLE: Certification Design Letter and Certification PSP for Selected Area 6 and Area 7 Concrete Structures		Date: 5/31/06

V ' RIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the following change to the CDL/PSP:

One of the certification units of the CDL/PSP will be revised to include the certification of three additional areas of concrete: 1) a concrete slab in the empty trailer parking area located in the former West Parking Lot (slab is 10' x 560'), 2) three small support pads that had been partially covered by gravel (each is 14' x 16' on average), and 3) a slab used to support scale/weighing operations northwest of the Silos Trailer Staging area. These concrete slabs are in Area 7, were constructed in the last five years, and have always been maintained as clean areas (no radiological contamination postings). The trailer parking slab was only used to stage empty trailers or trailers with clean, empty waste containers. The three support pads were used to stage clean equipment or storage shelters.

Certification Unit A7C-TP-C02, which initially covered the Silos Project Trailer Staging area concrete slabs (shown in Figure 4-7), will be modified to encompass the concrete slabs described above. The surface area for this CU will increase by 7,170 ft^2 from 15,500 ft^2 to 22,670 ft^2. Figures 4-7 through 4-9 illustrate the location of the additional concrete pads and 13 additional random sample locations to be added to the CU (for a total of 29 random sample locations).

The coordinates for the additional 13 random locations are attached as Table B-2. The number of additional samples was determined by a size comparison to the other trailer staging pads in this CU as well as consideration of the clean use of these new slabs. Also, two additional biased samples will be collected from this additional 7,170 ft^2 of concrete based on 95-100% coverage using alpha/beta detectors as described in the PSP/CDL. Therefore the revised total number of samples for this CU is 34 (29 random locations and four locations based on an alpha/beta scan). The biased locations will be documented in the final certification report.

T ample locations will be identified using the PSP guidelines (Section 4.3.3) with the following CU identifier: A7C-TP-C02-*xx* where "*xx*" is the sequential sample ID using the attached Figure 4-8 and 4-9 and Table B-2 addendum. The random locations will be surveyed prior to sampling; biased locations will be surveyed after sampling.

Historical data for shipping: 0.5 pCi/g Radium-226 and 12 mg/kg total uranium from concrete cores collected from other Area 6 and 7 concrete.

Justification:
The described concrete slabs are suitable for beneficial re-use at the Fernald site, primarily as fill for the erosion area in the Southfield. These concrete slabs were previously not available for precertification scanning and sampling.

REQUESTED BY: Mike Frank Date: 5/31/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	6-6-06	X	PROJECT MANAGER: J.D. Chiou	6/1/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	1 Jun 06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. Mehringer	6/1/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Guhrlage	6/9/06

VARIANCE/FCN APPROVED [X]YES [ ]NO REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QU Y ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ATTACHMENT 1
SAMPLING, ANALYTICAL REQUIREMENTS, AND TALs

Analyte	Method	ASL	Sample Matrix	Preservative	TAT	Container	Sample Volume/Mass
Rads (TAL B [Pb-210])	GPC, LSC, or Gamma Spec	D/E	Concrete	Cool to 4 degrees	10 days	Plastic Jar	405 g
Rads (TAL B)	Gamma Spec				10 day PEDD 30 days final		
Metals (TAL D)	ICP or ICP/MS				10 days final		
PCBs (TAL G)	GC						

TAL 20500-PSP-0011-B (34 samples)

Component	FRL	MDL	Method
Total uranium (mg/kg)	82	8.2	Gamma Spec
Radium-226 (pCi/g)	1.7	0.17	Gamma Spec
Radium-228 (pCi/g)	1.8	0.18	Gamma Spec
Thorium-228 (pCi/g)	1.7	0.17	Gamma Spec
Thorium-232 (pCi/g)	1.5	0.15	Gamma Spec
Lead-210 (pCi/g)	38	3.8	GPC, LSC, or Gamma Spec

TAL 20500-PSP-0011-D (34 samples)

Component	FRL (mg/kg)	MDL (mg/kg)	Method
Arsenic	12	1.2	ICP or ICP/MS
Beryllium	1.5	0.15	ICP or ICP/MS
Cobalt	740	74	ICP or ICP/MS
Lead	400	40	ICP or ICP/MS
Molybdenum	2,900	290	ICP or ICP/MS

TAL 20500-PSP-0011-G (34 samples)

Component	FRL (mg/kg)	MDL (mg/kg)	Method
Aroclor-1254	0.13	0.013	GC

TABLE B-4
Certification Unit Sample Identifiers and Locations for CU A7C-TP-C02

CU	Location	Depth	Sample ID	TAL	North-83	East-83
	2-1	0"-1"	A7C-TP-C02-1^RMP	B,D,G	479141.6	1347856.3
	2-2	0"-1"	A7C-TP-C02-2^RMP	B,D,G	478972.8	1347852.7
	2-3	0"-1"	A7C-TP-C02-3^RMP	B,D,G	479112.6	1347946.0
	2-4	0"-1"	A7C-TP-C02-4^RMP	B,D,G	479021.0	1347946.9
	2-5	0"-1"	A7C-TP-C02-5^RMP	B,D,G	478874.7	1347939.3
	2-6	0"-1"	A7C-TP-C02-6^RMP	B,D,G	479148.7	1348042.0
	2-7	0"-1"	A7C-TP-C02-7^RMP	B,D,G	479052.7	1348035.7
			A7C-TP-C02-7^RMP-D	B,D,G	479052.7	1348035.7
	2-8	0"-1"	A7C-TP-C02-8^RMP	B,D,G	478934.4	1348036.6
	2-9	0"-1"	A7C-TP-C02-9^RMP	B,D,G	478869.9	1348029.5
	2-10	0"-1"	A7C-TP-C02-10^RMP	B,D,G	479134.3	1348130.1
	2-11	0"-1"	A7C-TP-C02-11^RMP	B,D,G	479013.8	1348130.5
	2-12	0"-1"	A7C-TP-C02-12^RMP	B,D,G	478955.1	1348125.2
	2-13	0"-1"	A7C-TP-C02-13^RMP	B,D,G	478824.8	1348123.9
	2-14	0"-1"	A7C-TP-C02-14^RMP	B,D,G	479131.6	1348222.5
	2-15	0"-1"	A7C-TP-C02-15^RMP	B,D,G	478974.6	1348221.1
	2-16	0"-1"	A7C-TP-C02-16^RMP	B,D,G	478893.6	1348215.8
	2-17	0"-1"	A7C-TP-C02-17^RMP	B,D,G	478982.8	1349312.6
	2-18	0"-1"	A7C-TP-C02-18^RMP	B,D,G	478982.4	1349461.4
	2-19	0"-1"	A7C-TP-C02-19^RMP	B,D,G	478974.3	1349560.8
	2-20	0"-1"	A7C-TP-C02-20^RMP	B,D,G	478972.4	1349633.1
	2-21	0"-1"	A7C-TP-C02-21^RMP	B,D,G	478972.8	1349753.8
	2-22	0"-1"	A7C-TP-C02-22^RMP	B,D,G	479002.0	1348617.0
	2-23	0"-1"	A7C-TP-C02-23^RMP	B,D,G	479030.0	1348706.0
	2-24	0"-1"	A7C-TP-C02-31^RMP	B,D,G	479297.7	1347785.7
	2-25	0"-1"	A7C-TP-C02-32^RMP	B,D,G	479304.2	1347817.7
	2-26	0"-1"	A7C-TP-C02-33^RMP	B,D,G	479323.5	1347796.5
	2-27	0"-1"	A7C-TP-C02-34^RMP	B,D,G	479345.5	1347825.9
	2-28	0"-1"	A7C-TP-C02-35^RMP	B,D,G	479350.0	1347786.9
	2-29	0"-1"	A7C-TP-C02-36^RMP	B,D,G	479373.5	1347808.1

Example for Biased Samples:

A7C-TP-C02-24B^RMP First biased sample collected based on a alpha/beta scan.

Note: Sample IDs 24 through 30 to be used for biased sample IDs.

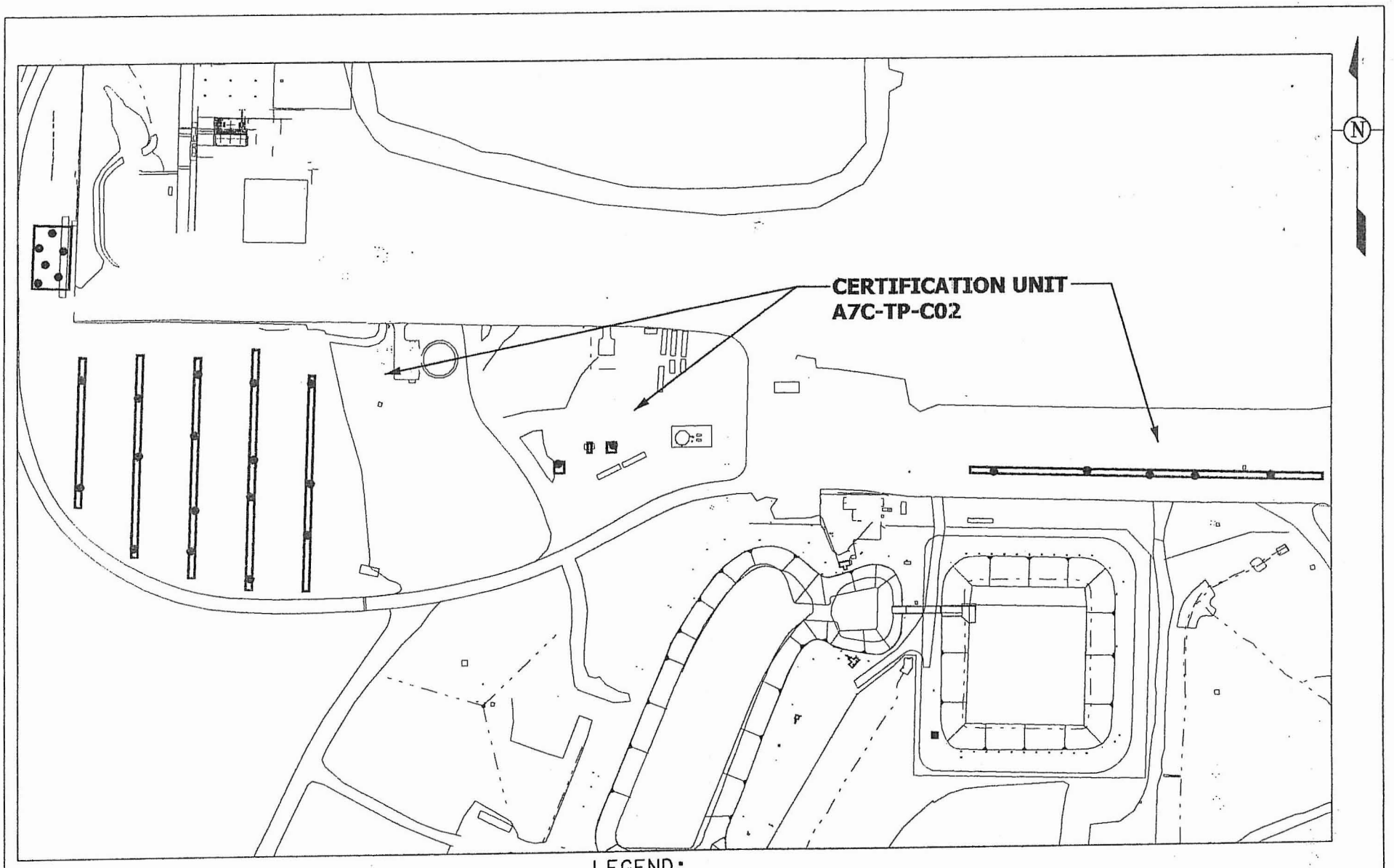
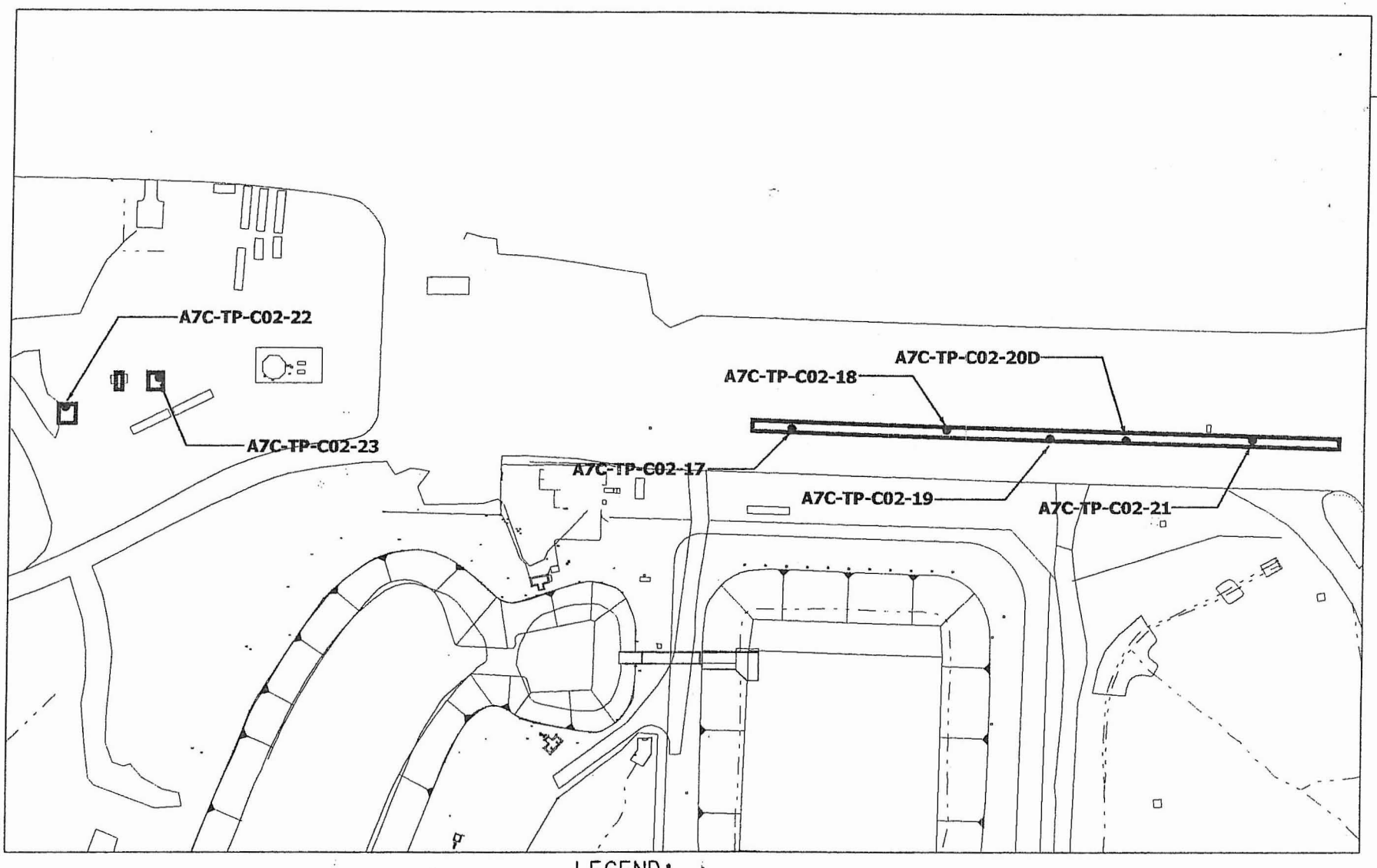


FIGURE 4-7. REVISED CONCRETE CU FOR AREA 7 TRAILER PARK AREA AND SUPPORT PADS

v:\[illegible]2\dgn\a7_conc_cu131dx.dgn
ST[illegible] ANAR COORDINATE SYSTEM 1983

01-JUN-2006



DRAFT

v:\#2fm12#dgn#a7_conc_cu13.dgn
STATE PLANAR COORDINATE SYSTEM 1983

FIGURE 4-8. AREA 7 EMPTY TRAILER PARKING AREA (EAST)/SUPPORT PADS - EXTENSION OF CU A7C-TP-C02

01-JUN-2006

0062995

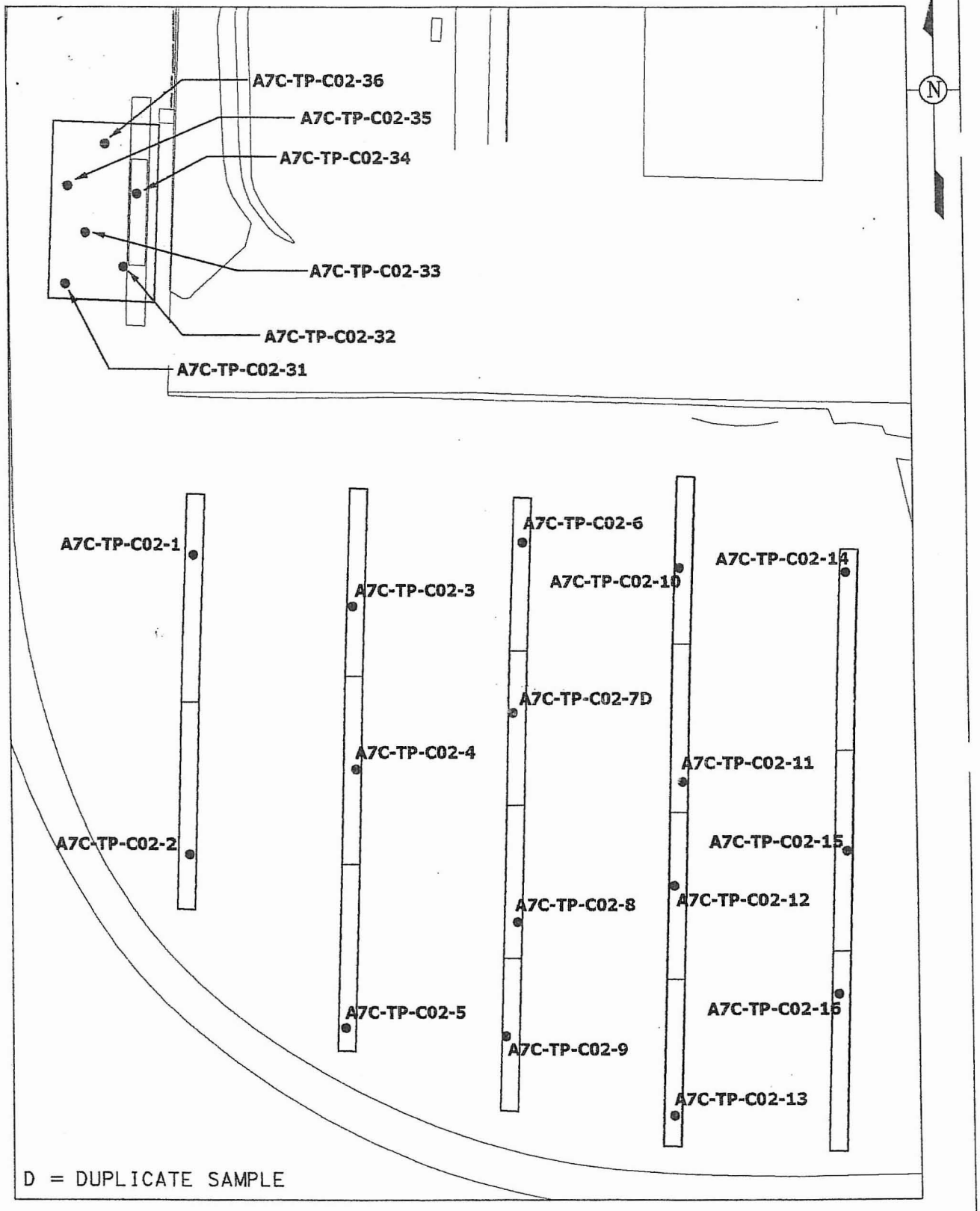


FIGURE 4-9. AREA 7 TRAILER PARKING AREA WITH ADDITIONAL LOCATIONS ON TRUCK SCALE PAD

State of Ohio Environmental Protection Agency

Southwest District Office

401 East Fifth Street
Dayton, Ohio 45402-2911

TELE: (937) 285-6357 FAX: (937) 285-6404

Bob Taft, Governor
Maureen O'Connor, Lt. Governor
Christopher Jones, Director

MEMO

TO: J.D. Chiou, Fluor

FROM: Michelle Waller, Ohio EPA/OFFO

DATE: June 5, 2006

SUBJECT: **V/FCN 20500-PSP-0011-04** for *CDL and Certification PSP for Selected Area 6 and Area 7 Concrete Structures*

This V/FCN requests the addition of three more areas of concrete to CU A7C-TP-C02. Thirteen more random samples and two additional biased samples will be added to this CU. Ohio EPA approves of this variance.

006295

VARIANCE / FIELD CHANGE NOTICE

Significant? (Yes or No): Yes

V/F: 20500-PSP-0011-05

WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-00011 Rev. 1

PROJECT TITLE: Certification Design Letter and Certification PSP for Selected Area 6 and Area 7 Concrete Structures

Date: 8/9/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This Variance/Field Change Notice (V/FCN) documents the following change to the CDL/PSP:

The CDL/PSP will be revised to include the certification of an additional concrete pad located east of the Silos Warehouse (94K) or future multi-use education facility (MUEF) (Figure 4-10). As with other concrete that has been certified clean, the concrete will be placed in the Southfield area for beneficial re-use for erosion control and salamander habitat. The pad was constructed in approximately 2001 and used for storage of construction materials and consumable supplies since that time. The area has not been used as or posted as a radiological contamination area during its use. There is no indication of chemical or oil spills on the pad. This pad measures approximately 88 feet X 60 feet.

Sixteen random concrete samples will be collected in addition to three-high biased samples based on the near 100% coverage scan using the alpha/beta detection system, therefore a total of 19 samples will be collected and analyzed for the constituents of concern. The coordinates for the 16 random locations are attached as Table B-1.

The sample locations will be identified using the PSP guidelines (Section 4.3.3) with the following CU identifier: A7C-C05-*xx* where "*xx*" is the sequential sample ID using the attached Table B-2 addendum. The random locations will be surveyed prior to sampling; biased locations will be surveyed after sampling.

Historical data for shipping: 0.8 pCi/g Radium-226 and 12 mg/kg total uranium from concrete cores collected from other Area 6 and 7 clean-use concrete.

Justification:
The described concrete slab is suitable for beneficial re-use at the Fernald site, primarily as fill for the erosion area in the S ıfield. These concrete slabs were previously not identified for removal and beneficial re-use of the material.

REQUESTED BY: Mike Frank Date: 8/8/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Eriske	8-9-06	X	PROJECT MANAGER: J.D. Chiou for J.D. Chiou	10 Aug 06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Abitz	10 Aug 06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McIlvaine	8/9/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage	8/10/06
VARIANCE/FCN APPROVED [X]YES [ ]NO			REVISION REQUIRED? [ ]YES [x]NO		

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ATTACHMENT 1
SAMPLING, ANALYTICAL REQUIREMENTS, AND TALs

Analyte	Method	ASL	Sample Matrix	Preservative	TAT	Container	Sample Volume/Mass
Rads (TAL B [Pb-210])	GPC, LSC, or Gamma Spec	D/E	Concrete	Cool to 4 degrees	10 days	Plastic Jar	405 g
Rads (TAL B)	Gamma Spec				10 day EDD* 14 days final		
Metals (TAL D)	ICP or ICP/MS				10 days final		

TAL 20500-PSP-0011-B (20 samples)

Component	FRL	MDL	Method
Total uranium (mg/kg)	82	8.2	Gamma Spec
Radium-226 (pCi/g)	1.7	0.3	Gamma Spec
Radium-228 (pCi/g)	1.8	0.3	Gamma Spec
Thorium-228 (pCi/g)	1.7	0.3	Gamma Spec
Thorium-232 (pCi/g)	1.5	0.3	Gamma Spec
Lead-210 (pCi/g)	38	3.8	GPC, LSC, or Gamma Spec

TAL 20500-PSP-0011-D (20 samples)

Component	FRL (mg/kg)	MDL (mg/kg)	Method
Arsenic	12	1.2	ICP or ICP/MS
Beryllium	1.5	0.15	ICP or ICP/MS
Cobalt	740	74	ICP or ICP/MS
Lead	400	40	ICP or ICP/MS
Molybdenum	2,900	290	ICP or ICP/MS

* Note: All samples are to be prepared for analysis (including homogenization) and radiological samples shall be sealed to begin the in-growth period for radium analysis. A 10-day turnaround time (TAT) is required for all analyses and data reporting. Therefore, a 7-day in-growth for all gamma analyses is required, with the electronic data deliverable (EDD) being reported 10 days after laboratory receipt and the final data package being reported 14 days after laboratory receipt.

Once all the radium-226 data (from the 7-day in-growth) for a CU have been evaluated by the Characterization Lead, the laboratory shall be notified to recount the sample with the highest result for radium-226 following a 21-day in-growth. The recount data shall be reported in 25 days (certificates of analysis and electronic data deliverable). All gamma analyses will have an identifier from the lab indicating whether the result represents a 7-day or 21-day in-growth. Samples with a 7-day in-growth will be denoted by a "7DAY" suffix while the sample chosen as a 21-day in-growth will be denoted by a "21DAY" suffix within the EDD.

TABLE B-1
Certification Unit Sample Identifiers and Locations for CU A7C-C05

CU	Depth	Sample ID	TAL	North-83	East-83
A7C-C05	0"-1"	A7C-C05-1^RM	B and D	480670.89	1347956.13
	0"-1"	A7C-C05-2^RM	B and D	480683.88	1347980.34
	0"-1"	A7C-C05-3^RM	B and D	480644.48	1347966.91
	0"-1"	A7C-C05-4^RM	B and D	480653.03	1347979.43
	0"-1"	A7C-C05-5^RM	B and D	480672.68	1347992.89
	0"-1"	A7C-C05-6^RM	B and D	480683.04	1348010.03
	0"-1"	A7C-C05-7^RM	B and D	480642.47	1347988.03
		A7C-C05-7^RM-D	B and D		
	0"-1"	A7C-C05-8^RM	B and D	480655.45	1348000.56
	0"-1"	A7C-C05-9^RM	B and D	480620.91	1347963.96
	0"-1"	A7C-C05-10^RM	B and D	480633.08	1347979.87
	0"-1"	A7C-C05-11^RM	B and D	480603.55	1347959.46
	0"-1"	A7C-C05-12^RM	B and D	480597.88	1347976.55
	0"-1"	A7C-C05-13^RM	B and D	480627.32	1347990.81
	0"-1"	A7C-C05-14^RM	B and D	480638.91	1348003.71
	0"-1"	A7C-C05-15^RM	B and D	480607.15	1347982.72
	0"-1"	A7C-C05-16^RM	B and D	480608.8	1347999.86
	0"-1"	A7C-C05-17B^RM	B and D	TBD	TBD
	0"-1"	A7C-C05-18B^RM	B and D	TBD	TBD
	0"-1"	A7C-C05-19B^RM	B and D	TBD	TBD

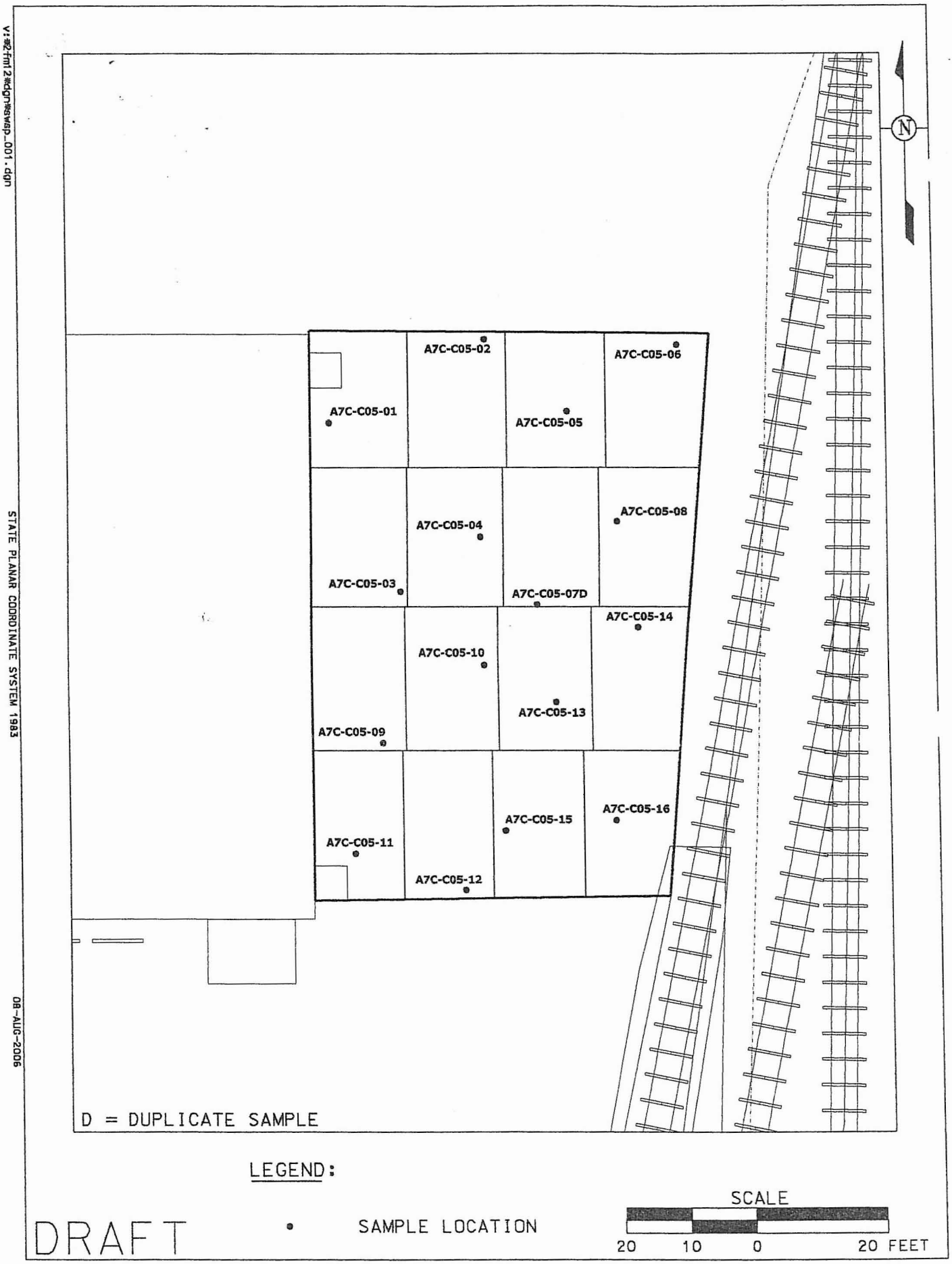


FIGURE 4-10. AREA 7 SILOS WAREHOUSE STORAGE PAD – CONCRETE CERTIFICATION SAMPLE LOCATIONS

State of Ohio Environmental Protection Agency

Southwest District Office

East Fifth Street
on, Ohio 45402-2911

TELE: (937) 285-6357 **FAX:** (937) 285-6404

Bob Taft, Governor
Maureen O'Connor, Lt. Governor
Christopher Jones, Director

MEMO

TO: J.D. Chiou, Fluor

FROM: Donna Bohannon, Ohio EPA/OFFO

DATE: August 22, 2006

SUBJECT: **V/FCN 20500-PSP-0011-05** for *CDL and Certification PSP for Selected Area 6 and Area 7 Concrete Structures*

This V/FCN requests a change to the Area 6 and Area 7 Concrete Structures CDL and PSP to include the addition of one CU with an 88 X 60 foot concrete pad located east of the Silos Warehouse. Nineteen samples will be collected from the concrete, of which three will be biased high toward a 100% coverage scan. The certified concrete will be used in the SWU for erosion control and salamander habitat. Ohio EPA approves of this variance. However, due to Ohio EPA's concern about the additional concrete being placed into the Southfield Design, which is near completion, precut concrete should be considered so it can be easily used as cleaner piece placement.

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VARIANCE/FIELD CHANGE NOTICE LOG FOR THE CERTIFICATION DESIGN LETTER AND CERTIFICATION PROJECT SPECIFIC PLAN FOR CONCRETE IN THE RADON CONTROL SYSTEM AND SILO 3 PROJECT AREA

Variance No.	Variance Date	Variance Description	Significant? (Y or N)	Date Signed	Date Distributed	EPA/OEPA Approval
20500-PSP-0013-01	N/A	Cancelled.	N/A	N/A	N/A	N/A
20500-PSP-0013-02	7/13/06	Documents the elimination of sumps from the Silo 3 certification scope, elimination of three CUs from the Silo 3 and Radon Control System, and change in CU A7C-RCS-C01.	N	8/18/06	8/22/06	N/A
20500-PSP-0013-03	8/22/06	Documents resampling of portion of concrete in CU A7C-S3-C03, former Silo 3 Electrical Building. Concrete pad was not removed after clean certification prior to demolition. Electrical Building pad re-cleaned after demolition and pad rescanned in order to collect biased samples for certification.	N	8/30/06	9/11/06	N/A

006295

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): No	V/F: 20500-PSP-0013-02
WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0013 Rev. 0		**Page: 1 of 3**
PROJECT TITLE: Certification Design Letter and Certification PSP for Concrete in the Radon Control System and Silo 3 Project Area		**Date: 7/13/06**

VARIANCE / FIELD CHANGE NOTICE (Include justification):

1. Variance/Field Change Notice (V/FCN) documents the following changes to the CDL/PSP:

Elimination of Sumps from Certification Scope (Silo 3)

Two certification units (CU) associated with the Silo 3 facility included sumps or trenches where the removal of debris and sediment was not feasible during the decontamination process following building demolition. The affected CUs are A7C-S3-C02 (Packaging Room) and A7C-S3-C06 (Excavator Room). As a result, relatively small portions (roughly 300 ft^2 total) of the two CUs encompassing the sumps/trenches were eliminated from the CU for the scope of certification. There were five (5) biased sample locations (above and beyond the required 16 samples per CU) in the bottom of these sumps that will not be collected due to the elimination of this portion of concrete from the certification scope. These sumps will be left in place and remain isolated during the removal of the surrounding clean certified concrete. The sump bottom sample locations are A7C-S3-C02-17B, A7C-S3-C06-17B, -18B, -19B and 20B.

In addition, two sample locations were moved due to the elimination of the excavator room sump/pit from the certification scope. The original locations were located near the edge of the sump/pit which will be disposed of as contaminated concrete. Both the original and new sample locations are identified in Figure 4-2A in addition to identifying the portions of concrete eliminated from the certification scope. The two sample locations, A7C-S3-C06-1 and A7C-S3-C06-9, were moved 9 feet north / 7 feet east and 7.5 feet south / 7 feet east, respectively.

Elimination of Three CUs from Certification Scope (Silo 3 and RCS)

Three CUs will not be certified under this PSP due to the demolition method required for portions of the Silo 3 facility and RCS structures. The three CUs to be removed from the certification scope are A7C-S3-C05 (excavator room), A7C-RCS-C02 (RCS walls) and A7C-RCS-C03 (RCS slab and deck). This concrete will be dispositioned to the OSDF or an off-site permitted disposal facility.

Change in Certification Unit A7C-RCS-C01

A portion of the concrete in CU A7C-RCS-C01 (RCS ancillary pads and concrete roadway) will be removed from the scope of the PSP. The section of concrete accounts for approximately 1,100 ft^2 of the entire CU (8,934 ft^2). The two samples designated for this area will not be collected (A7C-RCS-C01-5 and –6). A total of 21 samples were collected and analyzed from this CU.

Justification:

As stated in the executive summary of the PSP, the scope of the PSP may be increased or decreased based on the demolition process and contamination levels observed during initial surveys. As described above, it is not feasible to certify the selected areas for beneficial re-use of the concrete onsite.

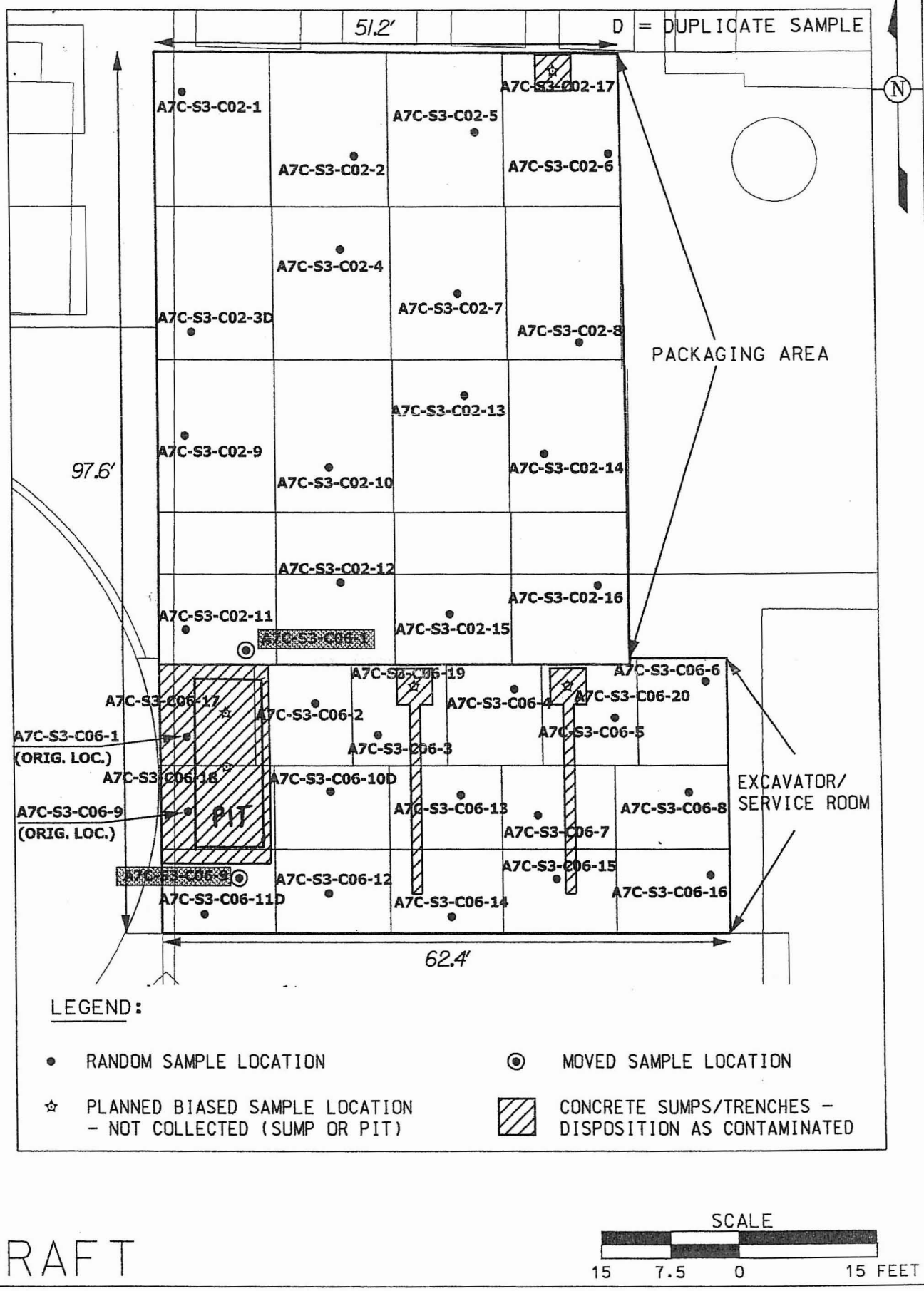
VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): No	V/F: 20500-PSP-0013-02
WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0013 Rev. 0		**Page: 1 of 3**
PROJECT TITLE: Certification Design Letter and Certification PSP for Concrete in the Radon Control System and Silo 3 Project Area		**Date: 7/13/06**

REQUESTED BY: Mike Frank Date: 7/13/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	7-18-06	X	PROJECT MANAGER: J.D. Chiou	8/18/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: K. Abel	7/26/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McLaughlin	7/21/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage Mike Frank for TB	7-14-06
VARIANCE/FCN APPROVED [X]YES [ ]NO			REVISION REQUIRED: [ ]YES [x]NO		

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller	OTHER:
FIELD MANAGER:	OTHER:	OTHER:



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STATE PLANAR COORDINATE SYSTEM 1983
14-JUL-2006

FIGURE 4-2A. SILO 3 PROCESS AREAS
- CERTIFICATION UNIT RANDOM AND BIASED SAMPLE LOCATIONS

006295

VARIANCE / FIELD CHANGE NOTICE

Significant? (Yes or No): No

V/F: 20500-PSP-0013-03

WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0013 Rev. 0

PROJECT TITLE: Certification Design Letter and Certification PSP for Concrete in the Radon Control System and Silo 3 Project Area

Date: 8/22/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

The Variance/Field Change Notice (V/FCN) documents the following changes to the CDL/PSP:

A portion of the concrete in certification unit A7C-S3-C03 will be re-sampled (two random locations plus biased locations) due to the concrete being potentially contaminated after the initial certification effort. The former Silo 3 Electrical Building pad (22 ft. x 34 ft.) was not removed after the initial clean certification of the concrete before the demolition of the nearby Silo 3 remediation facilities began. The Electrical Building pad was re-cleaned after all demolition activities were complete and the pad was re-scanned using alpha/beta detection instruments to identify the areas of highest contamination levels on the pad in order to collect biased samples in accordance with the PSP/CDL.

The portion of affected concrete includes two random sample points, A7C-S3-C03-1 and A7C-S3-C03-2 as shown on Figure 4-3. In addition, three high-biased samples will be collected based on the alpha/beta scan for a total of five samples. The analytical information, target analyte lists and sample locations are included as attachments.

Justification:

As stated above, the 22 feet by 34 feet concrete pad needs to be re-scanned and re-sampled due to the demolition of contaminated structures after the pad initially passed certification. The entire CU, which included 22 random and biased sample locations passed certification in after the first sampling effort.

REQUESTED BY: Mike Frank — Date: 8/22/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	8-23-06	X	PROJECT MANAGER: J.D. Chiou	8/30/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Ahlers	30 Aug 06
X	ANALYTICAL/CUSTOMER SUPPORT: Paul B. McGuigan	8/28/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage for TB	8/22/06

VARIANCE/FCN APPROVED [X]YES [ ]NO — REVISION REQUIRED: [ ]YES [x]NO

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	CHARACTERIZATION MANAGER: Frank Miller	OTHER:
FIELD MANAGER:	OTHER:	OTHER:

ATTACHMENT 1
SAMPLING, ANALYTICAL REQUIREMENTS, AND TALs

Analyte	Method	ASL	Sample Matrix	Preservative	TAT	Container	Sample Volume/Mass
Rads (TAL B [Pb-210])	GPC, LSC, or Gamma Spec	D/E	Concrete	Cool to 4 degrees	10 days	Plastic Jar	405 g
Rad (TAL B [Th-230])	Alpha Spec				10 days		
Rads (TAL B)	Gamma Spec				3 day PEDD 10 day EDD* 14 days final		
Metals (TAL D)	ICP or ICP/MS				10 days final		

TAL 20500-PSP-0013-B (5 samples)

Component	FRL	MDL	Method
Total uranium (mg/kg)	82	8.2	Gamma Spec
Radium-226 (pCi/g)	1.7	0.3	Gamma Spec
Radium-228 (pCi/g)	1.8	0.3	Gamma Spec
Thorium-228 (pCi/g)	1.7	0.3	Gamma Spec
Thorium-232 (pCi/g)	1.5	0.3	Gamma Spec
Thorium-230 (pCi/g)	280	28	Alpha Spec
Lead-210 (pCi/g)	38	3.8	GPC, LSC, or Gamma Spec

TAL 20500-PSP-0013-D (5 samples)

Component	FRL (mg/kg)	MDL (mg/kg)	Method
Arsenic	12	1.2	ICP or ICP/MS
Beryllium	1.5	0.15	ICP or ICP/MS
Cobalt	740	74	ICP or ICP/MS
Chromium	300	30	ICP or ICP/MS
Lead	400	40	ICP or ICP/MS
Manganese	4,600	460	ICP or ICP/MS

* Note: All samples are to be prepared for analysis (including homogenization) and radiological samples shall be sealed to begin the in-growth period for radium analysis. A 3-day turnaround time (TAT) is required for gamma spec analyses (using a two-day in-growth period for Ra-226) with a preliminary electronic data deliverable (EDD) reported. Additionally, a 10-day turnaround time (TAT) is required for all analyses and data reporting with the delivery of an EDD. Therefore, a 7-day in-growth for all gamma analyses is required, with the EDD being reported 10 days after laboratory receipt and the final data package being reported 14 days after laboratory receipt.

Once all the radium-226 data (from the 7-day in-growth) for a CU have been evaluated by the Characterization Lead, the laboratory shall be notified to recount the sample with the highest result for radium-226 following a 21-day in-growth. The recount data shall be reported in 25 days (certificates of analysis and EDD). All gamma analyses will have an identifier from the lab indicating whether the result represents a 7-day or 21-day in-growth. Samples with a 7-day in-growth will be denoted by a "7DAY" suffix while the sample chosen as a 21-day in-growth will be denoted by a "21DAY" suffix within the EDD.

APPENDIX B - V/FCN 03 RE-SAMPLING -
SILO 3 AND RCS FACILITIES CONCRETE CERTIFICATION SAMPLE LOCATIONS AND IDENTIFIERS

CU	Location	Depth	Sample ID	TAL	North-83	East-83	Comment
Silo 3 Container Bay/Support Slabs - CU3	3-1	0"-1"	A7C-S3-C03-1^RM	B, D	480869.2	1347035.3	To Be Re-Sampled
	3-2	0"-1"	A7C-S3-C03-2^RM	B, D	480857.9	1347063.9	To Be Re-Sampled
	3-3	0"-1"	A7C-S3-C03-3^RM	B, D	480861.6	1347072.4	previously sampled
	3-4	0"-1"	A7C-S3-C03-4^RM	B, D	480847.8	1347092.2	previously sampled
	3-5	0"-1"	A7C-S3-C03-5^RM	B, D	480855.0	1347113.7	previously sampled
	3-6	0"-1"	A7C-S3-C03-6^RM	B, D	480830.2	1347123.4	previously sampled
	3-7	0"-1"	A7C-S3-C03-7^RM	B, D	480824.3	1347150.3	previously sampled
			A7C-S3-C03-7^RM-D	B, D	480824.3	1347150.3	previously sampled
	3-8	0"-1"	A7C-S3-C03-8^RM	B, D	480833.5	1347171.3	previously sampled
	3-9	0"-1"	A7C-S3-C03-9^RM	B, D	480807.7	1347119.7	previously sampled
	3-10	0"-1"	A7C-S3-C03-10^RM	B, D	480814.8	1347136.2	previously sampled
	3-11	0"-1"	A7C-S3-C03-11^RM	B, D	480805.3	1347148.6	previously sampled
	3-12	0"-1"	A7C-S3-C03-12^RM	B, D	480807.1	1347167.2	previously sampled
	3-13	0"-1"	A7C-S3-C03-13^RM	B, D	480784.0	1347119.1	previously sampled
	3-14	0"-1"	A7C-S3-C03-14^RM	B, D	480795.0	1347140.1	previously sampled
	3-15	0"-1"	A7C-S3-C03-15^RM	B, D	480784.6	1347152.3	previously sampled
	3-16	0"-1"	A7C-S3-C03-16^RM	B, D	480789.4	1347164.9	previously sampled
	3-17	0"-1"	A7C-S3-C03-17^RM	B, D	480846.5	1346997.5	previously sampled
	3-18	0"-1"	A7C-S3-C03-18^RM	B, D	480844.2	1347049.1	previously sampled

Note:

The three biased samples will be assigned sample Ids A7C-S3-C03-24^RM, -25^RM and -26^RM.

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VFCN 20500-PSP-0013 03

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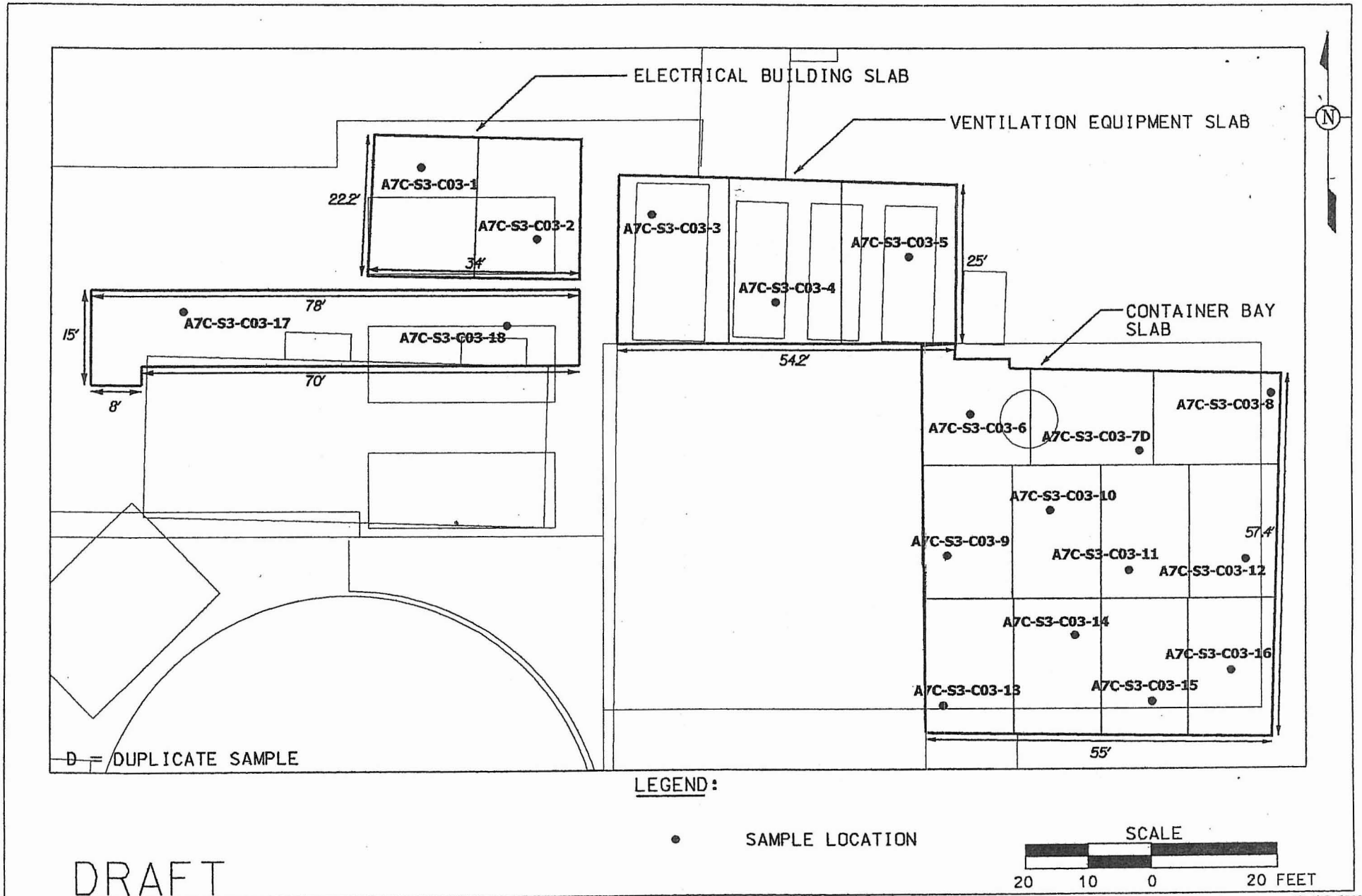

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STATE PLANAR COORDINATE SYSTEM 1983

27-MAR-2006

FIGURE 4-3. SILO 3 CONTAINER BAY AND SUPPORT SLABS
– CERTIFICATION UNIT RANDOM SAMPLE LOCATIONS

APPENDIX C

PRECERTIFICATION RADIOLOGICAL SCAN RESULTS

APPENDIX C
ALPHA/BETA SURVEYS OF CONCRETE STRUCTURES

C.1 Background Information for Alpha/Beta Scans

Millenium Services, Inc. performed alpha/beta scans of all concrete structures that went through the certification process. Figures C-1 through C-10 show the concrete structures that were certified, and each structure is cross-referenced to the survey files that contain the surface-activity charts and results. The survey files for each structure follow each figure. A data quality review (Attachment C-1) was performed for all the surveys to ensure the scanning systems performed within specifications prior to and after each survey.

Surveys were performed using gas-flow proportional detectors (180 cm by 10 cm in area) in dynamic and static operational modes. The dynamic mode was performed by moving the detector across the surface at a nominal speed of 10 cm/s and collecting a spectrum every second, and this was the primary survey method used on the concrete surfaces. A static mode was performed by placing the detector on the concrete surface and collecting counts over a period of 4 seconds. Static counts were needed to cover walls and surfaces that were not accessible to the larger equipment configuration needed to perform the dynamic surveys. Dynamic surveys are referred to as trap or recount mode in the data quality review (Attachment C-1), and the detectors are identified as T-180 or R-180 in the survey files. The difference between the trap and recount modes is the recount mode has a second detector that is shielded and only collects ambient gamma background, and this configuration can be used to subtract background from the first detector when surveys are performed in areas that have elevated background. A static survey is referred to as a corner mode of operation, and this configuration is identified as C-180. Decay events collected by the detectors are processed through proprietary software and results are presented as a color-pixel map, a cumulative frequency distribution (CFD) of the data, and a summary table of the three 100 cm^2 areas that contain the highest activity (dpm per 100 cm^2).

The color-pixel map of the surveyed surface, with the origin (0,0) located in the southwest corner of the survey, contains 100cm^2 areas plotted on a square meter grid to create a pixel map of surface activity. Every figure in this appendix has one or more survey reports attached to the figure, and a pixel map is contained in every survey report. For the pixel map in the survey report following Figure C-1, the Locomotive Maintenance Pad, the contiguous black area along the center of the map represents a lack of measurements from the survey due to structural obstacles and the maintenance pit, and this applies to all other pixel maps that contain black area. The pixel image is auto-scaled to show the maximum value as white and the minimum value as dark brown. The randomly distributed speckles of white and yellow on the Locomotive Maintenance Pad are indicative of the randomness of radioactive decay in a homogenous background media (concrete, in this case). If small areas of contamination were present (e.g., greater than 20,000 dpm/100 cm^2), the hotspots would be the only white and yellow pixels on the map, with the

remaining background counts reddish brown to dark brown. This is shown on the pixel map for the survey of the Electrical Building slab (SP10202B), which follows Figure C-10.

The CFD plots show the activity (dpm) for each 100cm^2 value in the survey, which results in a large sample population (N) for each survey. When the sample points are ranked and plotted against a percentile scale, most sample points lie along a straight line, indicating the data are normally distributed [refer to the CFD plot for the Locomotive Building Pad surveys (XP80102A and XP80202A)], presented after Figure C-1). Data points that are not part of normal distribution will appear as outliers and are readily identifiable as falling along a different slope [compare the above noted CFD with the CFD for the Electrical Building pad survey (SP10202B), presented after Figure C-10]. As the data follow a normal distribution, the mean and the median (0.5 percentile) are approximately equal. Additionally, the large number of sample points (N) result in the 95 percent UCL of the mean lying very close to the mean (95 percent UCL = mean + t*s/$\sqrt{N}$; where t is the student's t statistic, s is the standard deviation and N is the sample size). This is shown by the intersection of the 95 percent UCL line with the sample trend at the 0.5 percentile line. For the locomotive building pad survey, the 0.9 percentile line indicates that 90 percent of the samples have a value less than 4,400 dpm/100 cm^2.

A summary table of the three highest 100 cm^2 locations is provided with each survey. When more than one survey is performed on the concrete structure, all summary tables are reviewed to select the three highest locations for the concrete pad. For example, if there are three surveys for a structure, the three summary tables will contain a total of nine 100 cm^2 locations, and the top three of these nine are selected as the bias sample locations.

As there are three different configurations for the detectors (trap, recount, corner), and the dynamic (trap, recount) vs. static (corner) modes are unique with respect to operational parameters, the 95 percent UCL and 0.5 percentile (median value) are different for each configuration when background activity levels are measured. However, if contamination is present on the concrete surface, all detector configurations will detect approximately the same activity level. The lowest background levels will be reported for surveys that are run with the recount mode, as ambient gamma background is subtracted (see surveys for the Vitrification Pilot Plant slab, following Figure C-3). Background values for the corner mode will be greater than the recount mode and less than the trap mode, as there is less uncertainty in the counts recorded for the corner detector due to the longer counting time and static measurement geometry (see corner survey reports XP60102A, XP80302A and XP80402A for the Locomotive Maintenance Building, following Figure C-1). The highest background levels are recorded when the detector is run in the trap mode, as the movement of the detector over the surface is not uniform at all times, and this results in some areas having very few counts and others more counts (i.e., higher variability in the data set) relative to those areas where there is uniform motion (see trap surveys XP80102A and XP80202A for the Locomotive Maintenance Building, following Figure C-1, and compare this CFD to the CFD for the corner surveys

noted above). On the low end of the CFD for the trap surveys identified above, zero counts are recorded for less than 1 percent of the data set, due to the relatively fast scanning speed. Additionally, the wave pattern at low activities is caused by duplicate counting results for many sample points, and this pattern is typical of clean concrete surveyed at 10 cm/s. The trend could be smoothed out at the low end by surveying at a slower speed (i.e., increasing the counting time per unit area). Note that the low-end trend for the corner mode CFD cited above is smooth, due to a longer counting time.

C.2 Survey Results

Figure C-1 cross references the alpha/beta concrete surveys that were performed on the Locomotive Maintenance Building slab. Trap and corner modes were used to survey the structures. A recount configuration was unnecessary because there was no significant gamma background. All surveys that follow this figure show background alpha/beta levels.

Figure C-2 cross references the alpha/beta concrete surveys that were performed on the Test Stand Building slab. Recount and corner modes were used to survey the structures. A recount configuration was necessary because there was significant gamma background from operations in the silos area. All surveys that follow this figure show background alpha/beta levels.

Figure C-3 cross references the alpha/beta concrete surveys that were performed on the Vitrification Pilot Plant slab. Recount and corner modes were used to survey the structures. A recount configuration was necessary because there was significant gamma background from operations in the silos area. All surveys that follow this figure show background alpha/beta levels.

Figure C-4 cross references the alpha/beta concrete surveys that were performed on the support pads for the Silos Trailer Staging Area. Recount mode was used for all surveys because there was significant gamma background from trailers staged in the area. All surveys that follow this figure show background alpha/beta levels.

Figure C-5 cross references the alpha/beta concrete surveys that were performed on the Vitrification Pilot Plant West slab. Trap and corner modes were used to survey the structures. A recount configuration was unnecessary because there was no significant gamma background. All surveys that follow this figure show background alpha/beta levels.

Figure C-6 cross references the alpha/beta surveys that were performed on the miscellaneous concrete pads located in the former administrative area of the site northwest of the former west stormwater retention basin. A recount configuration was unnecessary because there was no significant gamma background. All survey illustrations that follow Figure C-6 show background alpha/beta levels.

Figure C-7 cross references the alpha/beta concrete surveys that were performed on miscellaneous concrete pads associated with the Silos RCS building and the service road east of the former Vitrification Pilot Plant. Recount, trap and corner modes were used to survey the structures. A recount configuration was necessary for the road survey because there was significant gamma background. All surveys that follow this figure show background alpha/beta levels.

Figure C-8 cross references the alpha/beta concrete surveys that were performed on the storage pad east of the Silos Warehouse. Trap mode was used to survey the pad. A recount configuration was unnecessary because there was no significant gamma background. All surveys that follow this figure show background alpha/beta levels.

Figure C-9 cross references the alpha/beta concrete surveys that were performed on the Silo 3 Storage pad and the Silo 3 Cargo Bay pad. Recount and trap modes were used to survey the pad. A recount configuration was necessary for the XP surveys performed on the southeast corner of the pad because there was significant gamma background on the day of the survey. All surveys that follow this figure show background alpha/beta levels.

Figure C-10 cross references the alpha/beta concrete surveys that were performed on miscellaneous pads north of the former Silo 3 including the electrical building pad and HVAC pad. Trap and corner modes were used to survey the pads. A recount configuration was unnecessary because there was no significant gamma background. The initial survey for the electrical building slab was performed in March 2006, and the results showed the slab to contain only background activity. However, this slab was not removed prior to decontamination and demolition of the Silo 3 Facility, and the pad was resurveyed in August 2006 to determine if the surface was contaminated. The resurvey (SP10202B) identified two locations of elevated contamination, and biased samples were collected from these locations as part of the certification process. All other surveys that follow this figure show background alpha/beta levels.

C.3 Measurement Methodology and Variability

Attachment C-2 includes supplemental information that summarizes the measurement methodology using the Surface Contamination Monitor (SCM) in various detector configurations, modes of operation and the techniques used to identify points of maximum activity from scanning results. A second document is also included in Attachment C-2 entitled "Surface Contamination Monitor Approach and Measurement Variability" which explains the reason for some variability in measurement results, based on radiation counting statistics, when surveying concrete that contains background levels of radioactivity.

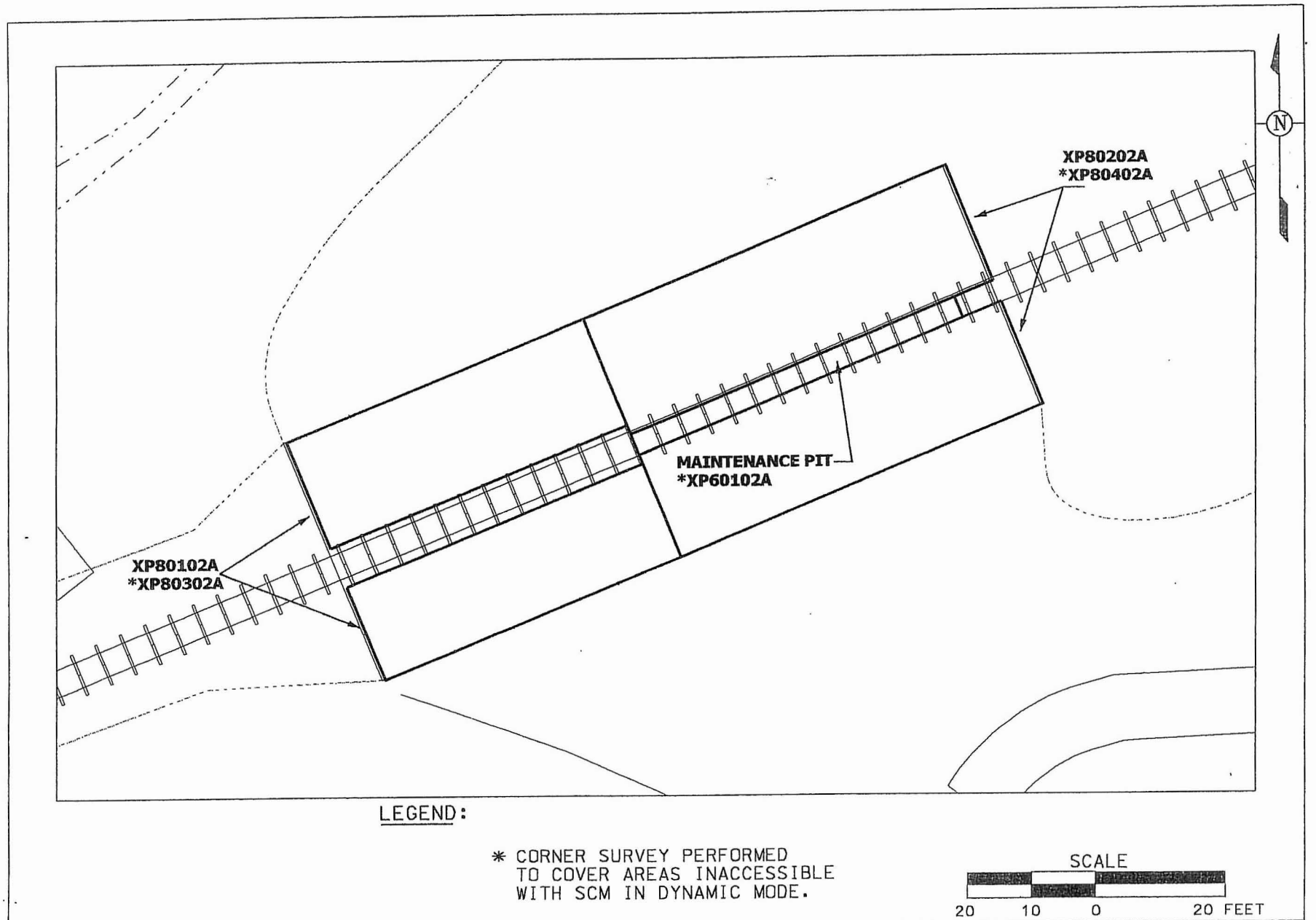

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FIGURE C-1. AREA 6 LOCOMOTIVE MAINTENANCE BUILDING (FLOOR SLAB).
SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A6C-C01

Fernald Closure Project

Survey Report

Locomotive Maintenance Pad

Surveys of the Locomotive Maintenance Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad and pit floor, separately, for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey reports XP80102A and XP80202A are the result of the SCM operating in the rolling mode which was able to cover most of the pad. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 in each survey report provides spatially correlated results, with the (0,0) point representing the southwest corner of the surveyed area. The random distribution of survey results and the normal distribution of all data represented in Figure 2 of each survey report are indicative of natural radioactivity within the concrete; no outliers representative of added contamination are noted.

Survey reports XP60102A, XP80302A, and XP80402A are the result of the SCM operating in the corner mode, used to survey those areas that are not accessible to the SCM in the rolling mode. The survey was performed with a static measurement time of 4 seconds. The results presented in Figure 1 in each survey report are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey reports if necessary. The random distribution of survey results and the normal distribution of all data represented in Figure 2 of each survey report are indicative of natural radioactivity within the concrete; no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Locomotive Maintenance Pad pit floor, strips 370 through 497 of survey report XP60102A, are identified in the table below.

Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
4,093	401	(315,805)	(0,0)
4,093	468	(990,955)	(5,150)
4,093	477	(1080,890)	(5,85)

The locations of the three highest readings obtained on the remaining areas of the Locomotive Maintenance Pad are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
XP80202A	9,330	4	(1090,835)	(1065,80)
XP80102A	9,328	6	(1450,85)	(1445,80)
XP80202A	9,152	1	(1165,1140)	(380,70)

The data from survey reports XP80102A and XP80202A were combined into one spatially correlated image, shown in Figure 1, and the data presented in a CFD, shown in Figure 2.

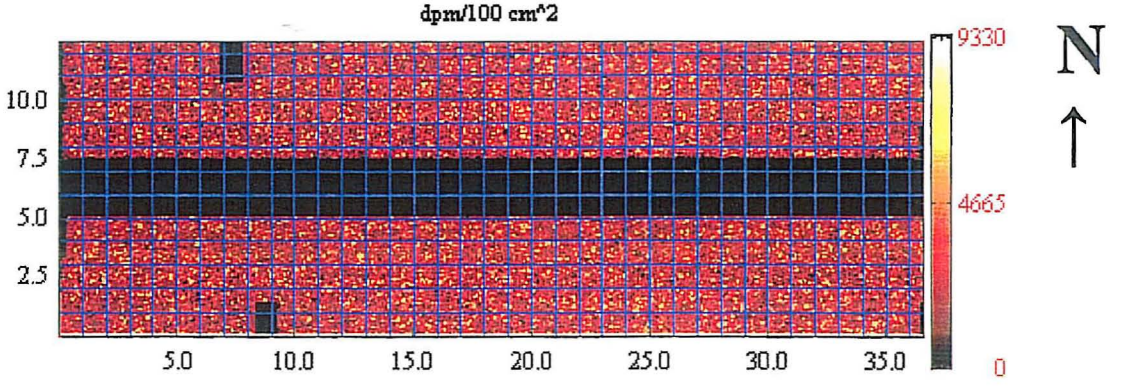


Figure 1: Meter grid overlaid onto image plot of 100 cm^2 areas. The color scale is in dpm/100cm^2 and the maximum has been set to the highest surface activity in the data set. The (0,0) point is the southwest corner of the pad.

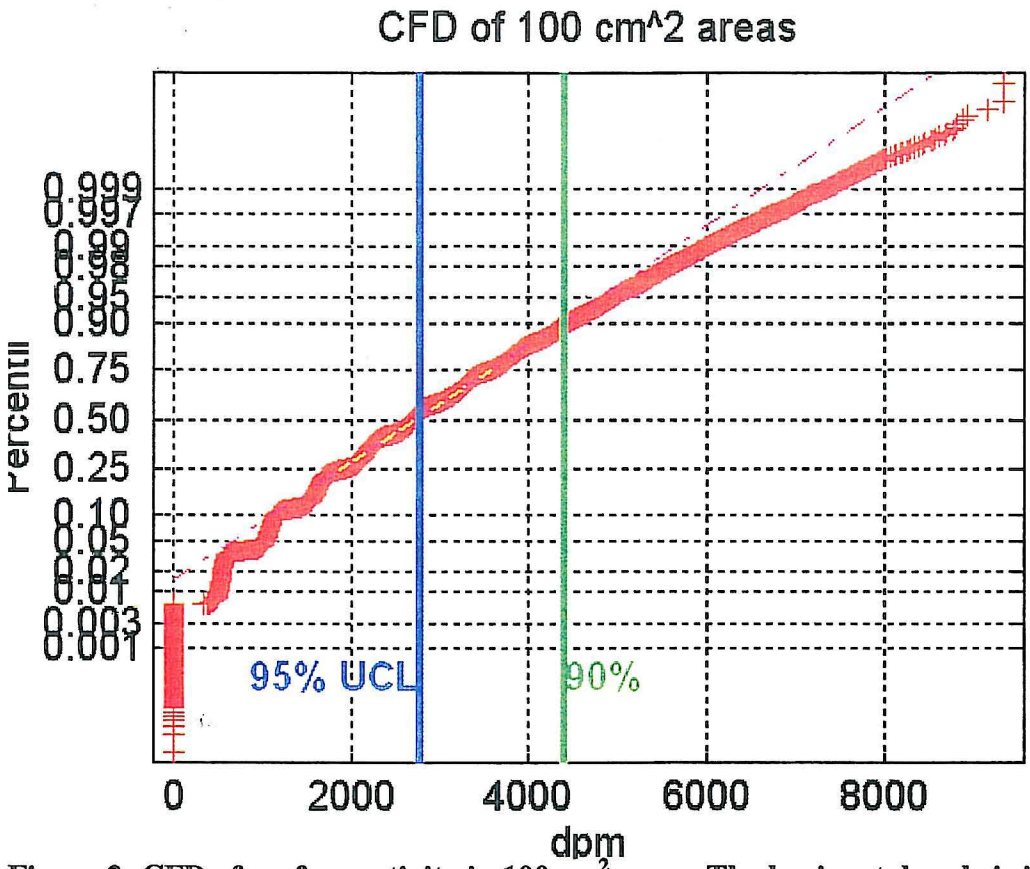


Figure 2: CFD of surface activity in 100 cm^2 areas. The horizontal scale is in dpm/100 cm^2.

The data from survey reports XP60102A, XP80302A, and XP80402A were combined into one non-spatially correlated image, shown in Figure 3, and the data presented in a CFD, shown in Figure 4.

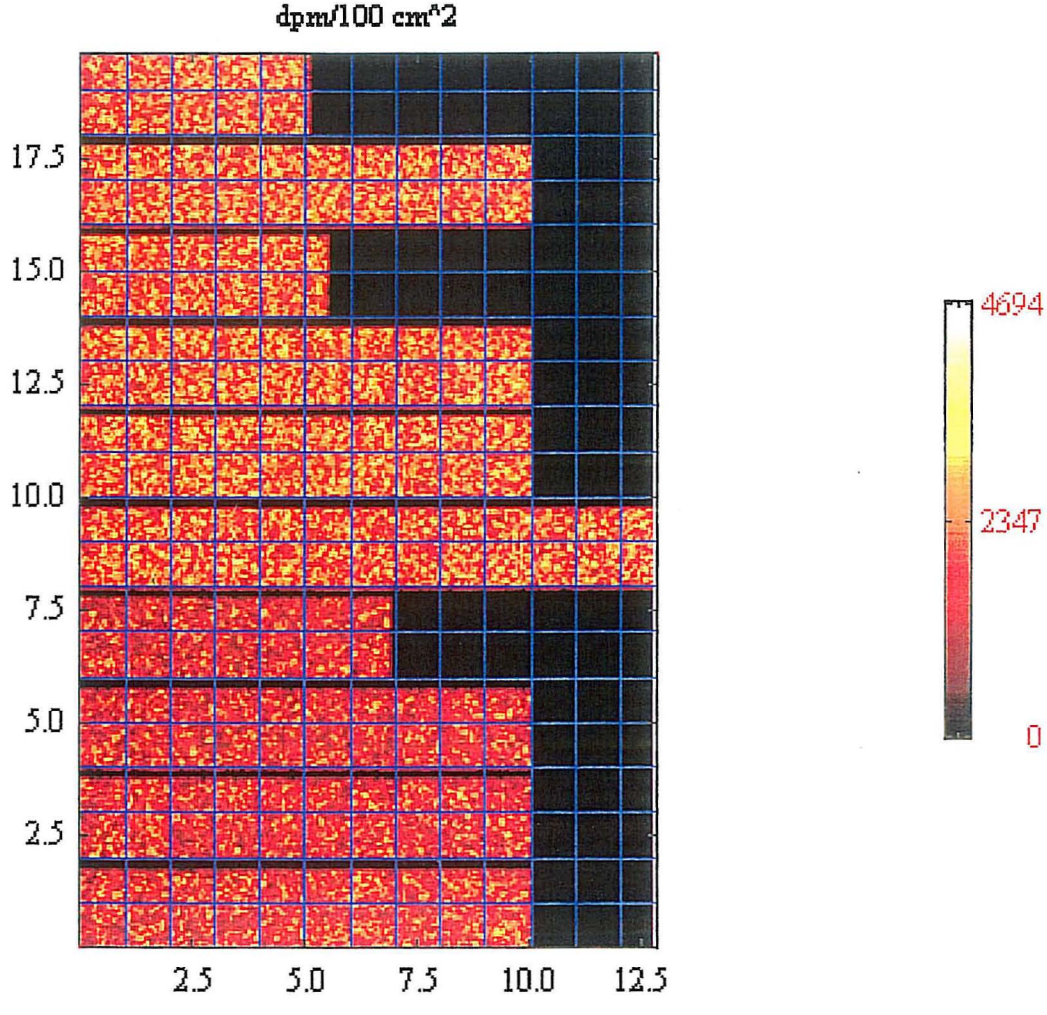


Figure 3: Meter grid overlaid onto image plot of 100 cm^2 areas. The color scale is in dpm/100cm^2 and the maximum has been set to the highest surface activity in the data set. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

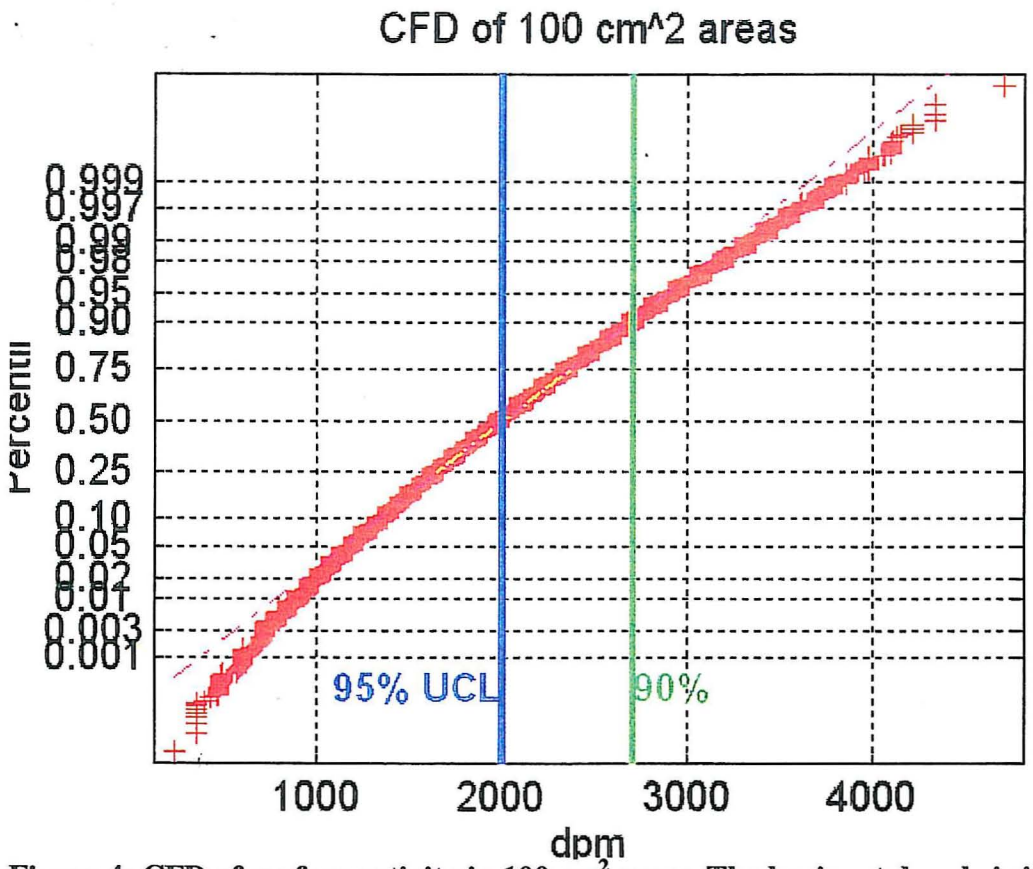


Figure 4: CFD of surface activity in 100 cm^2 areas. The horizontal scale is in dpm/100 cm^2.

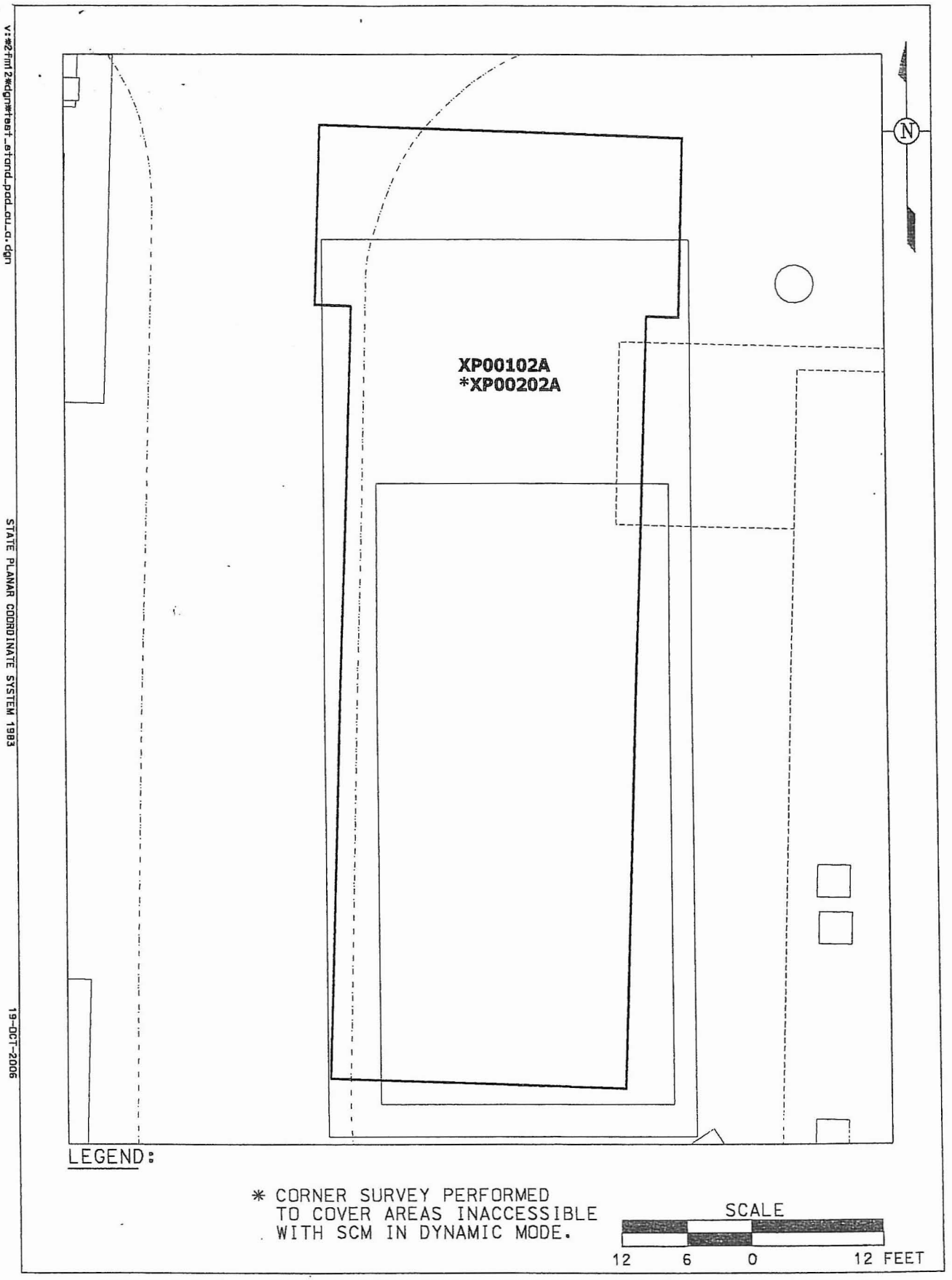


FIGURE C-2. AREA 7 TEST STAND BUILDING (FLOOR SLAB). SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-TS-C01

Fernald Closure Project

Survey Report

Test Stand Pad

Surveys of the Test Stand Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report XP00102A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

Survey report XP00202A is the result of the SCM operating in the corner mode, used to survey those areas that are not accessible to the SCM in the rolling mode. The survey was performed with a static measurement time of 4 seconds. Areas surveyed included the trench, exposed outer vertical surfaces of the pad, and small areas along the perimeter of the pad. The results presented in Figure 1 are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey reports if necessary. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Test Stand Pad are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
XP00102A	13,982	14	(430,50)	(190,45)
XP00102A	13,387	3	(1040,2935)	(150,95)
XP00102A	13,351	18	(475,555)	(75,350)

Survey Report

Survey Location:	TEST STAND PAD
Survey File Name:	XP00102A
Survey Date:	March 14, 2006
Survey Equipment:	SCM5
Detector(s):	R180
Survey Mode	Rolling 4"/sec Ambient Gamma Bkg Subtract
Surveyor(s):	SAPP/KIMOKEO
Criteria	
System Information	
Efficiency (100 cm^2):	R180: 20.8%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**13,982 dpm/100 cm^2**
Maximum m^2 Average:	3,267 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012830XP00102A

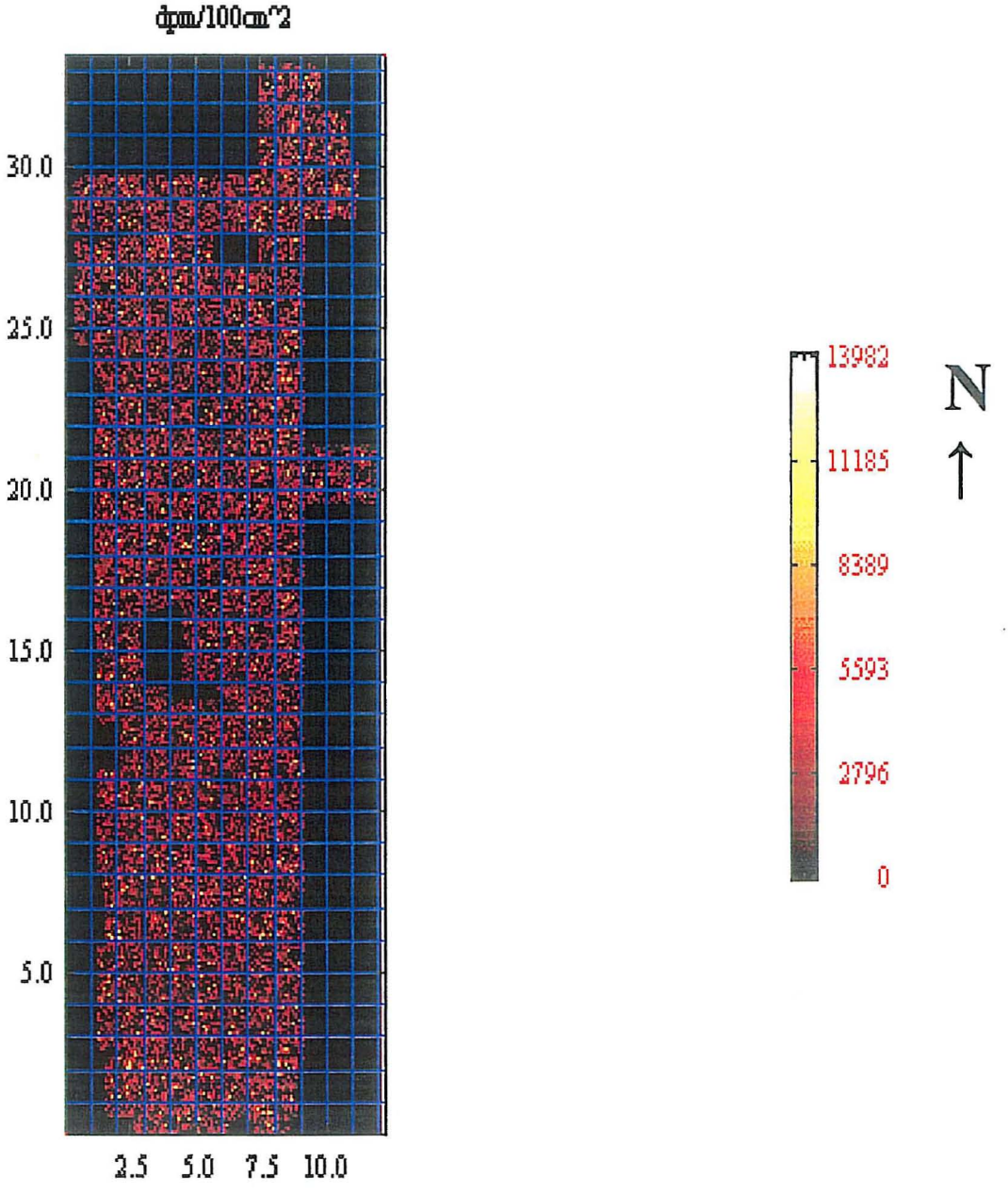


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the southwest corner of the pad.

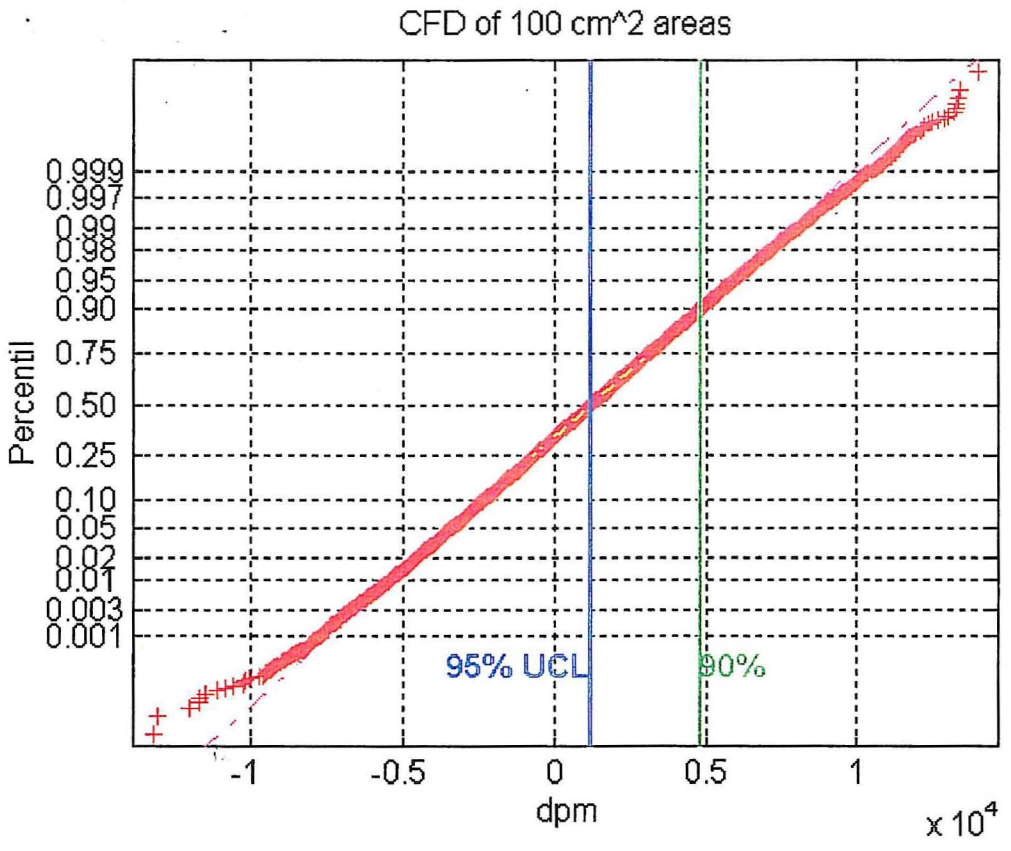


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2 x 10^4.

Survey Report

Survey Location:	TEST STAND PAD
Survey File Name:	XP00202A
Survey Date:	March 15, 2006
Survey Equipment:	SCM5
Detector(s):	C180
Survey Mode	Static 4 sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	C180: 32.4%
SIMS Version:	V5.31
SCM Version:	V3.4a
Survey Results	
Maximum 100 cm^2:	**5,176 dpm/100 cm^2**
Maximum m^2 Average:	2,688 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012651XP00202A

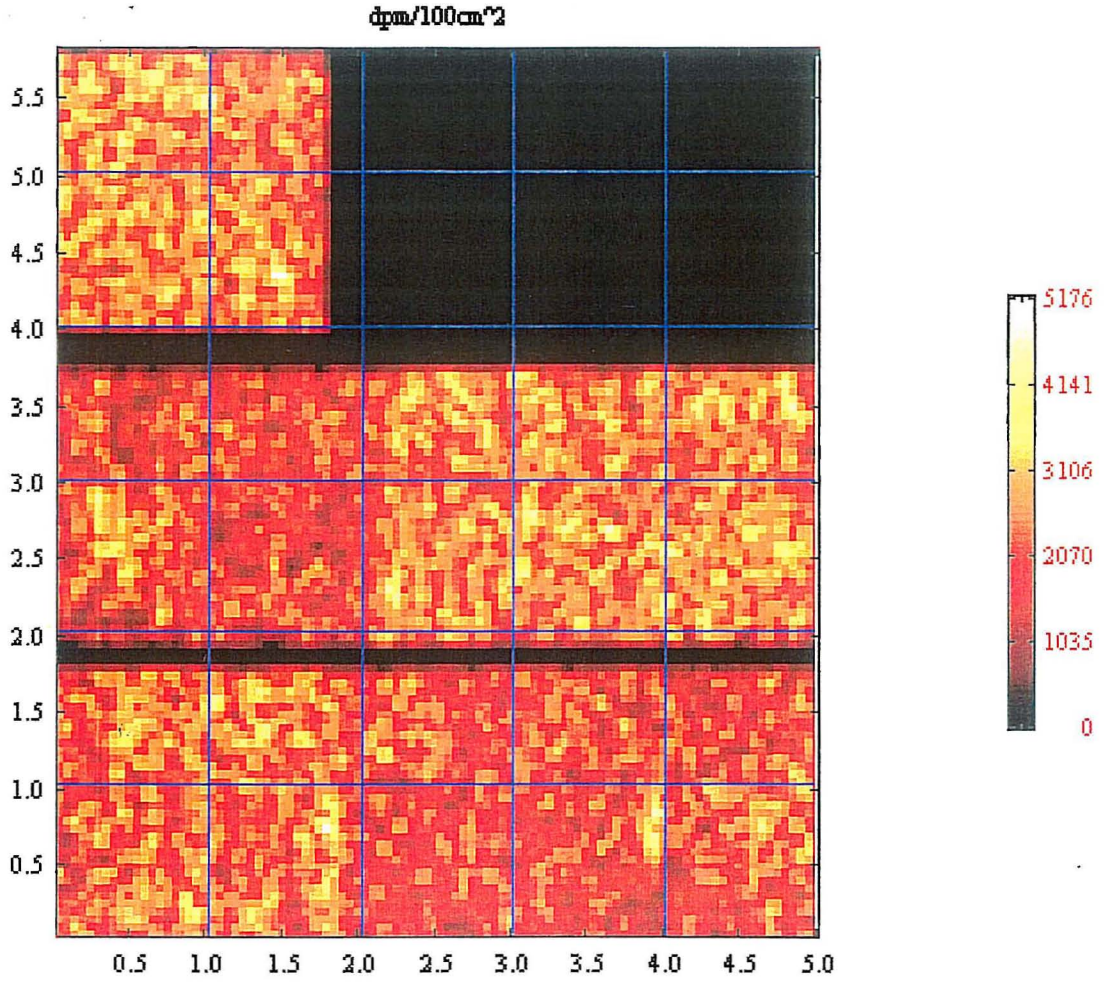


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

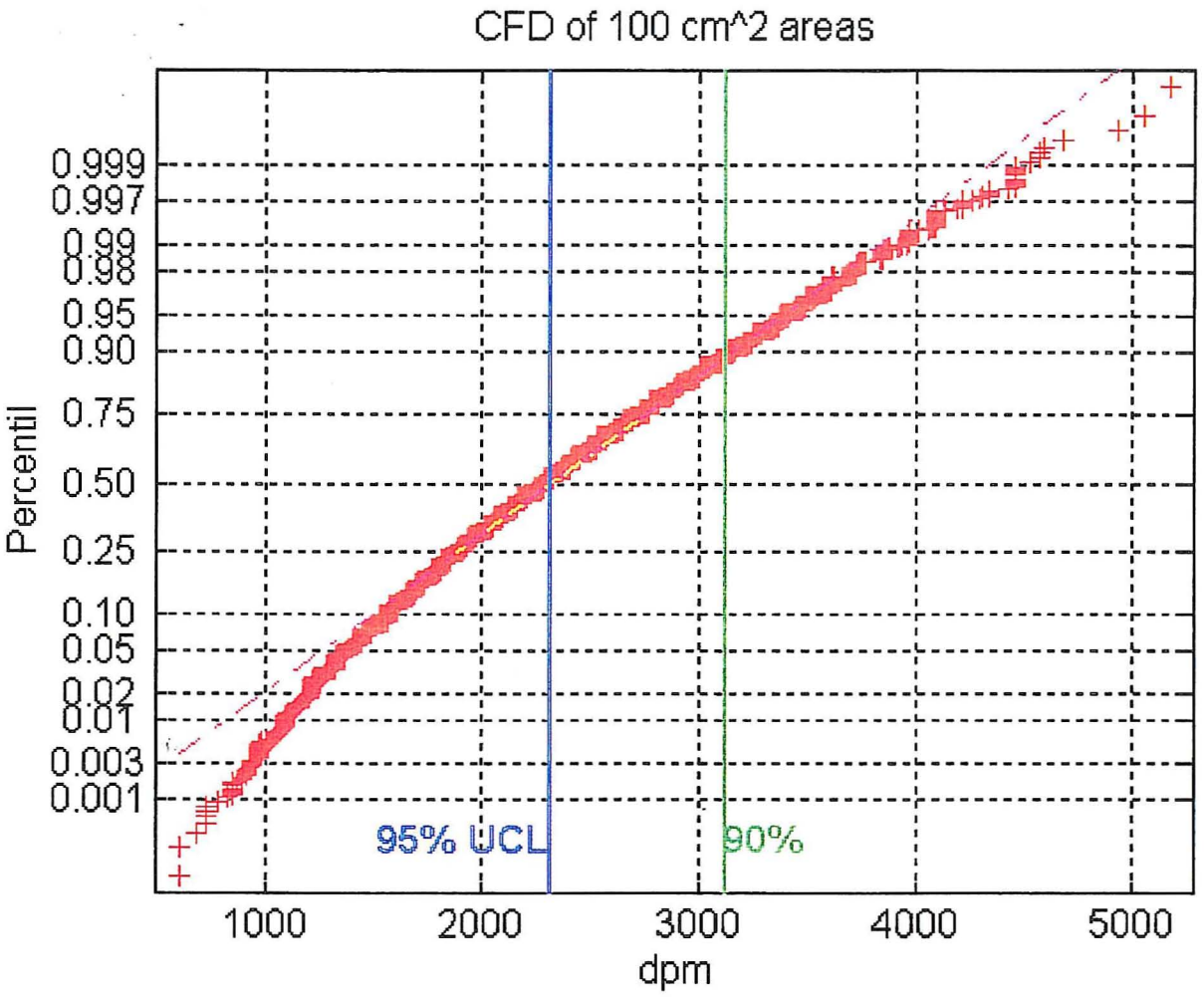


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

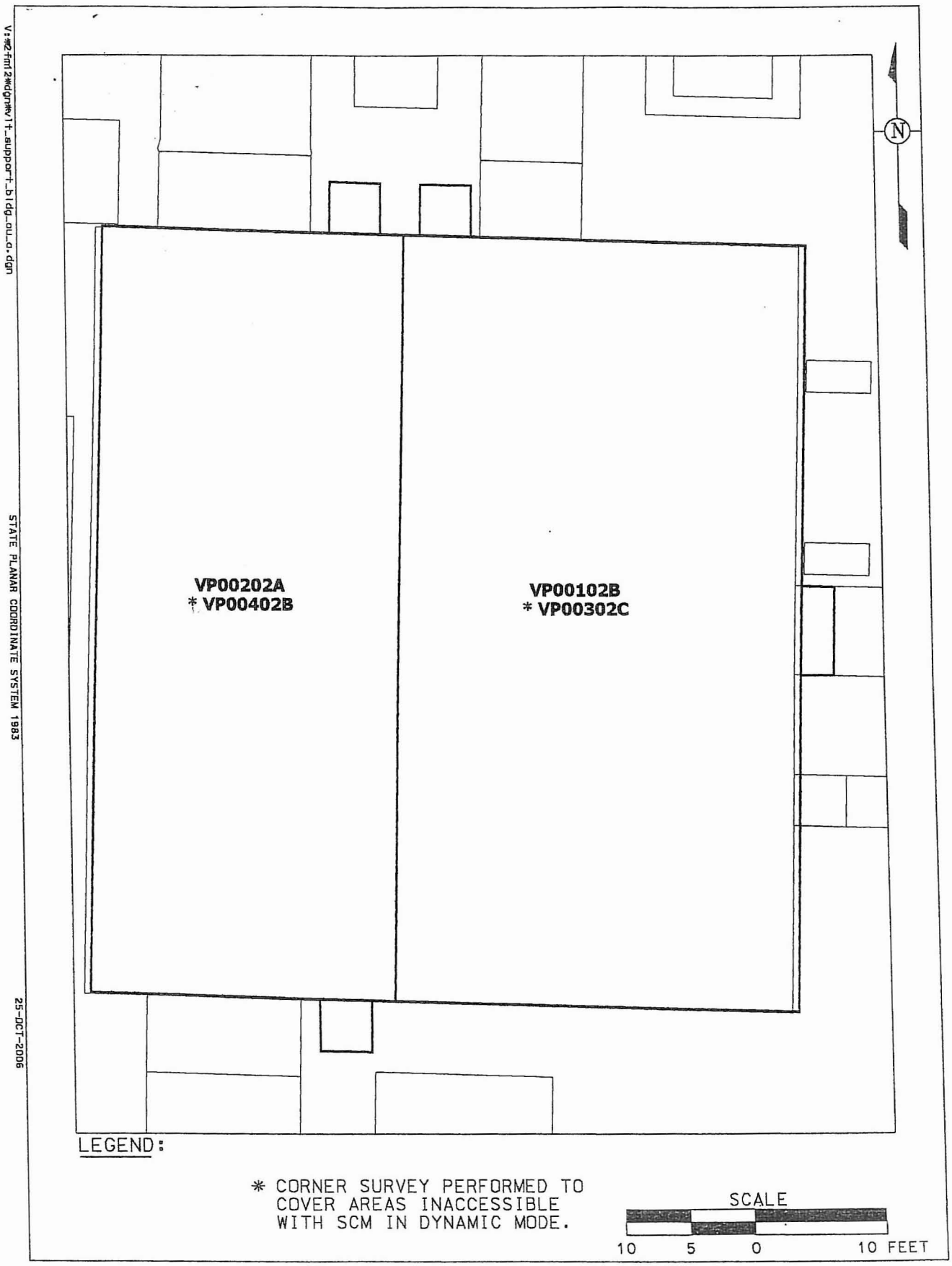


FIGURE C-3. AREA 7 VITRIFICATION PILOT PLANT (FLOOR SLAB). SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-VP-C03

Fernald Closure Project

Survey Report

Vitrification Building Pad

Surveys of the Vitrification Building Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey reports VP00102A and VP00202A are the result of the SCM operating in the rolling mode which was able to cover most of the pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad. Following the initial survey strip 3 was found to have insufficient length, most likely due to operator error. A second survey, VP00102B was performed to repeat the strip. Data form the strip obtained in the second survey was used to replace the bad strip in the first survey. This information is detailed in the Survey Record for VP00102A. Figure 1 in each survey report provides spatially correlated results, with the (0,0) point representing the southwest corner of the surveyed area. The random distribution of survey results and the normal distribution of all data represented in Figure 2 of each survey report are indicative of natural radioactivity within the concrete; no outliers representative of added contamination are noted.

Survey reports VP00302A and VP00402A are the result of the SCM operating in the corner mode, used to survey those areas that are not accessible to the SCM in the rolling mode. The survey was performed with a static measurement time of 4 seconds. Areas surveyed included the trench, exposed outer vertical surfaces of the pad, and small areas along the perimeter of the pad. During the initial surveys, several strips in both VP00302A and VP00402A were found to have less than full data across the detector. This is typically a result of the SCM operator not allowing sufficient time for all data to be written to file before saving the data. Re-surveys of the strips in question were performed as VP00302B, VP00302C and VP00402B. The strips from the re-surveys replaced the bad strips in the "A" surveys. This information is detailed in the Survey Records for VP00302A and VP00402A. The results presented in Figure 1 in each survey report are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey reports if necessary. The random distribution of survey results and the normal distribution of all data represented in Figure 2 of each survey report are indicative of natural radioactivity within the concrete; no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Vitrification Building Pad are from the rolling mode surveys and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
VP00202A	12,436	9	(645,2805)	(160,405)
VP00102A	11,861	20	(480,1865)	(320,30)
VP00202A	11,282	5	(995,370)	(145,10)

The data from survey reports VP00102A and VP00202A were combined into one spatially correlated image, shown in Figure 1, and the data presented in a CFD, shown in Figure 2.

The data from survey reports VP00302A and VP00402A were combined into one non-spatially correlated image, shown in Figure 3, and the data presented in a CFD, shown in Figure 4.

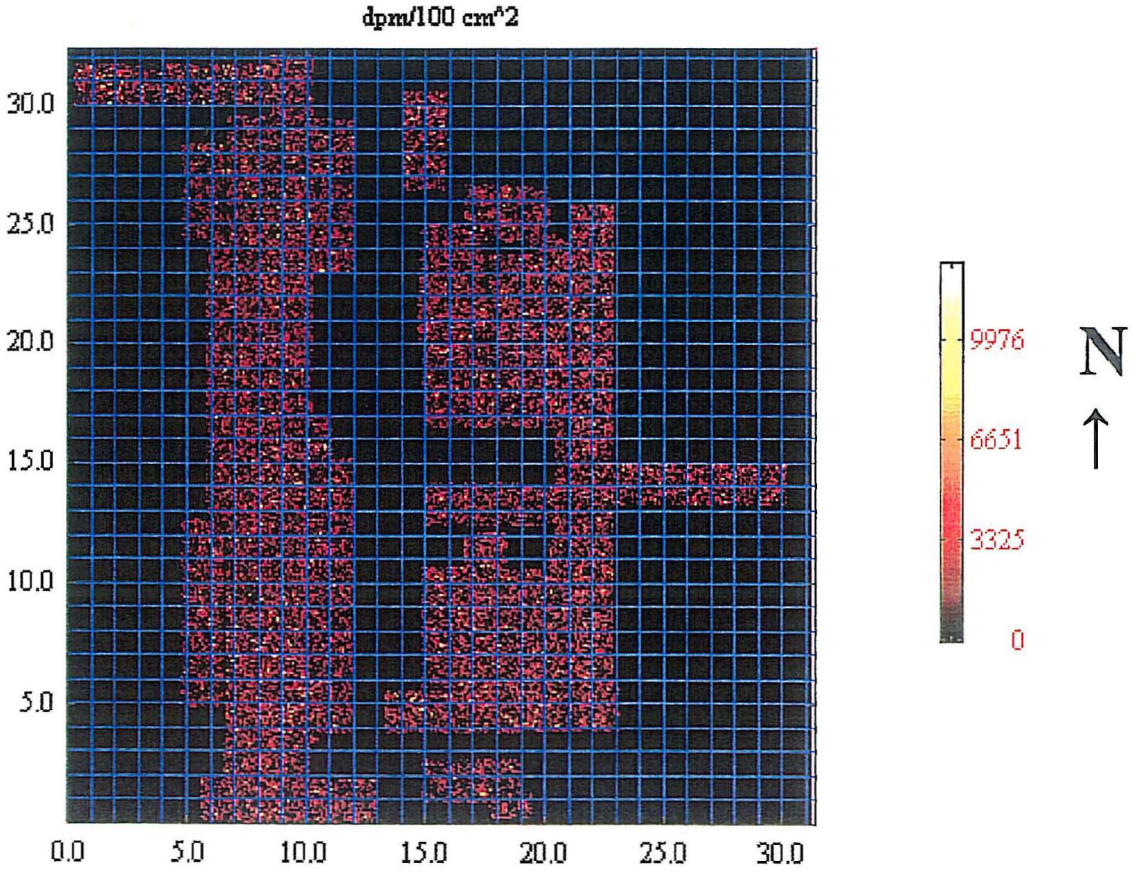


Figure 1: Meter grid overlaid onto image plot of 100 cm^2 areas. The color scale is in dpm/100cm^2 and the maximum has been set to the highest surface activity in the data set.

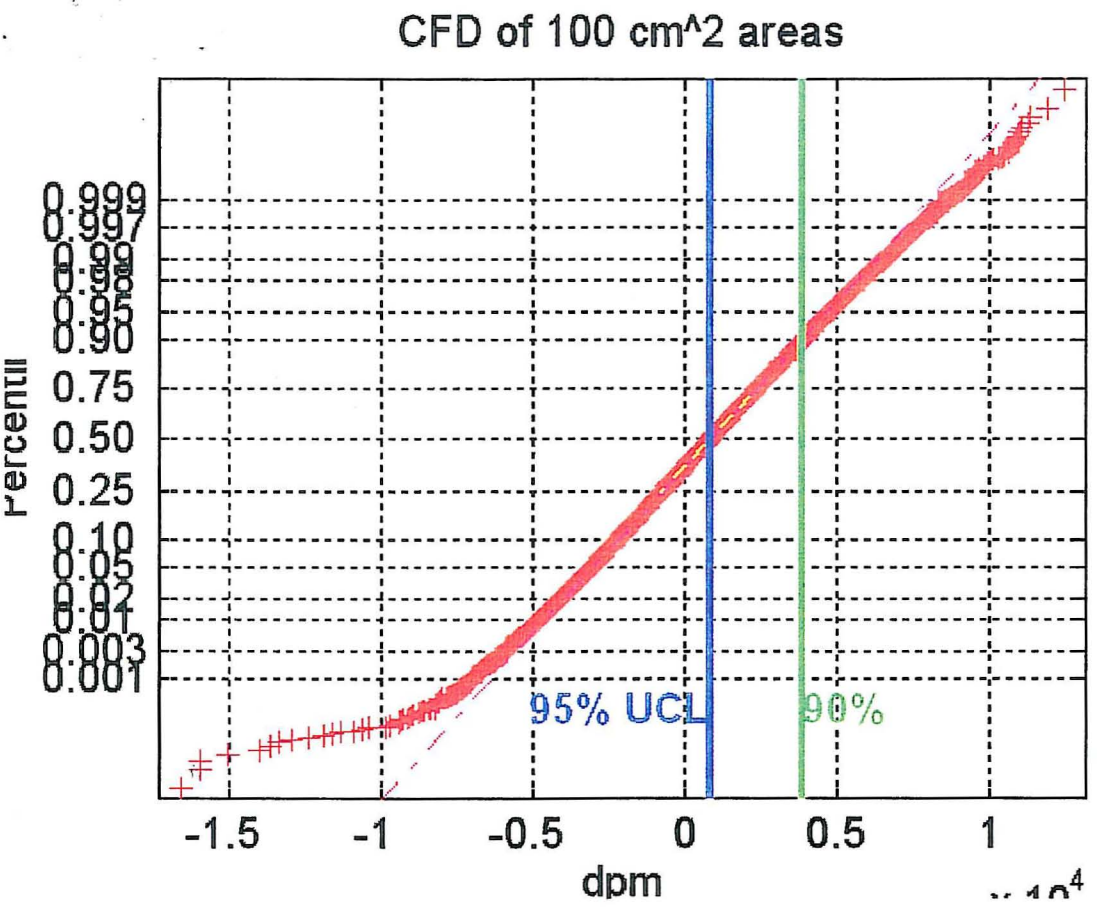


Figure 2: CFD of surface activity in 100 cm^2 areas. The horizontal scale is in dpm x 10^4 /100 cm^2.

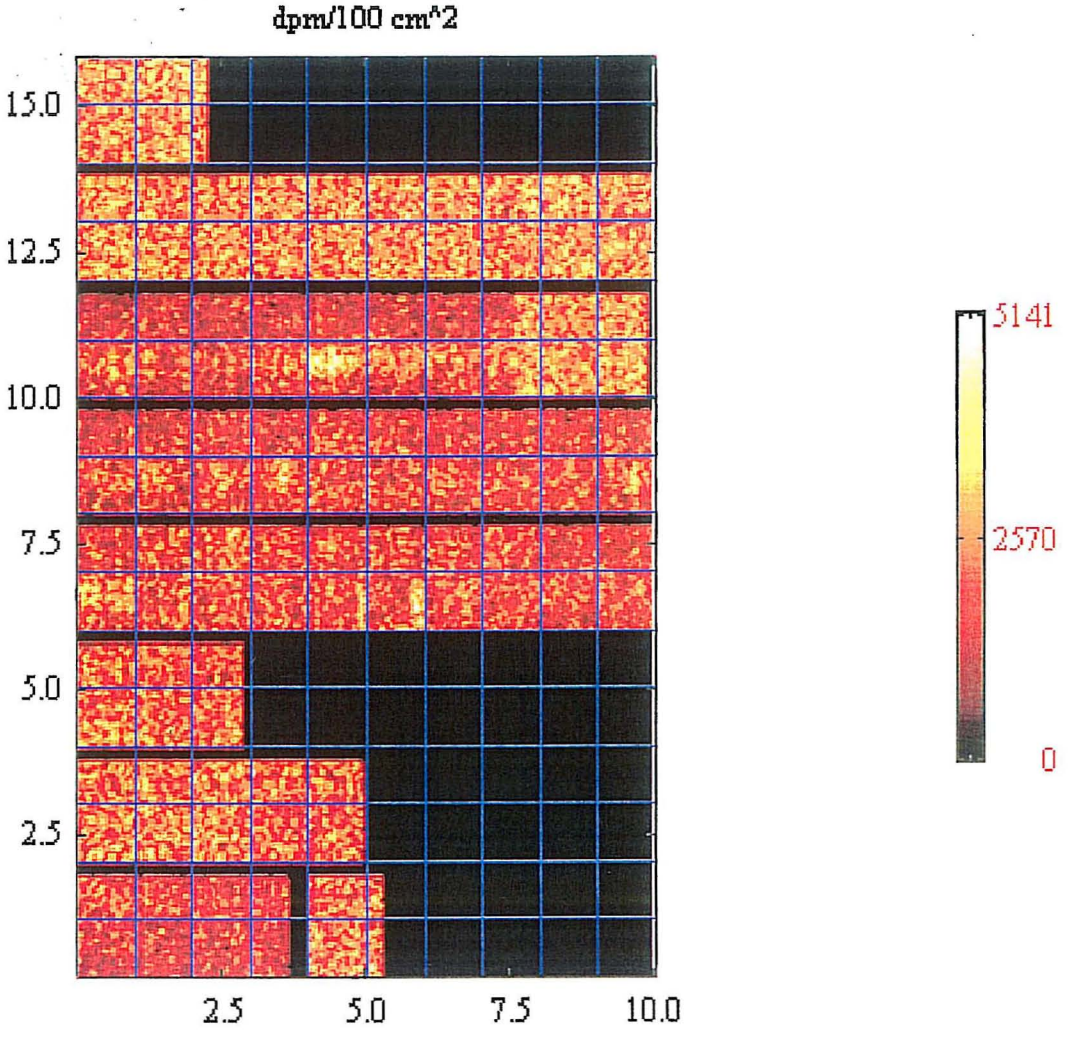


Figure 3: Meter grid overlaid onto image plot of 100 cm^2 areas. The color scale is in dpm/100cm^2 and the maximum has been set to the highest surface activity in the data set. Note that the static measurement data are not position stitched for this report.

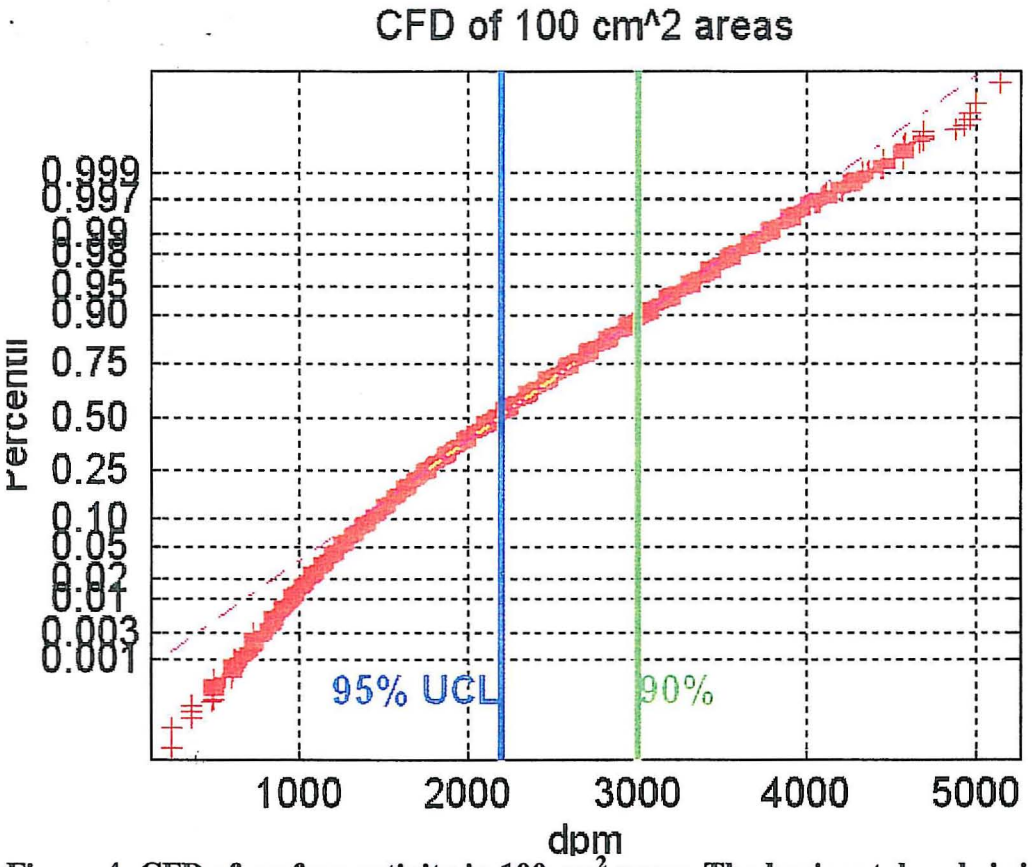
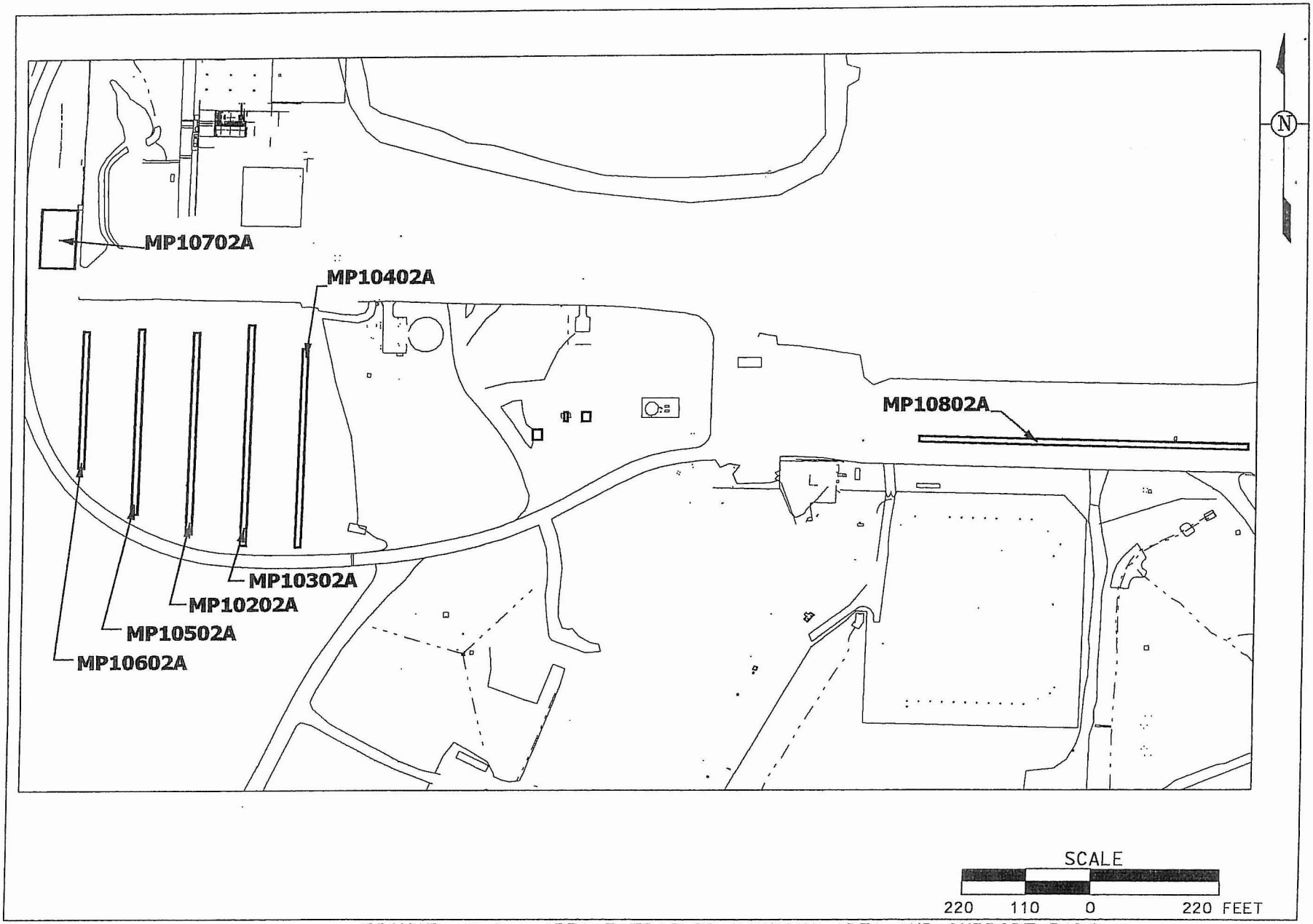


Figure 4: CFD of surface activity in 100 cm^2 areas. The horizontal scale is in dpm/100 cm^2.



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STATE PLANAR COORDINATE SYSTEM 1983

FIGURE C-4. AREA 7 TRAILER PARKING AREA AND SUPPORT PADS.
SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-TP-C02

19-OCT-2006

006295

Fernald Closure Project

Survey Report

Truck Staging Pad A

Surveys of the Truck Staging Pad C were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP10602A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad (Ambient Background Subtract Mode). Figure 1 provides meter grid data for the various survey strips obtained. The data is not spatially correlated, but specific locations can be determined through the survey map and the stitch pattern attached to the survey record. The length of the pad and relatively narrow width would, if stitched geometrically, result in a poor aspect ratio with limited resolution. By cutting the length into 4 pieces, the resulting image has adequate resolution to note any patterns that may be indicative of contamination. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Truck Staging Pad A are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP10602A	11642	2	(630,985)	(45,980)
MP10602A	10992	6	(865,1670)	(65,1665)
MP10602A	10519	6	(830,1765)	(30,1760)

Survey Report

Survey Location:	TRAILER STAGING - PAD A
Survey Unit Area Code:	N0099X
Survey File Name:	MP10602A
Survey Date:	June 7, 2006
Survey Equipment:	SCM5
Detector(s):	R180
Survey Mode:	Rolling 4"/sec Ambient Gamma Bkg Subtract
Surveyor(s):	SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	R180: 20.8%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**11,642 dpm/100 cm^2**
Maximum m^2 Average:	1,646 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012830MP10602A

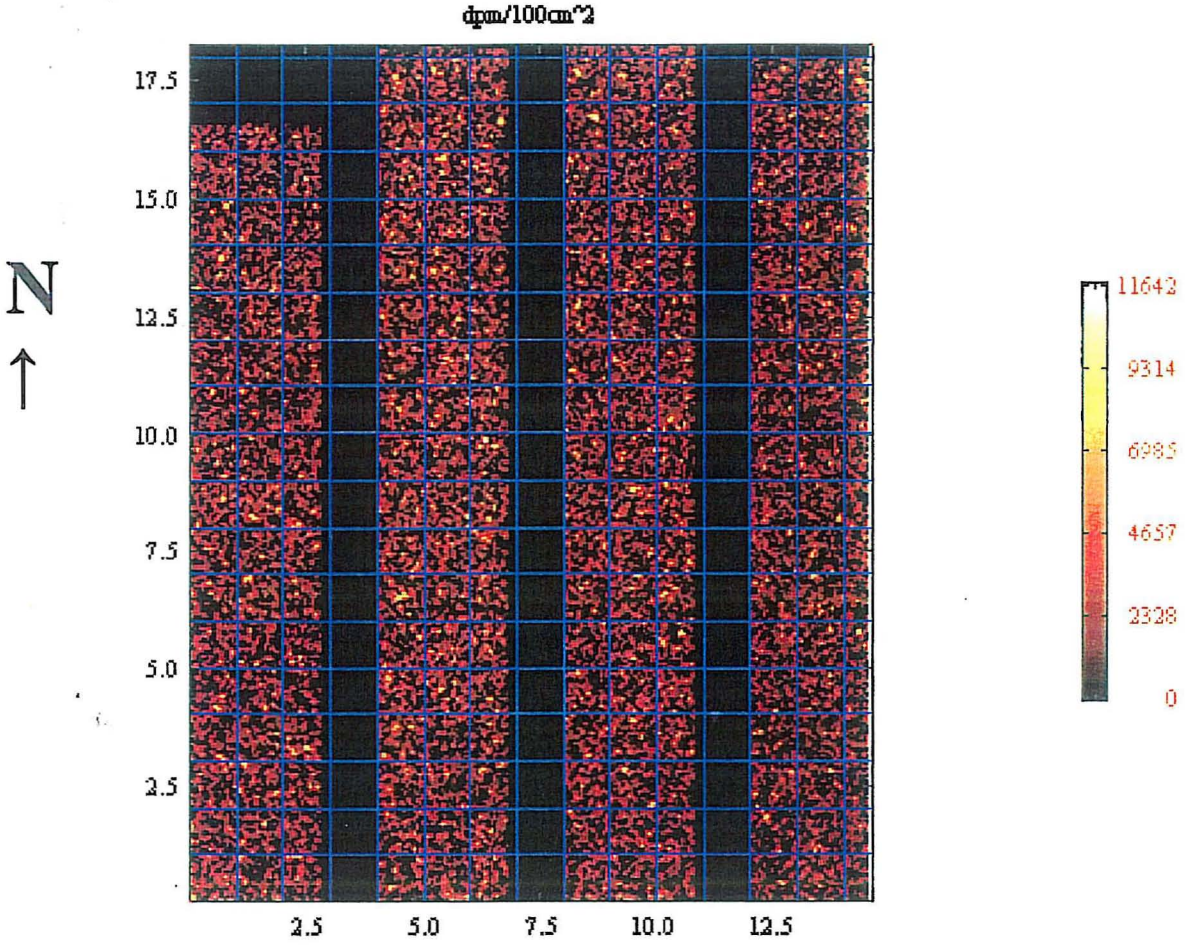


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map and stitch pattern for strip locations.

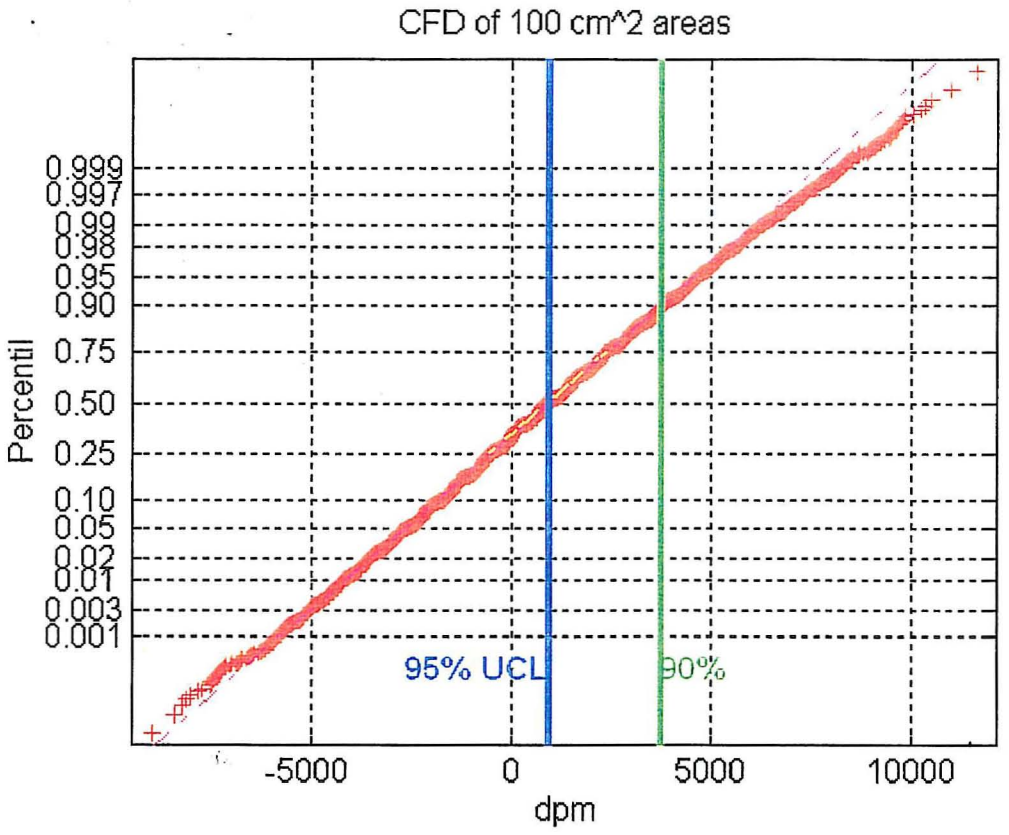


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

Truck Staging Pad B

Surveys of the Truck Staging Pad C were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP10502A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad (Ambient Background Subtract Mode). Figure 1 provides meter grid data for the various survey strips obtained. The data is not spatially correlated, but specific locations can be determined through the survey map and the stitch pattern attached to the survey record. The length of the pad and relatively narrow width would, if stitched geometrically, result in a poor aspect ratio with limited resolution. By cutting the length into 6 pieces, the resulting image has adequate resolution to note any patterns that may be indicative of contamination. Potential outliers exist, however not sufficiently above the remainder of the data set to be conclusive. The locations are identified for core sampling. No other outliers representative of added contamination are noted. The random distribution of survey results and the normal distribution of all other data represented in Figure 2 is indicative of natural radioactivity within the concrete, no additional outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Truck Staging Pad B are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP10502A	16415	10	(270,1295)	(85,1290)
MP10502A	14868	10	(215,1420)	(30,1415)
MP10502A	12086	12	(175,380)	(170,375)

Survey Report

Survey Location:	TRUCK STAGING - PAD B
Survey Unit Area Code:	N0099X
Survey File Name:	MP10502A
Survey Date:	June 7, 2006
Survey Equipment:	SCM5
Detector(s):	R180
Survey Mode:	Rolling 4"/sec Ambient Gamma Bkg Subtract
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	R180: 20.8%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**16,415 dpm/100 cm^2**
Maximum m^2 Average:	1,658 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012830MP10502A

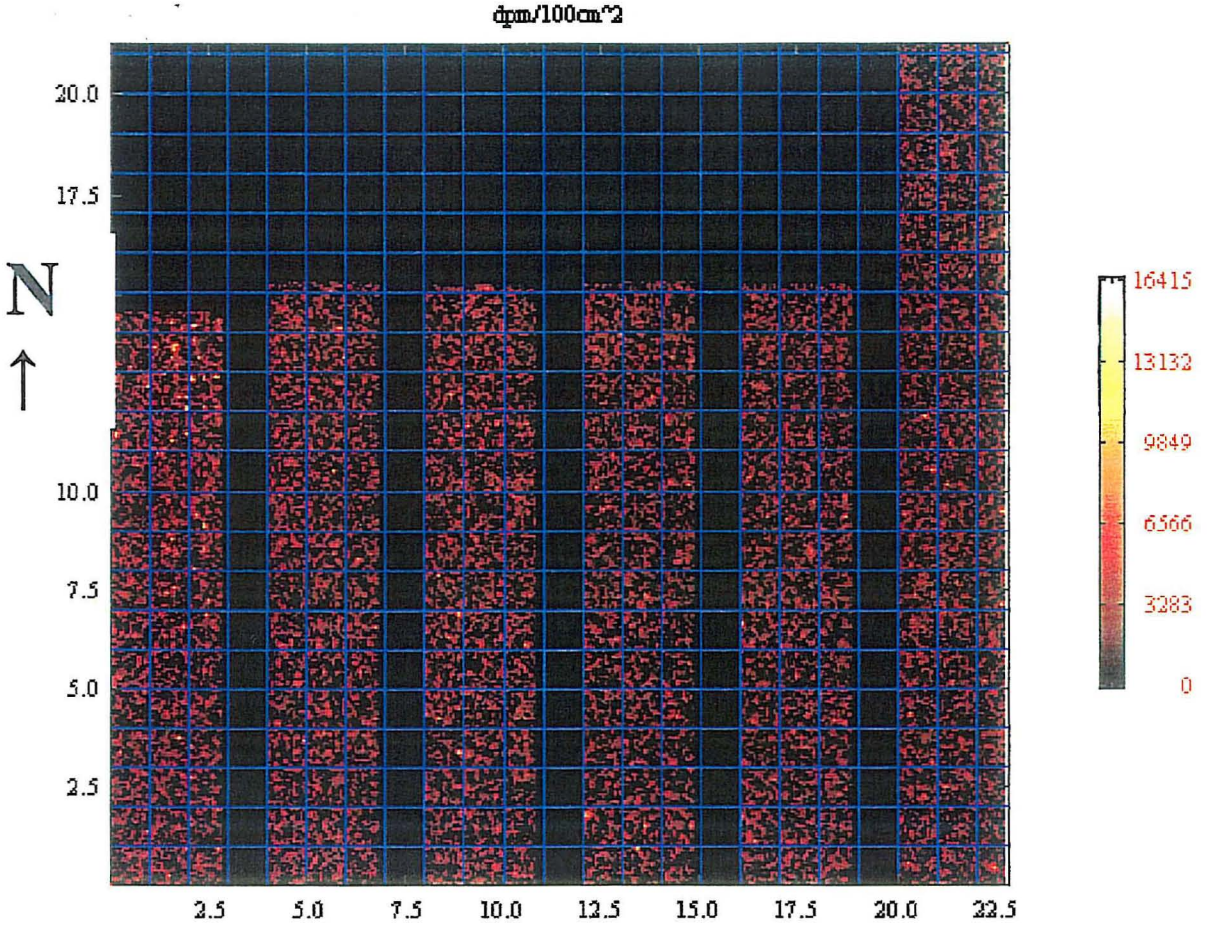


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². Image is not spatially correlated to field surfaces. Refer to survey map and stitch pattern for strip locations.

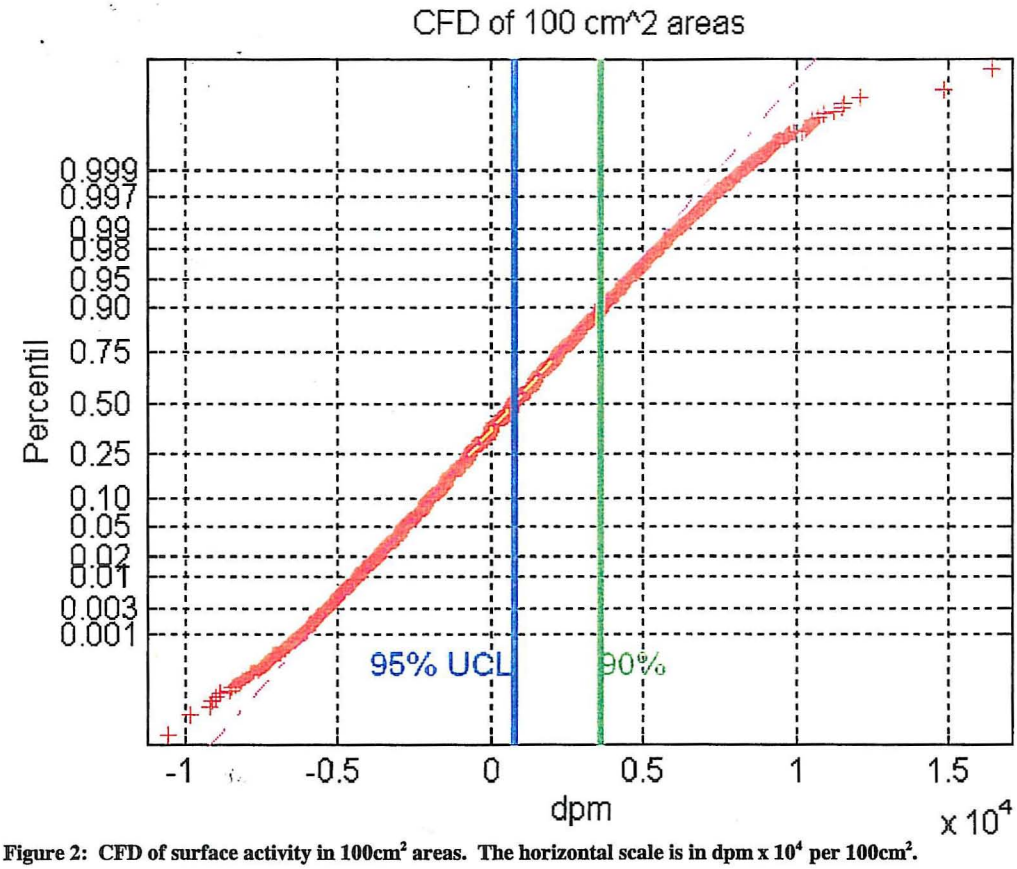


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.

Fernald Closure Project

Survey Report

Truck Staging Pad C

Surveys of the Truck Staging Pad C were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP10202A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad (Ambient Background Subtract Mode). Figure 1 provides meter grid data for the various survey strips obtained. The data is not spatially correlated, but specific locations can be determined through the survey map and the stitch pattern attached to the survey record. The length of the pad and relatively narrow width would, if stitched geometrically, result in a poor aspect ratio with limited resolution. By cutting the length into 6 pieces, the resulting image has adequate resolution to note any patterns that may be indicative of contamination. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Truck Staging Pad C are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP10202A	15802	7	(1025,1640)	(40,1635)
MP10202A	14354	2	(450,800)	(50,795)
MP10202A	14138	8	(965,1720)	(160,1715)

Survey Report

Survey Location:	TRUCK STAGING - PAD C
Survey Unit Area Code:	N0099X
Survey File Name:	MP10202A
Survey Date:	May 19, 2006
Survey Equipment:	SCM5
Detector(s):	R180
Survey Mode	Rolling 4"/sec Ambient Gamma Bkg Subtract
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	R180: 20.8%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**15,802 dpm/100 cm^2**
Maximum m^2 Average:	2,779 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012830MP10202A

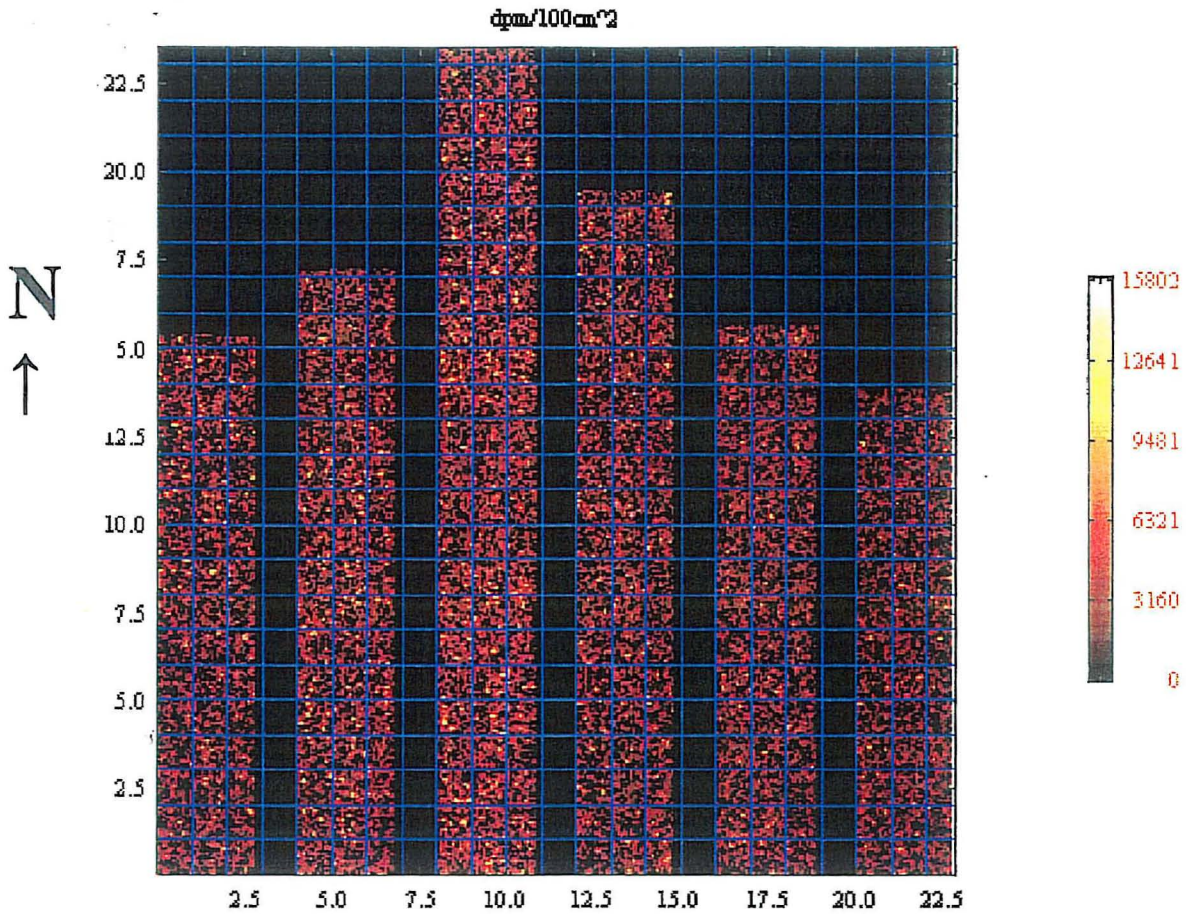


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

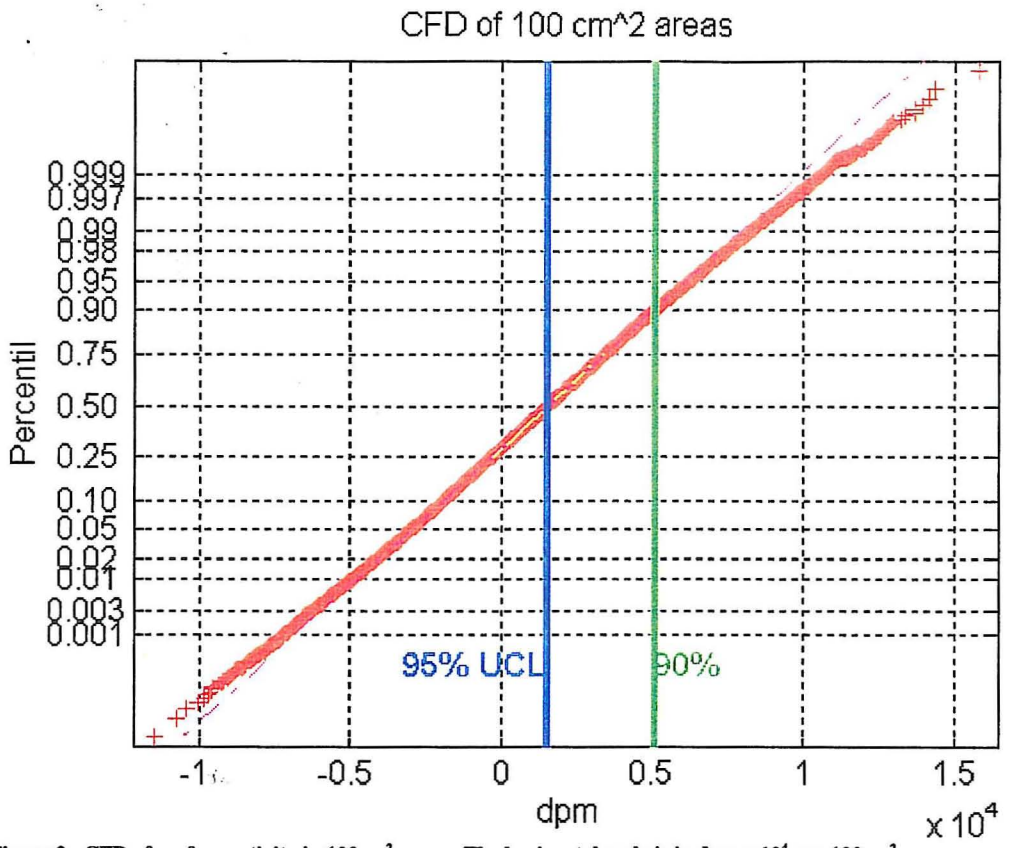


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².

Fernald Closure Project

Survey Report

Truck Staging Pad D

Surveys of the Truck Staging Pad D were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP10302A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad (Ambient Background Subtract Mode). Figure 1 provides meter grid data for the various survey strips obtained. The data is not spatially correlated, but specific locations can be determined through the survey map and the stitch pattern attached to the survey record. The length of the pad and relatively narrow width would, if stitched geometrically, result in a poor aspect ratio with limited resolution. By cutting the length into 6 pieces, the resulting image has adequate resolution to note any patterns that may be indicative of contamination. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Truck Staging Pad D are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP10302A	14414	3	(150,800)	(145,795)
MP10302A	13237	1	(670,30)	(85,25)
MP10302A	13124	4	(430,1115)	(30,1110)

Survey Report

Survey Location:	TRUCK STAGING - PAD D
Survey Unit Area Code:	N0099X
Survey File Name:	MP10302A
Survey Date:	May 19, 2006
Survey Equipment:	SCM5
Detector(s):	R180
Survey Mode	Rolling 4"/sec Ambient Gamma Bkg Subtract
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	R180: 20.8%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**14,414 dpm/100 cm^2**
Maximum m^2 Average:	2,206 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012830MP10302A

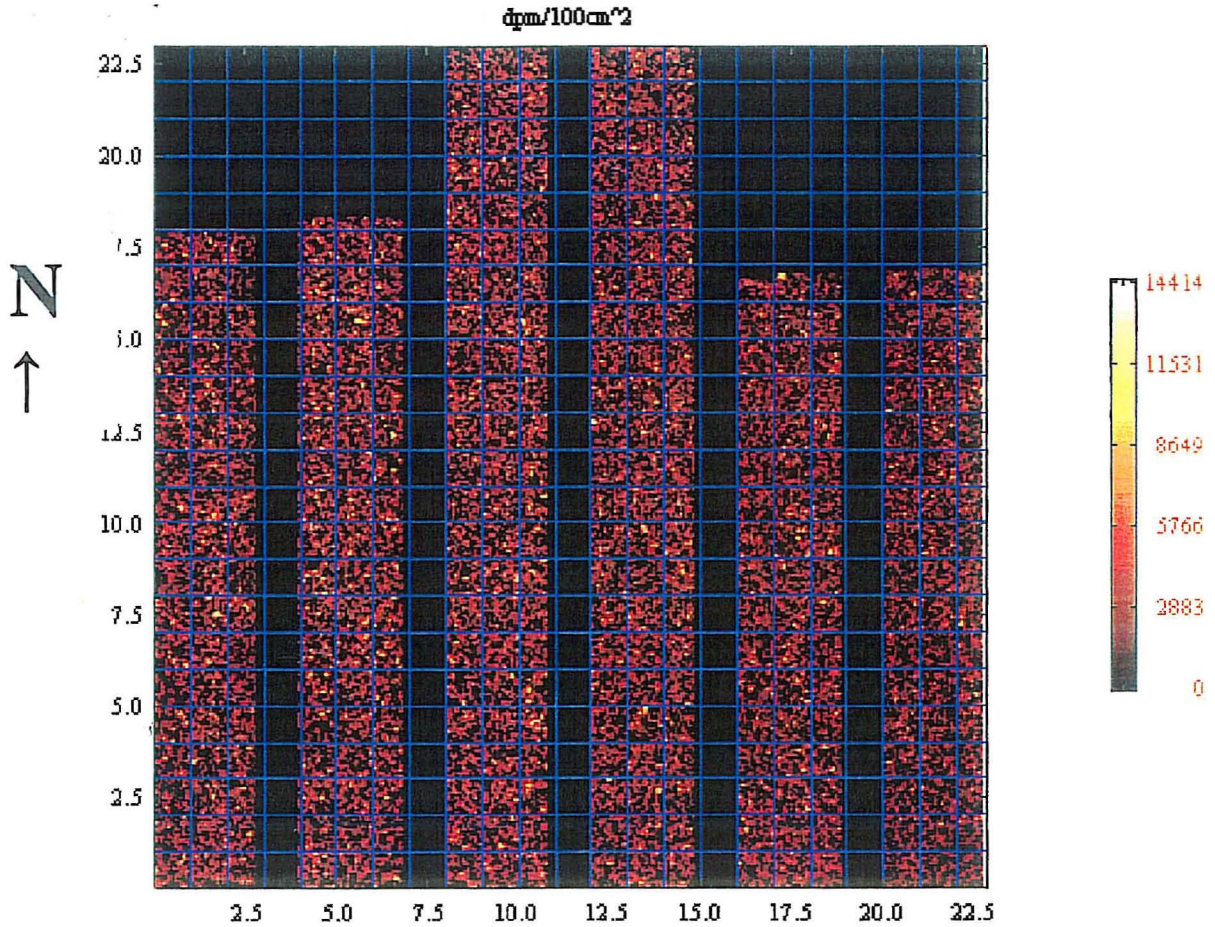


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

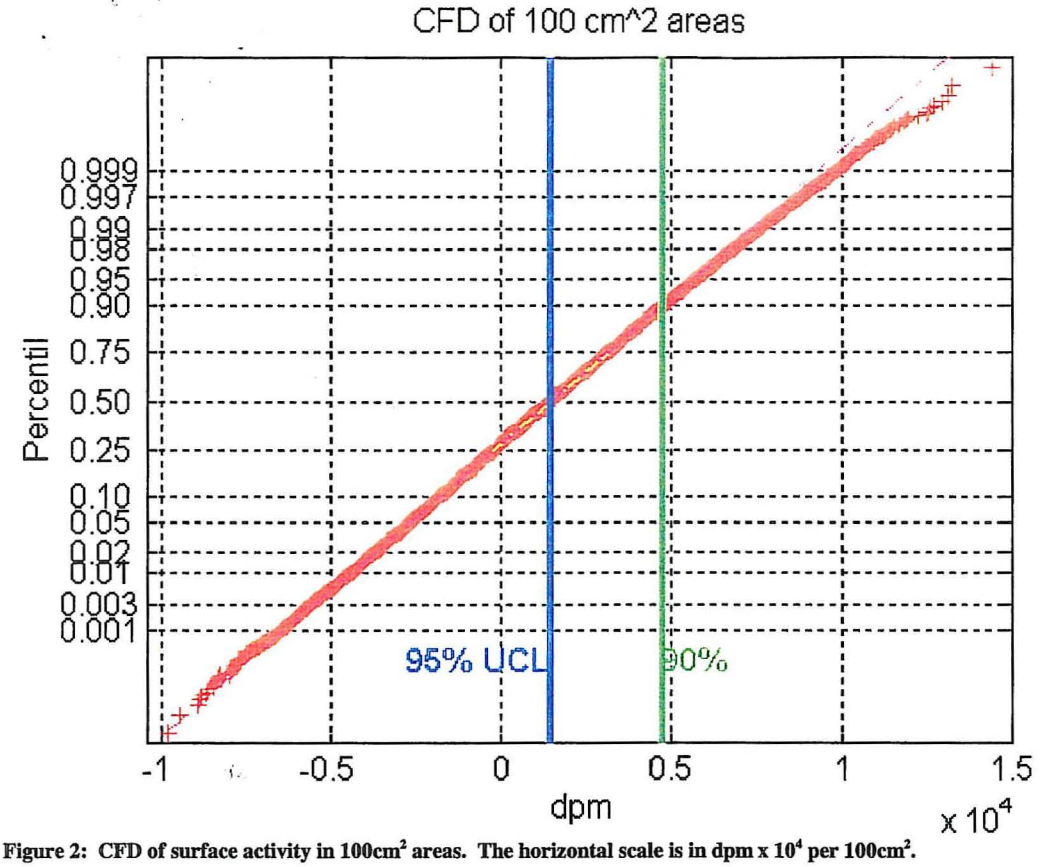


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.

Fernald Closure Project

Survey Report

Truck Staging Pad E

Surveys of the Truck Staging Pad E were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP10402A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad (Ambient Background Subtract Mode). Figure 1 provides meter grid data for the various survey strips obtained. The data is not spatially correlated, but specific locations can be determined through the survey map and the stitch pattern attached to the survey record. The length of the pad and relatively narrow width would, if stitched geometrically, result in a poor aspect ratio with limited resolution. By cutting the length into 6 pieces, the resulting image has adequate resolution to note any patterns that may be indicative of contamination. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Truck Staging Pad E are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP10402A	12530	6	(945,125)	(140,120)
MP10402A	11502	3	(30,115)	(25,110)
MP10402A	11365	8	(1250,1285)	(50,1280)

Survey Report

Survey Location:	TRUCK STAGING - PAD E
Survey Unit Area Code:	N0099X
Survey File Name:	MP10402A
Survey Date:	May 19, 2006
Survey Equipment:	SCM5
Detector(s):	R180
Survey Mode	Rolling 4"/sec Ambient Gamma Bkg Subtract
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	R180: 20.8%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**12,530 dpm/100 cm^2**
Maximum m^2 Average:	2,246 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012830MP10402A

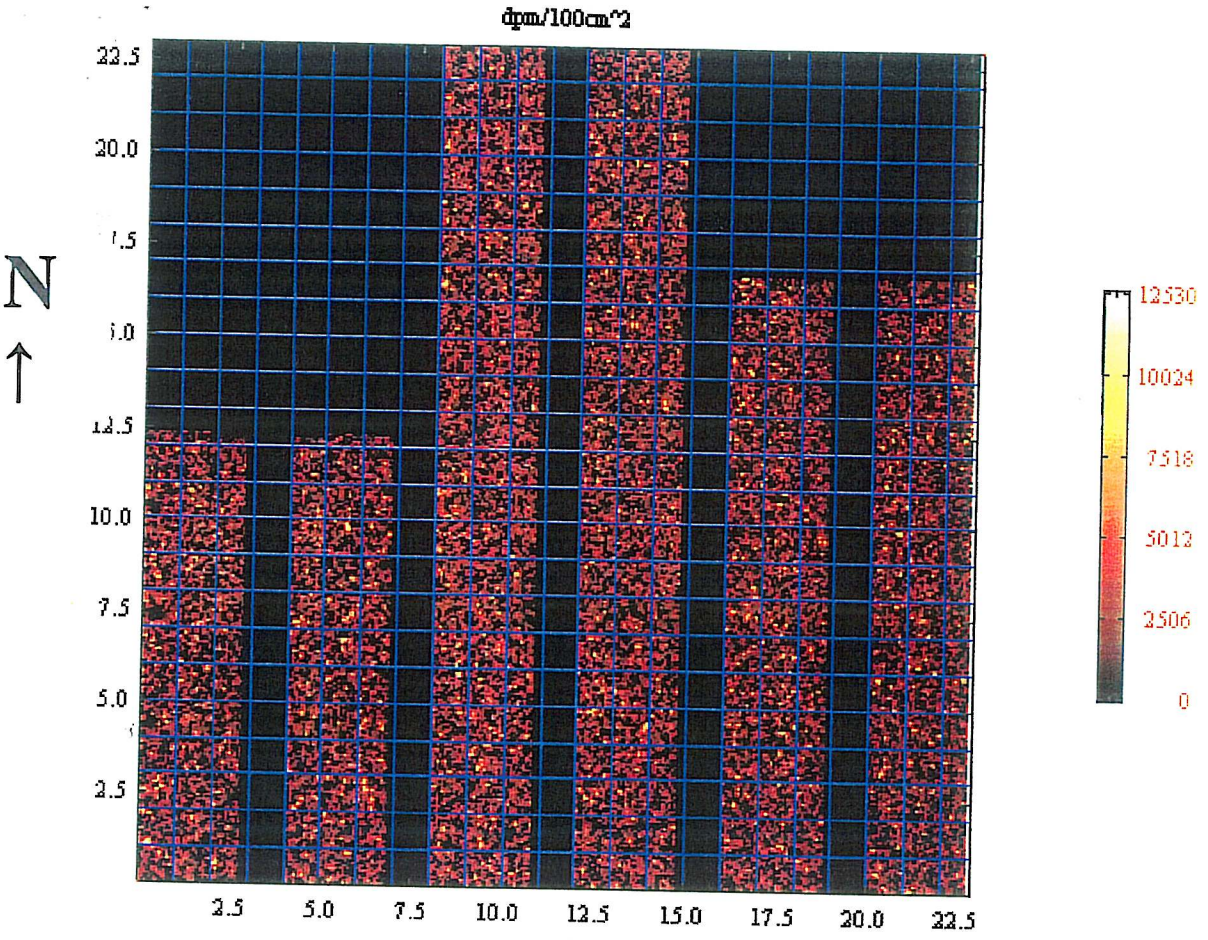


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

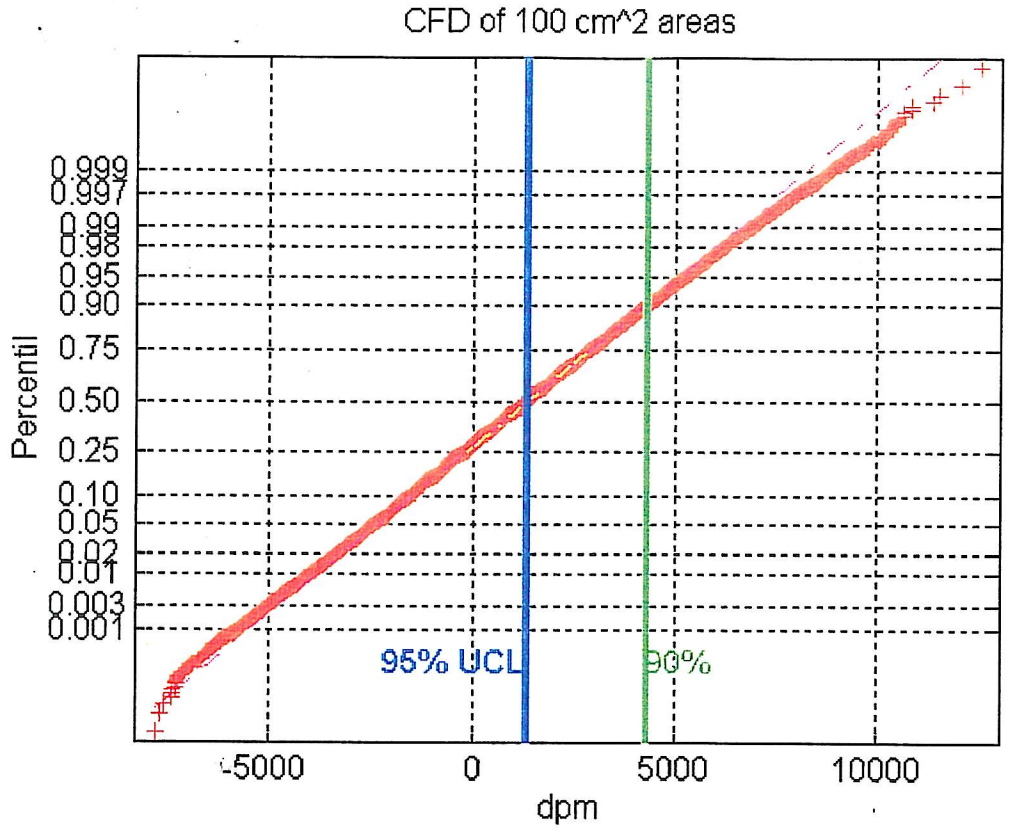


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.

Fernald Closure Project

Survey Report

Truck Staging Scale Pad

Surveys of the Truck Staging Scale Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP10702A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad (Ambient Background Subtract Mode). Figure 1 provides spatially correlated meter grid data for the survey. The initial survey identified high values in strips 1 and 2. Field evaluation of the specific locations determined that the readings were due to system grounding on metal surfaces. The strips were re-rolled as MP10702B survey and used as replacement strips in MP10702A. All areas exhibit a random distribution of survey data and a normal distribution as represented in Figure 2, indicative of natural radioactivity within the concrete. No outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Truck Staging Scale Pad from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP10702A	13426	5	(1020,2115)	(170,1930)
MP10702A	13293	3	(1085,1750)	(50,1325)
MP10702A	13122	5	(915,2125)	(65,1940)

Survey Report

Survey Location:	TRUCK STAGING - SCALE PAD
Survey Unit Area Code:	N0099X
Survey File Name:	MP10702A
Survey Date:	June 7, 2006
Survey Equipment:	SCM5
Detector(s):	R180
Survey Mode:	Rolling 4"/sec Ambient Gamma Bkg Subtract
Surveyor(s):	SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	R180: 20.8%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**13,426 dpm/100 cm^2**
Maximum m^2 Average:	3,466 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012830MP10702A

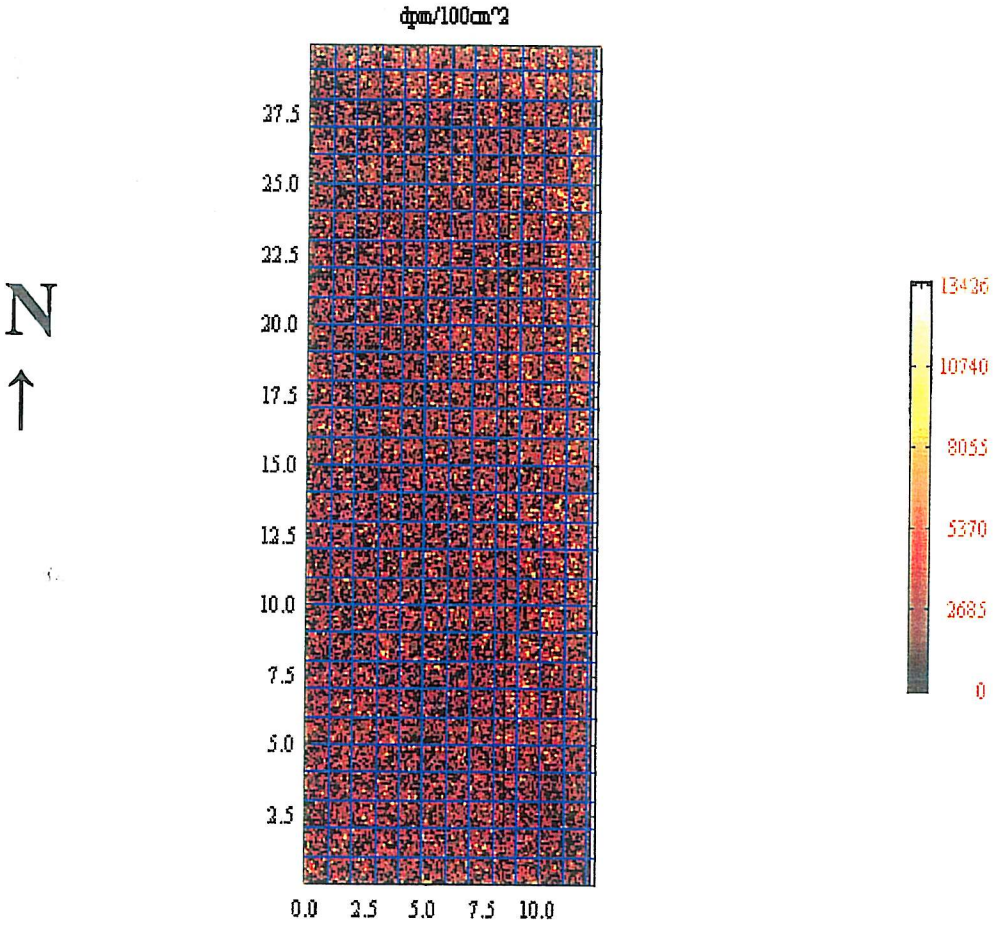


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

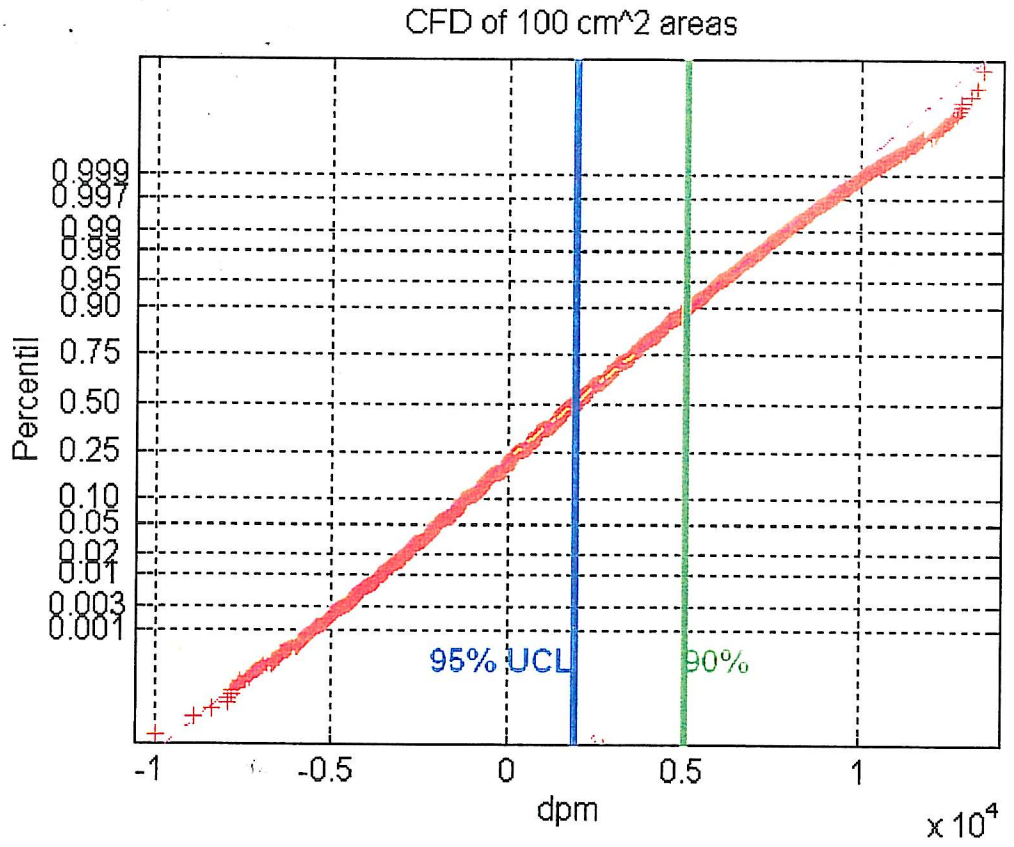


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.

Fernald Closure Project

Survey Report

Truck Staging Pad West End

Surveys of the Truck Staging Pad West End were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP10802A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad (Ambient Background Subtract Mode). Figure 1 provides meter grid data for the various survey strips obtained. The data is not spatially correlated, but specific locations can be determined through the survey map and the stitch pattern attached to the survey record. The length of the pad and relatively narrow width would, if stitched geometrically, result in a poor aspect ratio with limited resolution. By cutting the length into 11 pieces, the resulting image has adequate resolution to note any patterns that may be indicative of contamination. Survey report Mp10202A identified a single 100 cm^2 area at grid location 2290, 2200 of 23,701 dpm. The spot is in strip 2. Subsequently, a resurvey, MP10202B was performed for that strip. The elevated reading did not re-appear. As the area had a small amount of dirt and debris, the elevated activity may have been removed trough personnel traffic or the SCM power cord dragging on the surface. The area of elevated activity is included in areas to be sampled. All other areas exhibit a random distribution of survey data and a normal distribution of as represented in Figure 2, indicative of natural radioactivity within the concrete. No other outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Truck Staging Pad West End are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP10802A	23701	2	(2290,2200)	(380,100)
MP10802A	13812	1	(700,2200)	(695,100)
MP10802A	12706	1	(1335,2195)	(1330,95)

Survey Report

Survey Location:	TRAILER STAGING - WEST END PAD
Survey Unit Area Code:	N0099X
Survey File Name:	MP10802A
Survey Date:	June 8, 2006
Survey Equipment:	SCM5
Detector(s):	R180
Survey Mode:	Rolling 4"/sec Ambient Gamma Bkg Subtract
Surveyor(s):	SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	R180: 20.8%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**23,701 dpm/100 cm^2**
Maximum m^2 Average:	1,871 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012830MP10802A

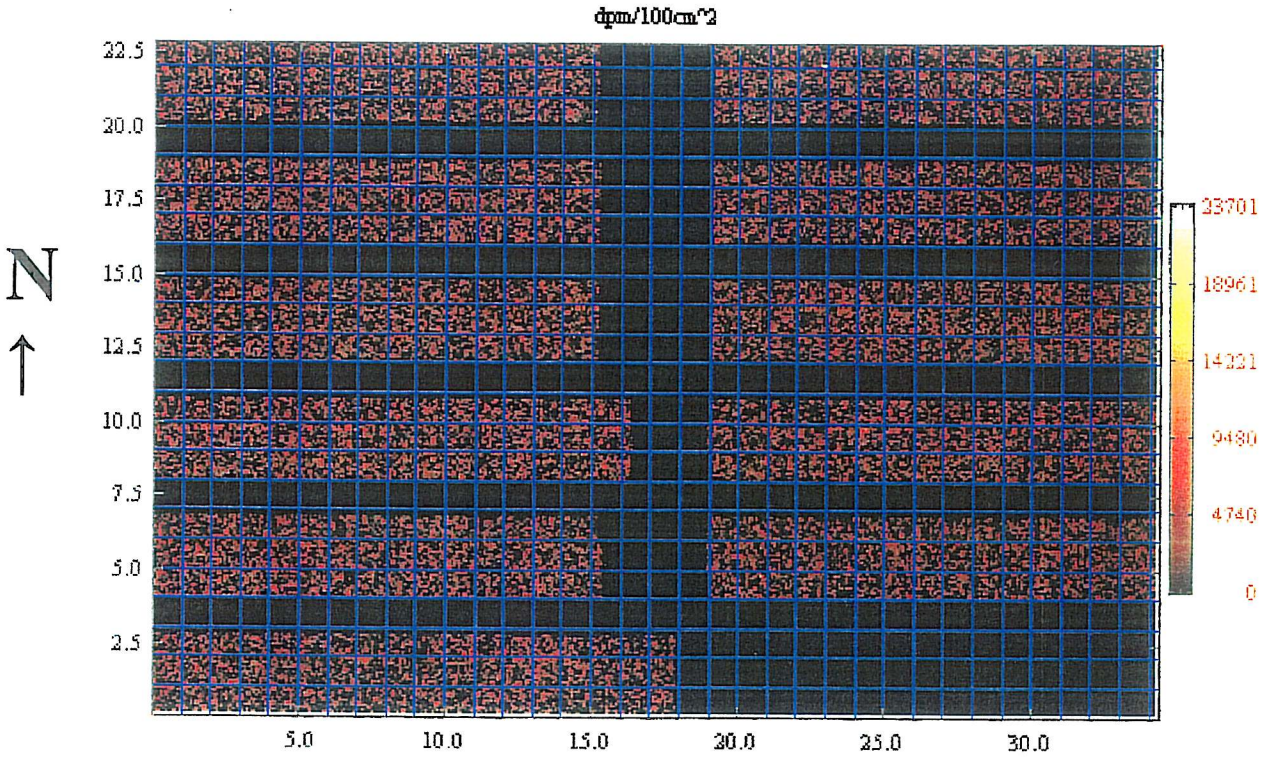


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map and stitch pattern for strip locations.

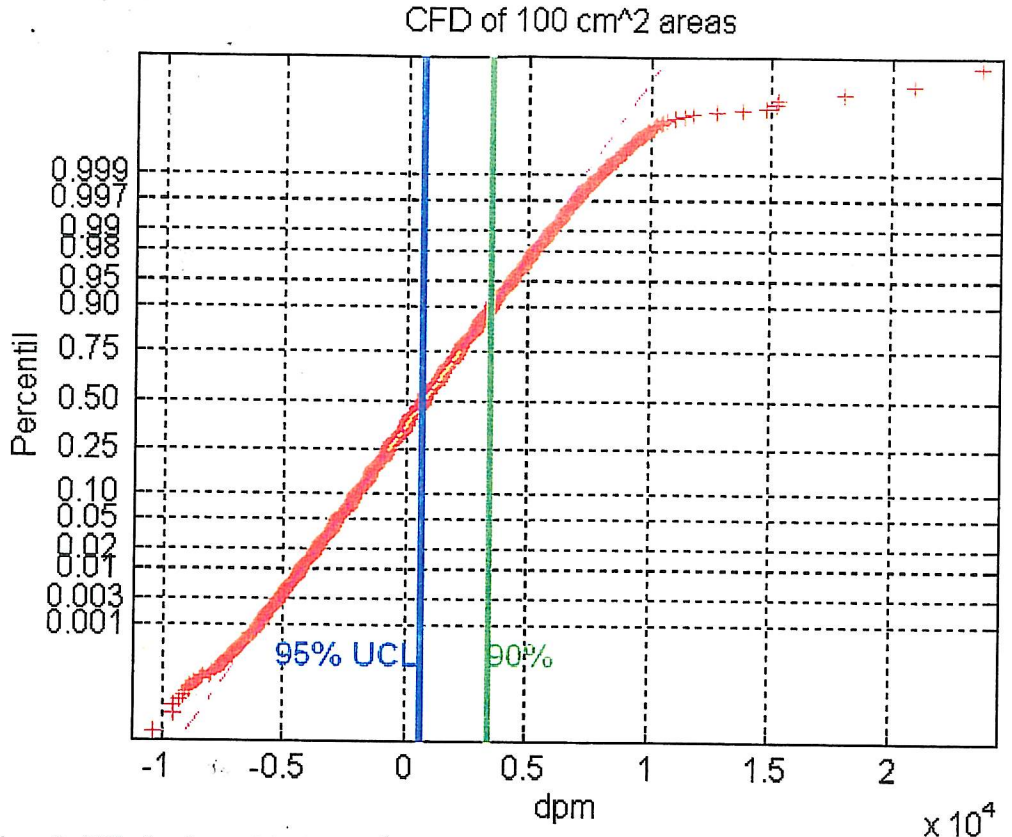


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.

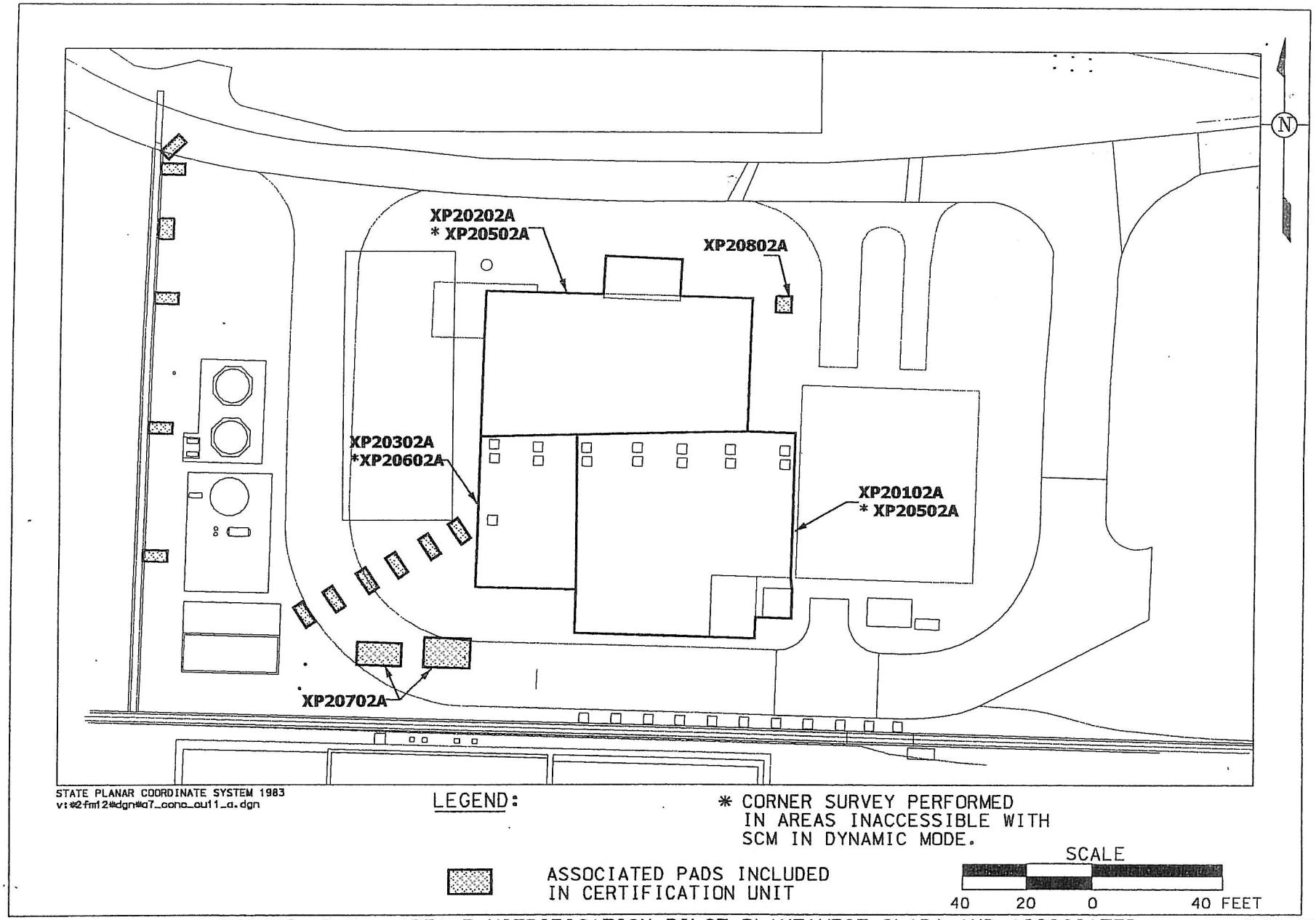


FIGURE C-5. AREA 7 VITRIFICATION PILOT PLANT(WEST SLAB) AND ASSOCIATED PADS SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-VP-C04

Fernald Closure Project

Survey Report

Vitrification Plant Pad – West

Surveys of the Vitrification Plant Pad -West were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. The Vitrification Plant Pad - West had been covered with soil and recently exposed for this survey. The area was initially referred to as the Radon Pad, the unit name appearing in several of the survey documents. The surface was highly irregular, resulting many small area surveys. Due to the geometries involved, a single "quilted" image of the activity results is impractical. However, each individual survey is evaluated for outliers in the data and to determine the locations for core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey reports XP20102A XP20202A and XP20302A are the result of the SCM operating in the rolling mode which was able to cover most of the pads. The surveys were performed at a dynamic speed of 4 in./sec. Figure 1 in each survey report provides spatially correlated results, with the (0,0) point representing the southwest corner of the surveyed area. The random distribution of survey results and the normal distribution of all data represented in Figure 2 of each survey report are indicative of natural radioactivity within the concrete. Potential outliers in survey XP20102A and XP20302A exist, however not sufficiently above the remainder of the data set to be conclusive. Those locations are identified for core sampling. No other outliers representative of added contamination are noted. During survey XP20102A, the anode wire of the detector failed. The detector was replaced and all quality control checks were performed and verified that the system was operating in a consistent manner. Review of the survey 2-dimensional plot indicates that one area appears to be at lower average value that the remaining area. Reviews indicate that this area was not unique to the new detector. The lower average activity may be a result of concrete surface conditions (finished vs. rough). All regions exhibit normal distributions.

Survey reports XP20402A, XP20502A, XP20602A, XP20702A and XP20802A are the result of the SCM operating in the corner mode, used to survey those areas that are not accessible to the SCM in the rolling mode. These surveys were performed with a static measurement time of 4 seconds. The results presented in Figure 1 in each survey report are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey reports if necessary. The random distribution of survey results and the normal distribution of all data represented in Figure 2 of each survey report are indicative of natural radioactivity within the concrete. One potential outlier in survey XP20802A exists, however not sufficiently above the remainder of the data set to

be conclusive. This location is identified for core sampling. No other outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Vitrification Plant Pad – West from SCM rolling surveys are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
XP20102A	11,059	17	(1620,1475)	(160,20)
XP20202A	11,041	21	(2095,1375)	(15,10)
XP20302A	10,755	26	(485,275)	(140,100)

The locations of the three highest readings obtained on the associated pads from static surveys are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
XP20802A	5,898	63	(220,360)	(5,155)
XP20702A	5,056	29	(485,95)	(0,90)
XP20802A	5,056	86	(720,205)	(5,0)

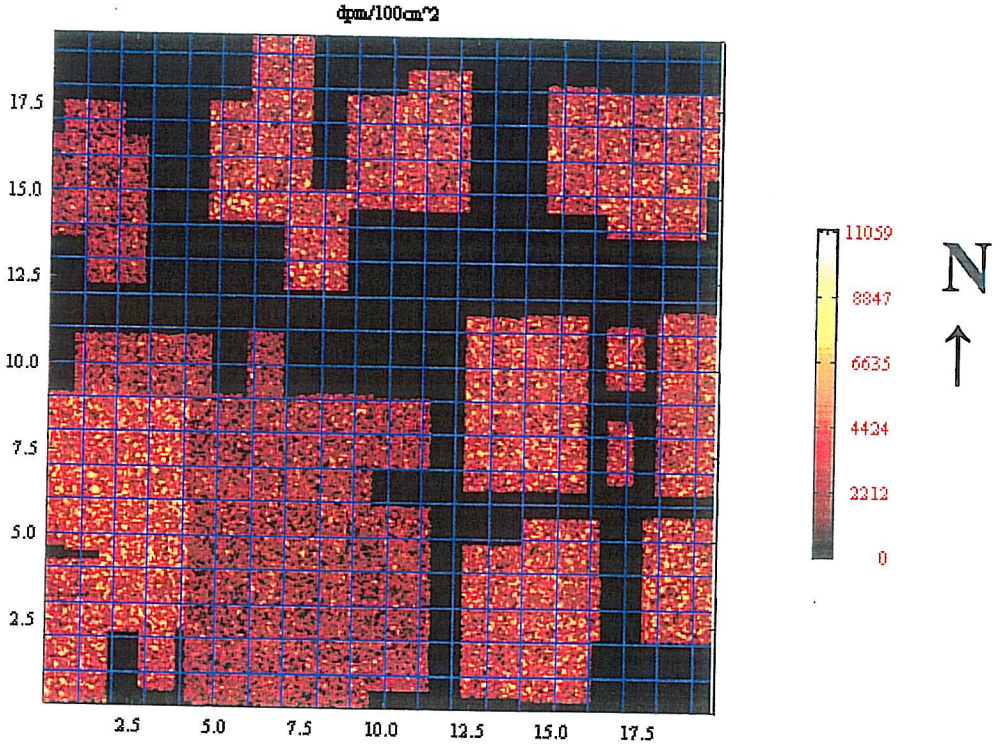


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². The (0,0) point is the Southwest corner of the concrete pad.

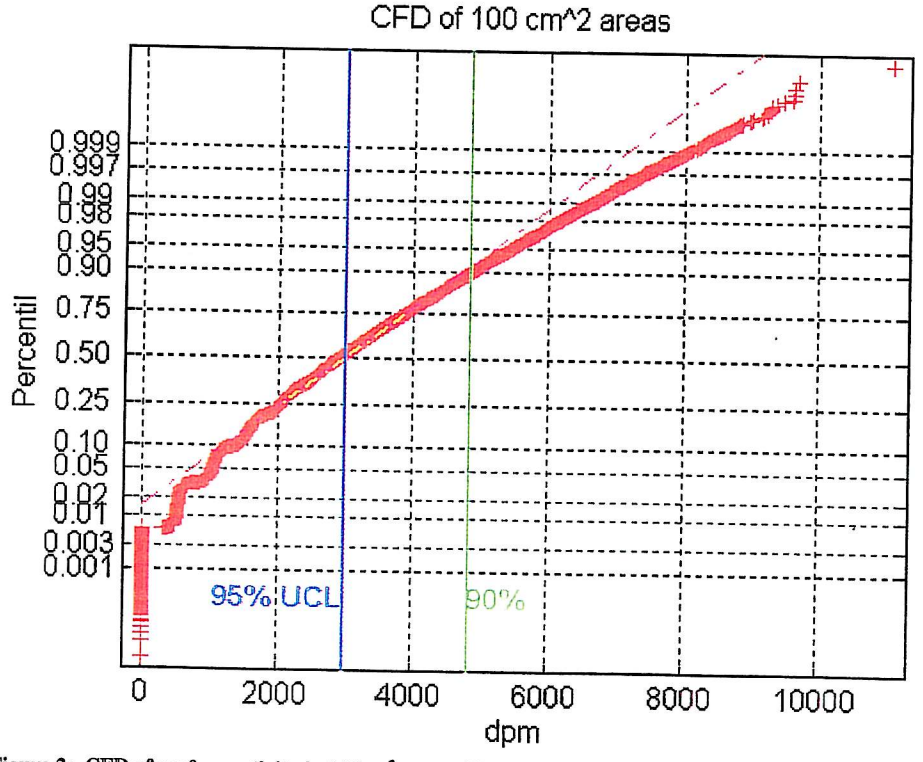


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

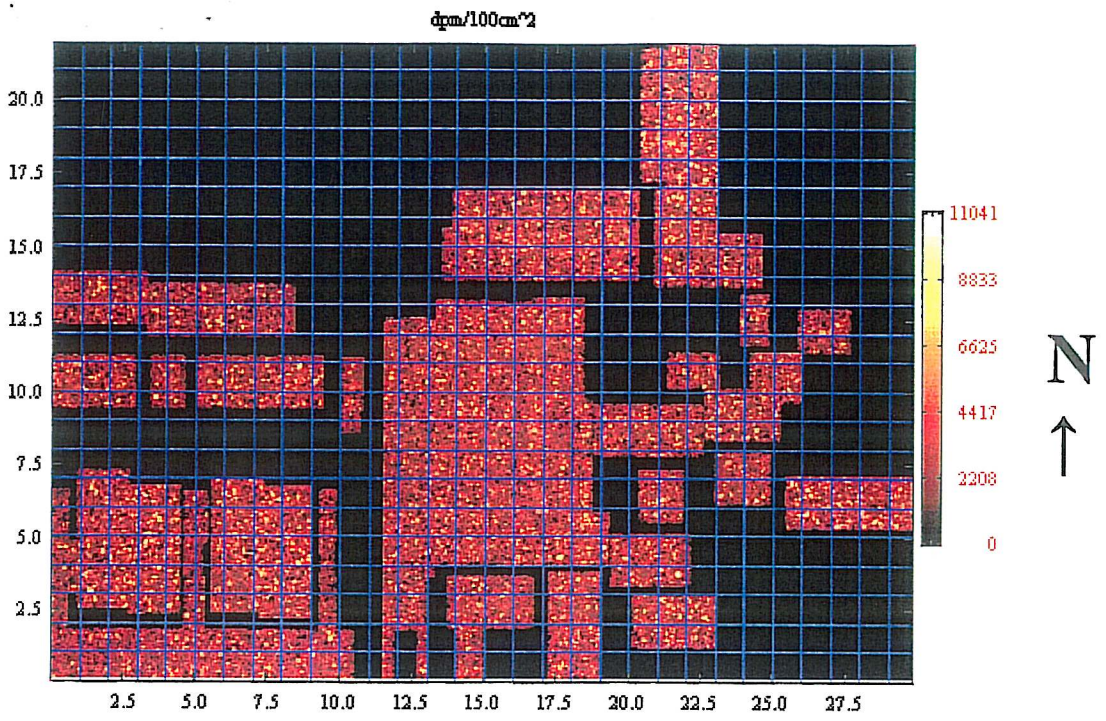


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². The (0,0) point is the Southwest corner of the concrete pad.

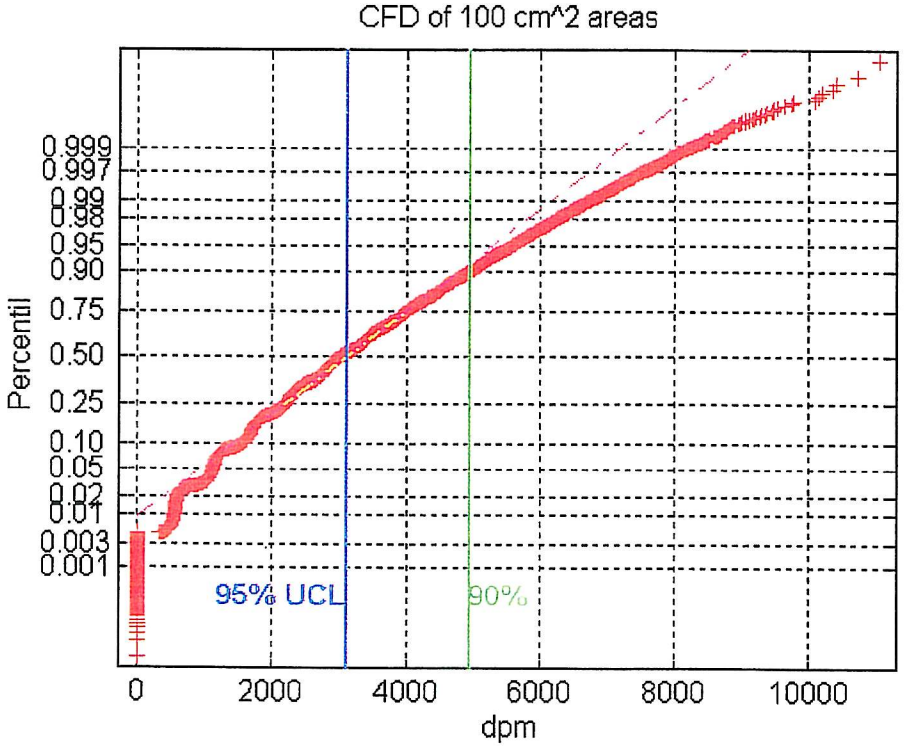


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

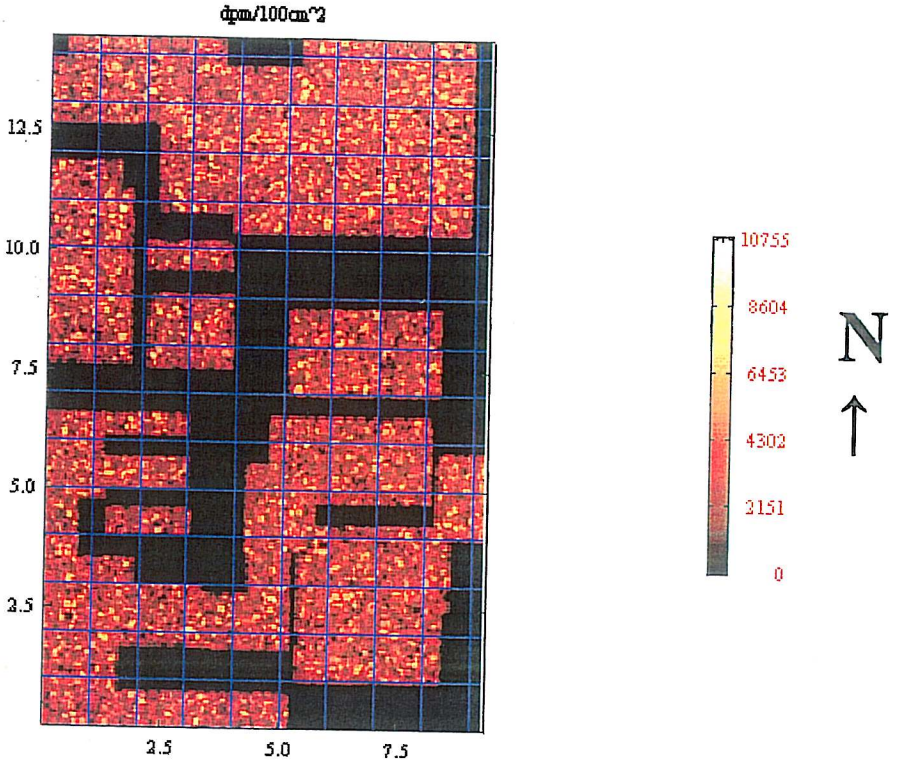


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². The (0,0) point is the Southwest corner of the concrete pad.

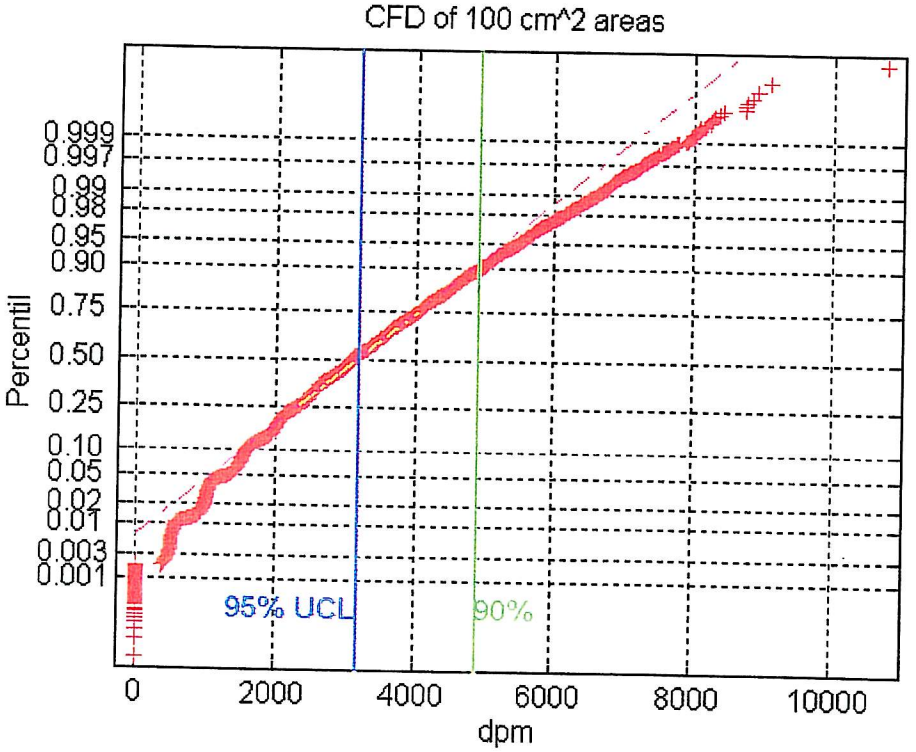


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

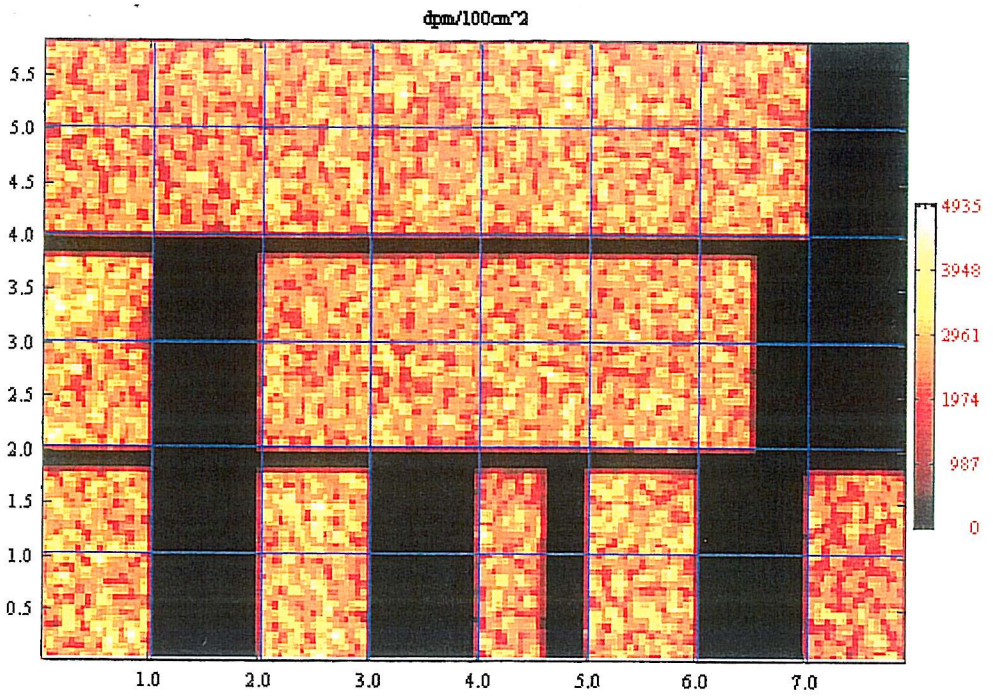


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

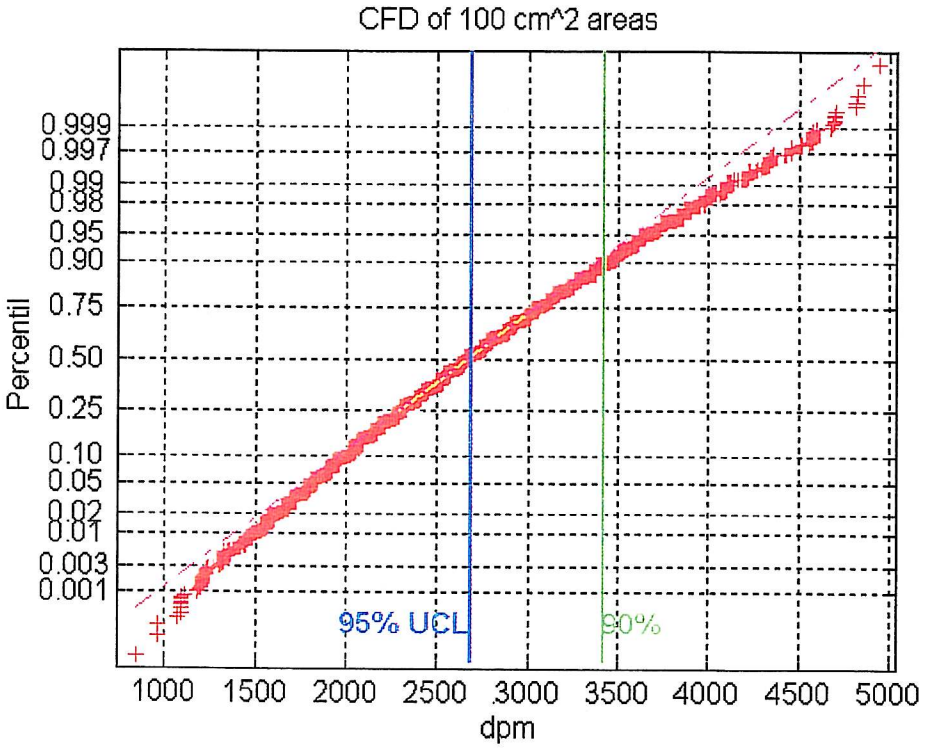


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

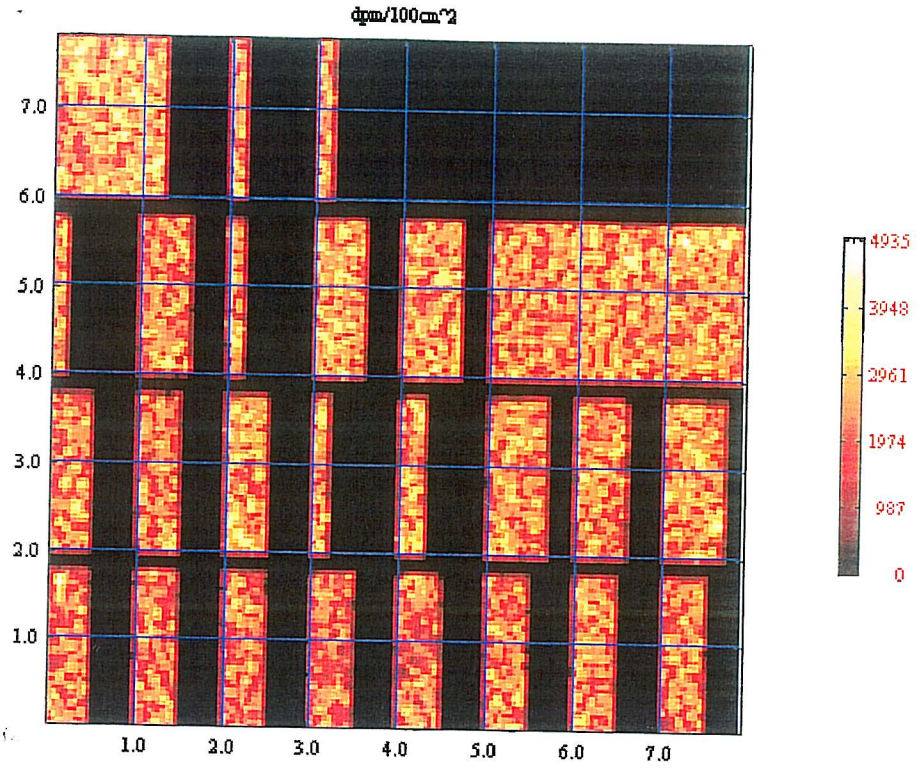


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

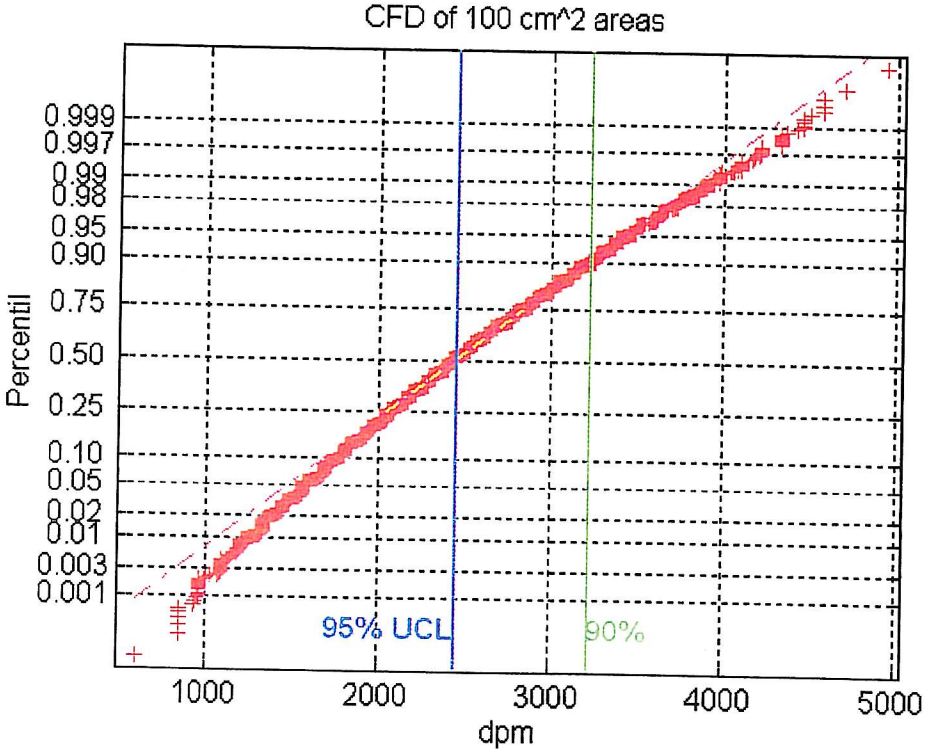


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

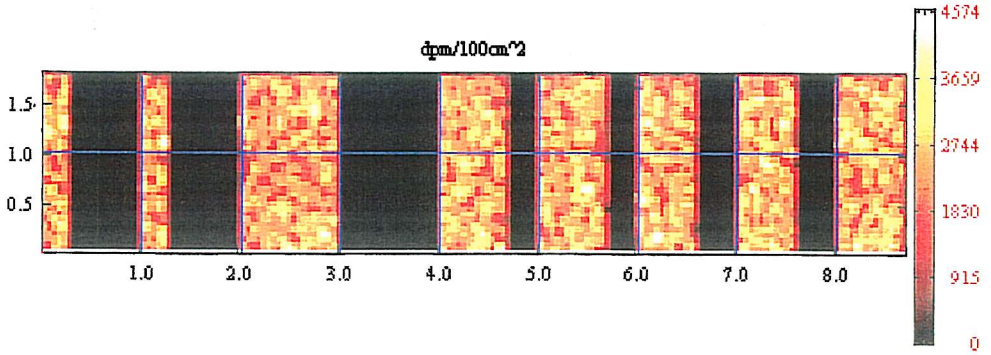


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

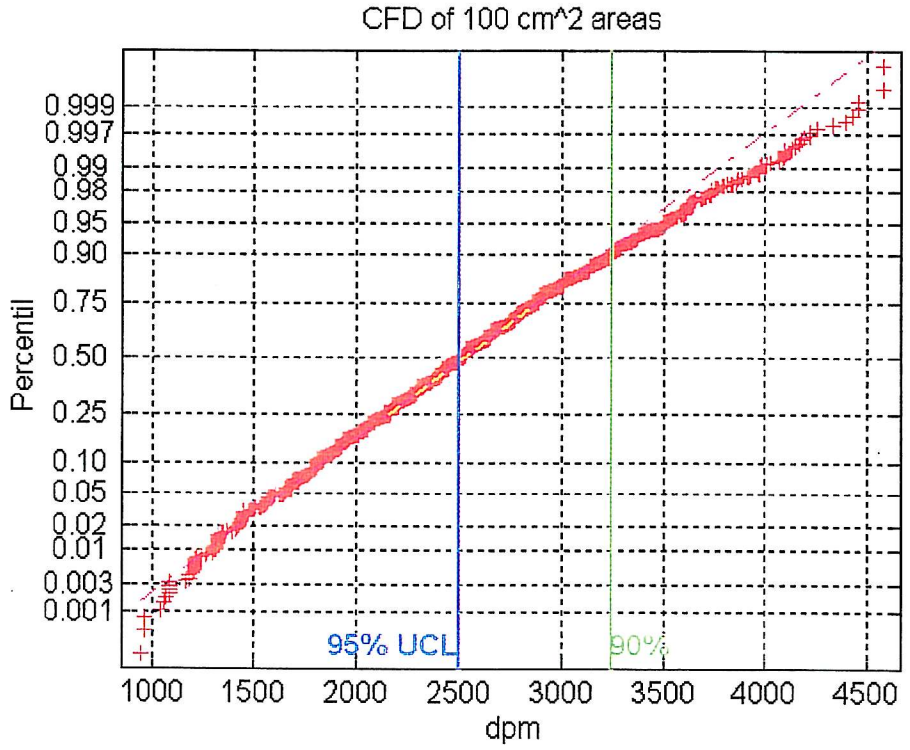


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

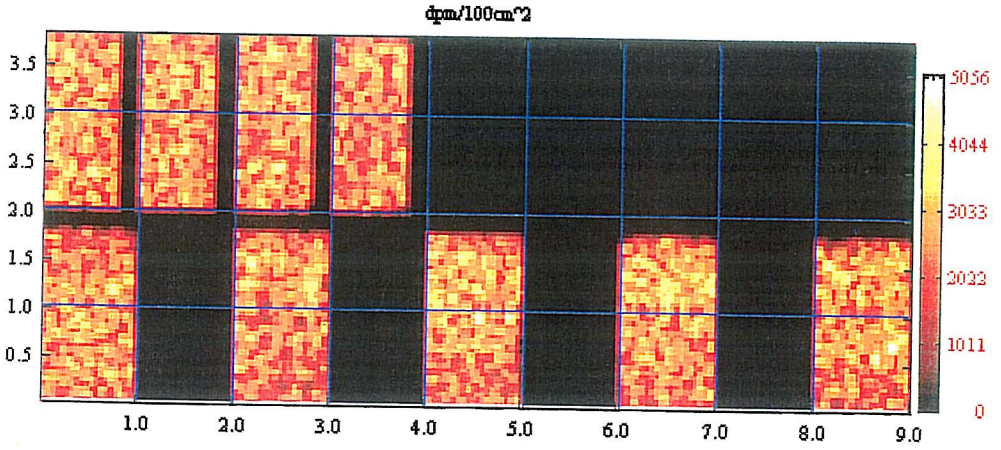


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

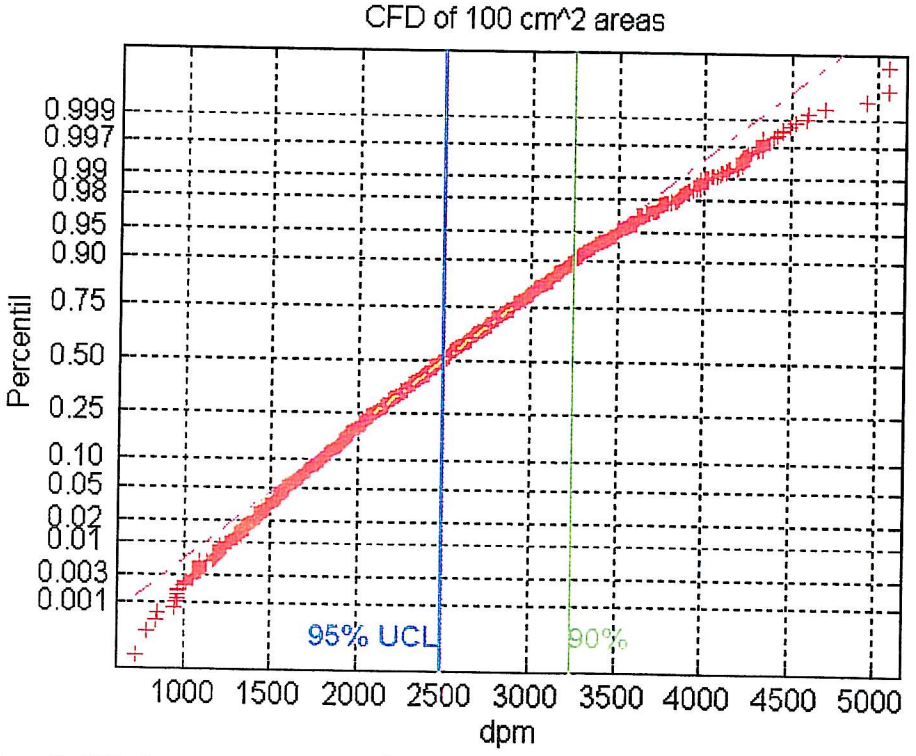


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

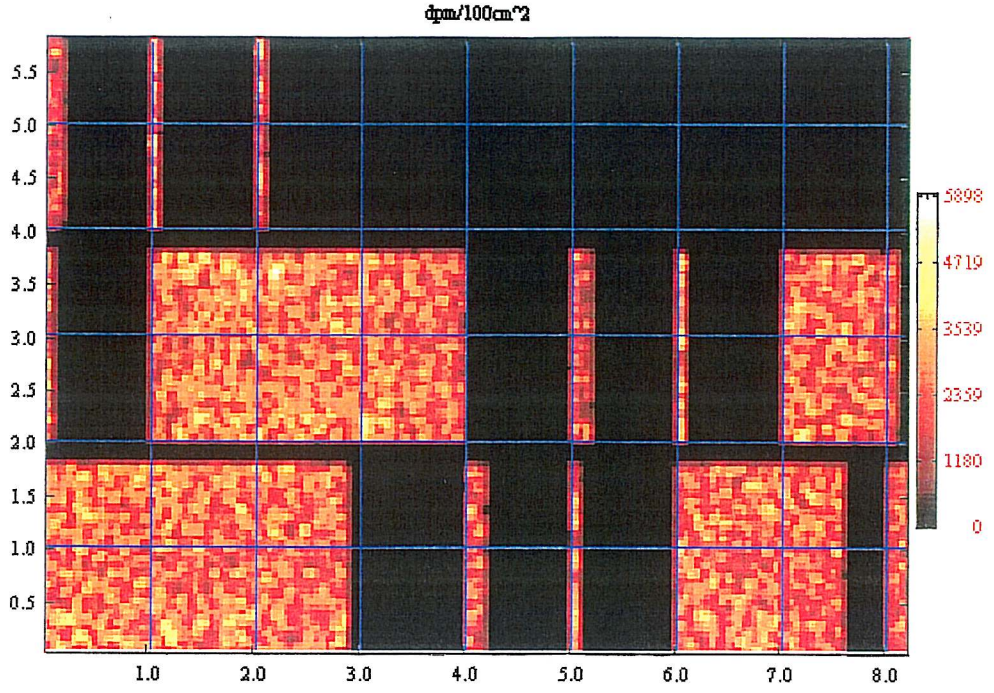


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

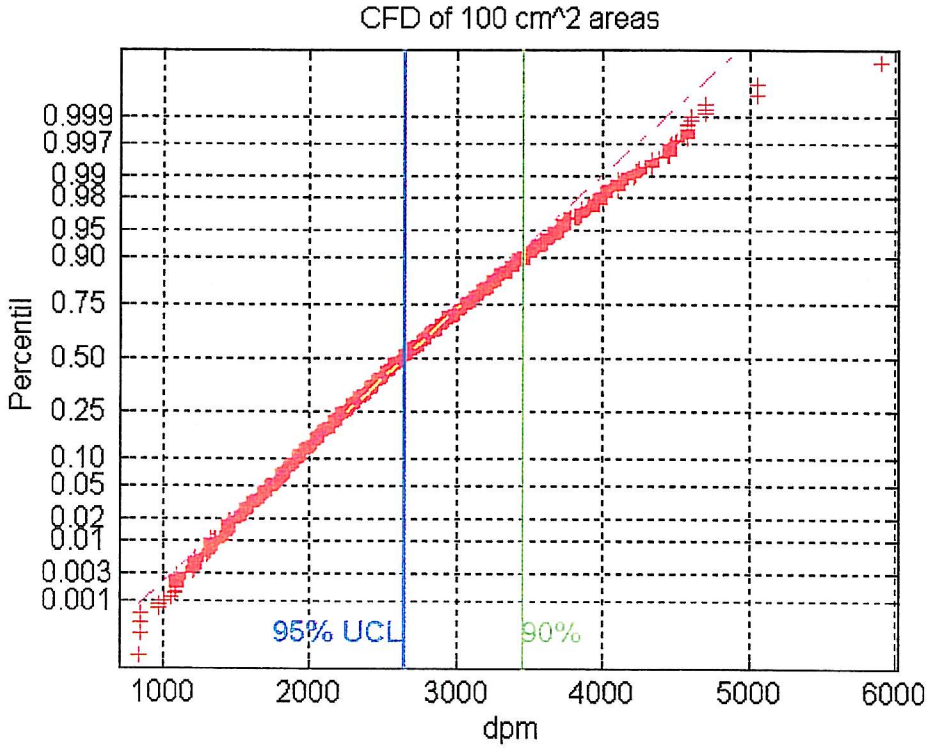
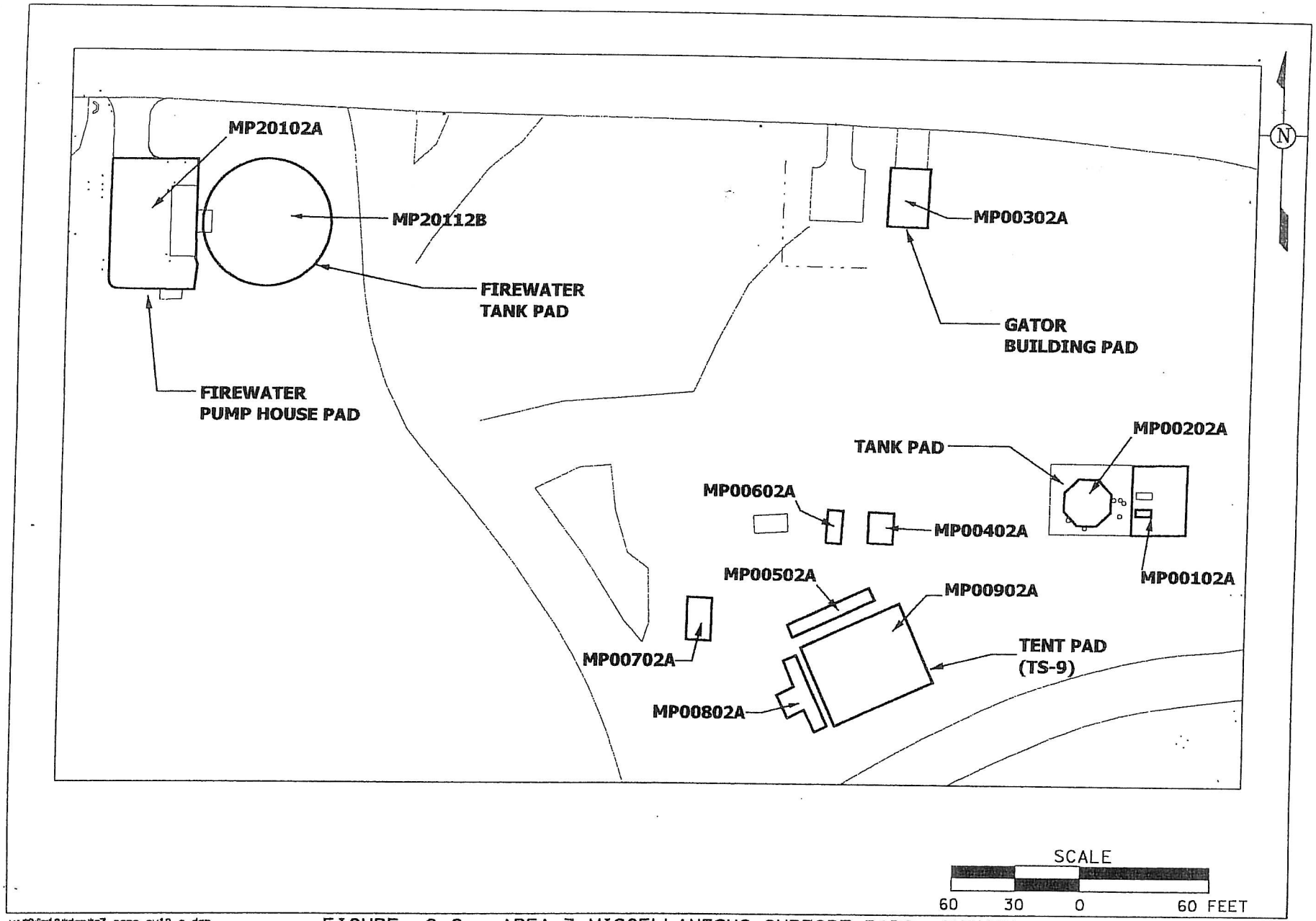


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².



v:#2fm12#dgn#a7_conc_cu12_a.dgn
STATE PLANAR COORDINATE SYSTEM 1983

FIGURE C-6. AREA 7 MISCELLANEOUS SUPPORT PADS. SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-7HK-C01

19-OCT-2006

006295

Fernald Closure Project

Survey Report

Ellis Island

Surveys of the Ellis Island pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP00102A is the result of the SCM operating in the corner mode. The corner mode was used since the pad was small with no area large enough to warrant the system rolling mode operation. The survey was performed with a static measurement time of 4 seconds. The results presented in Figure 1 are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey reports if necessary. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Ellis Island pad are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP00102A	4097	5	(120,25)	(5,20)
MP00102A	4093	22	(335,10)	(0,5)
MP00102A	4078	23	(345,160)	(0,155)

Survey Report

Survey Location:	ELLIS ISLAND
Survey Unit Area Code:	N0099X
Survey File Name:	MP00102A
Survey Date:	May 18, 2006
Survey Equipment:	SCM5
Detector(s):	C180
Survey Mode:	Static 4 sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	C180: 32.4%
SIMS Version:	V5.3l
SCM Version:	V3.4a
Survey Results	
Maximum 100 cm^2:	**4,097 dpm/100 cm^2**
Maximum m^2 Average:	2,553 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012651MP00102A

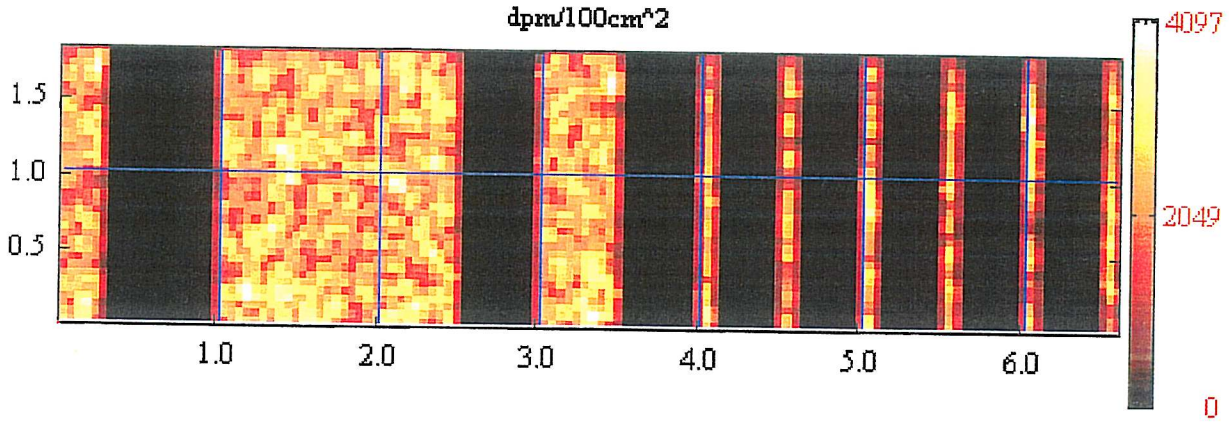


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

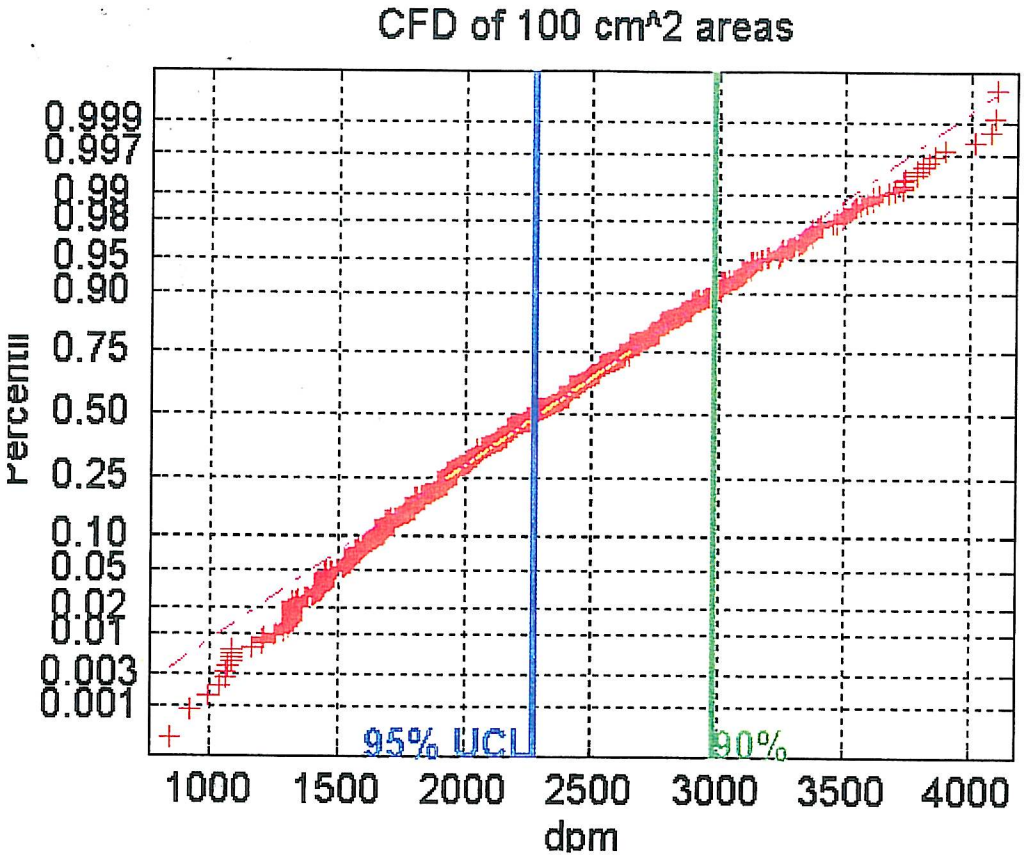


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

Fernald Closure Project

Survey Report

Ellis Island Storage Pad A

Surveys of the Ellis Island Storage Pad A were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP00402A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Ellis Island Storage Pad A are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP00402A	9314	4	(55,390)	(50,385)
MP00402A	7945	3	(210,415)	(25,410)
MP00402A	7916	1	(250,510)	(245,65)

Survey Report

Survey Location:	ELLIS ISLAND STG PAD A
Survey Unit Area Code:	N0099X
Survey File Name:	MP00402A
Survey Date:	May 19, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**9,314 dpm/100 cm^2**
Maximum m^2 Average:	3,178 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630MP00402A

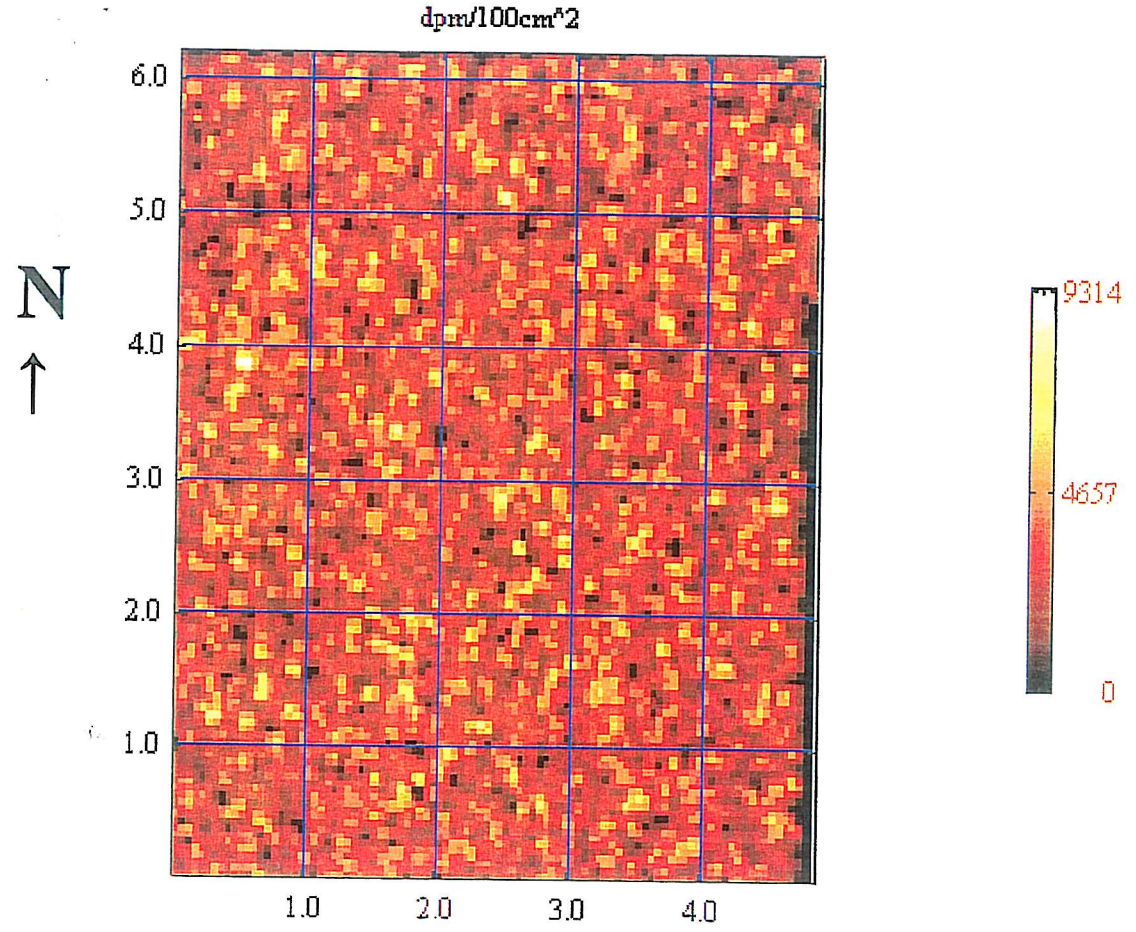


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

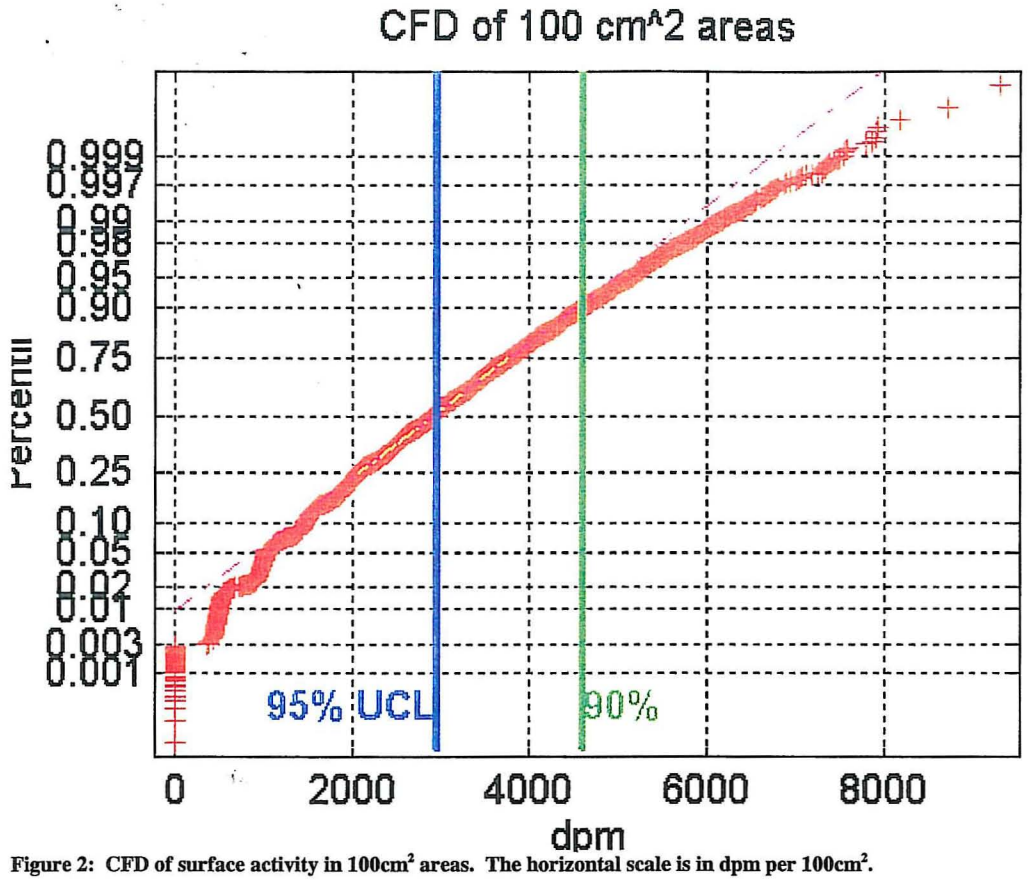


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

Ellis Island Storage Pad B

Surveys of the Ellis Island Storage Pad B were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP00602A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Ellis Island Storage Pad B are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP00602A	7965	1	(155,385)	(150,380)
MP00602A	7491	1	(120,440)	(115,435)
MP00602A	7349	1	(175,340)	(170,335)

Survey Report

Survey Location:	ELLIS ISLAND STG PAD B
Survey Unit Area Code:	N0099X
Survey File Name:	MP00602A
Survey Date:	May 19, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**7,965 dpm/100 cm^2**
Maximum m^2 Average:	3,097 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630MP00602A

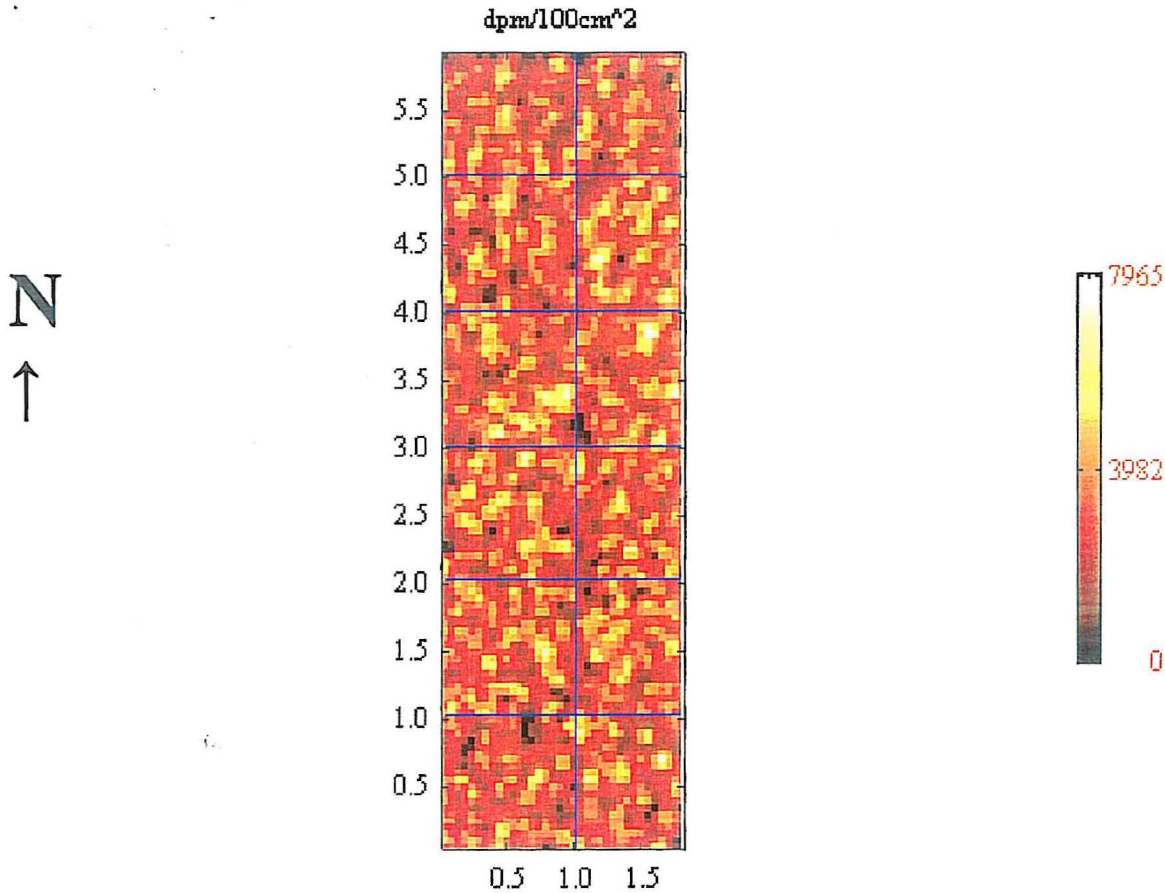


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

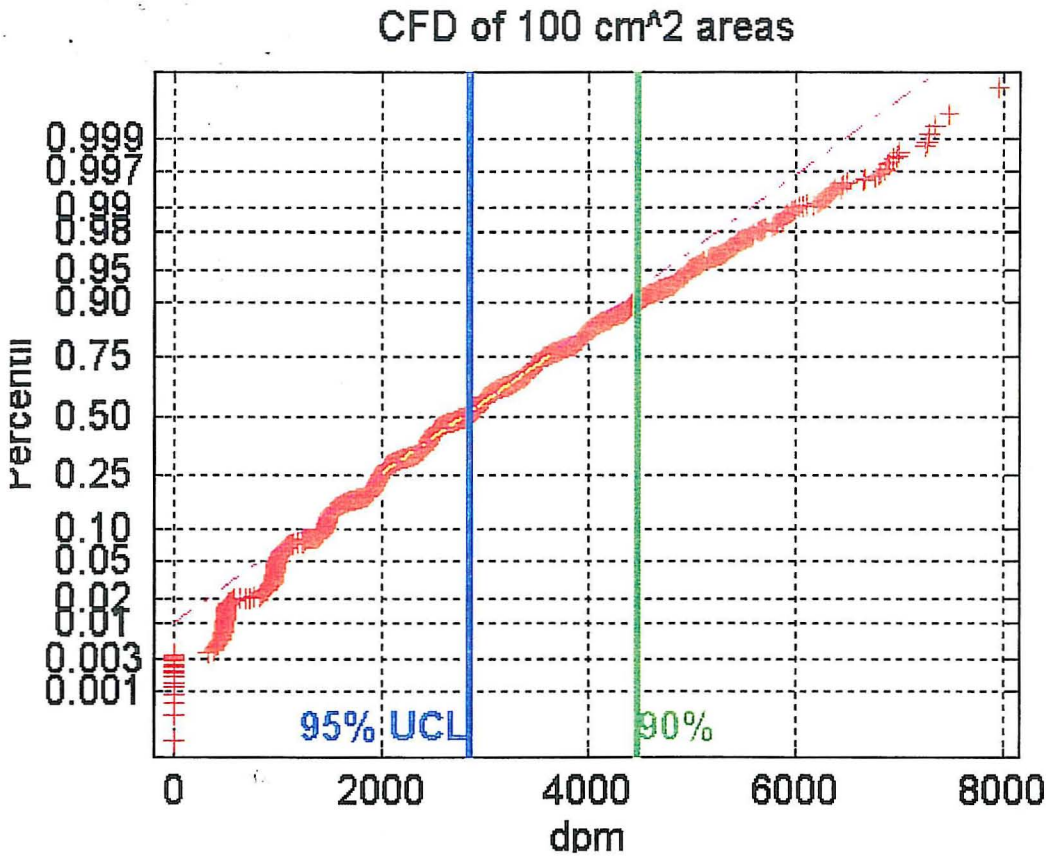


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

Ellis Island Storage Pad C

Surveys of the Ellis Island Storage Pad C were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP00702A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Ellis Island Storage Pad C are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP00702A	8944	1	(365,45)	(360,40)
MP00702A	8119	1	(30,135)	(25,130)
MP00702A	8059	3	(330,365)	(145,180)

Survey Report

Survey Location:	ELLIS ISLAND STG PAD C
Survey Unit Area Code:	N0099X
Survey File Name:	MP00702A
Survey Date:	May 19, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**8,944 dpm/100 cm^2**
Maximum m^2 Average:	3,231 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630MP00702A

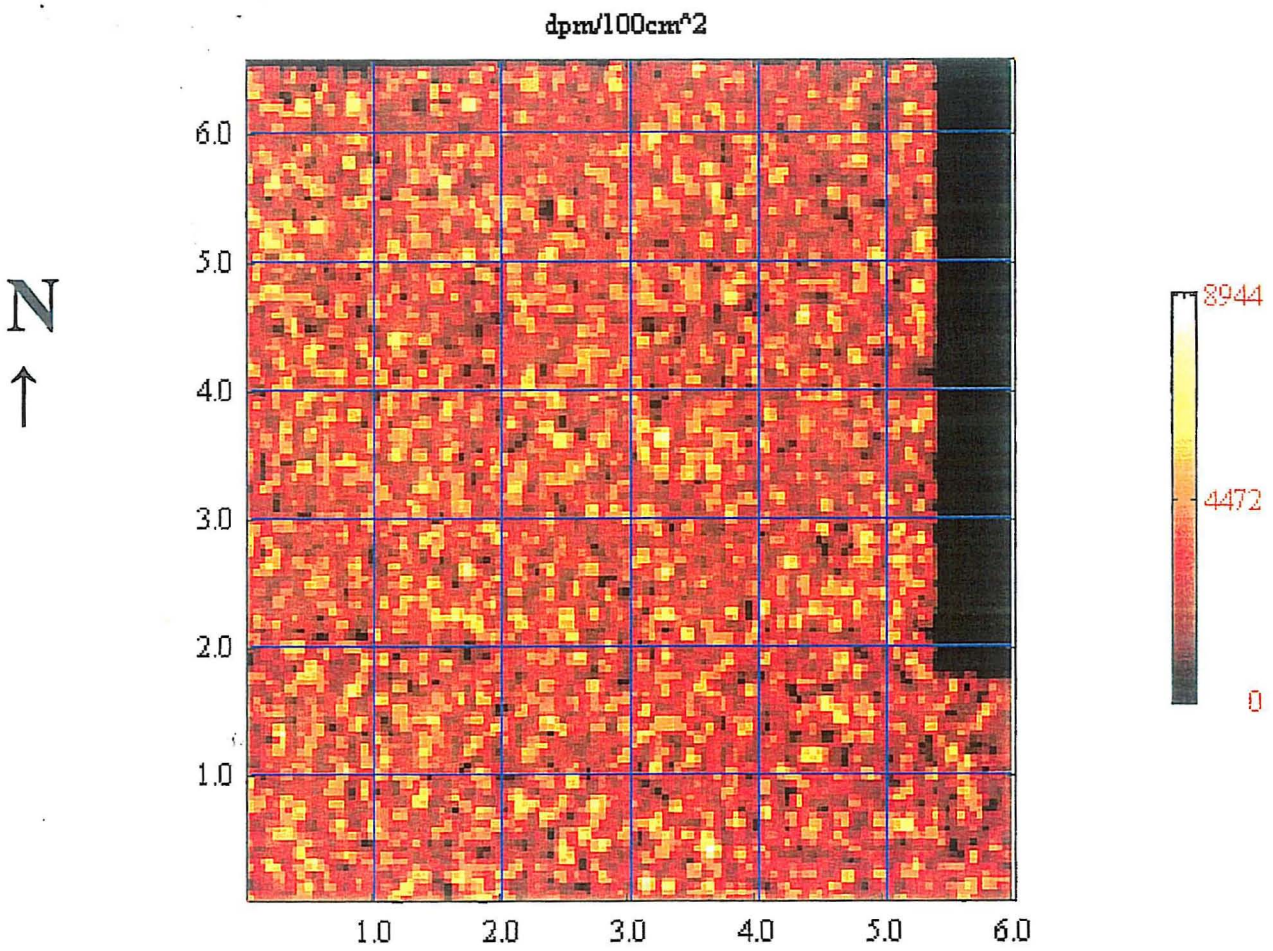


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

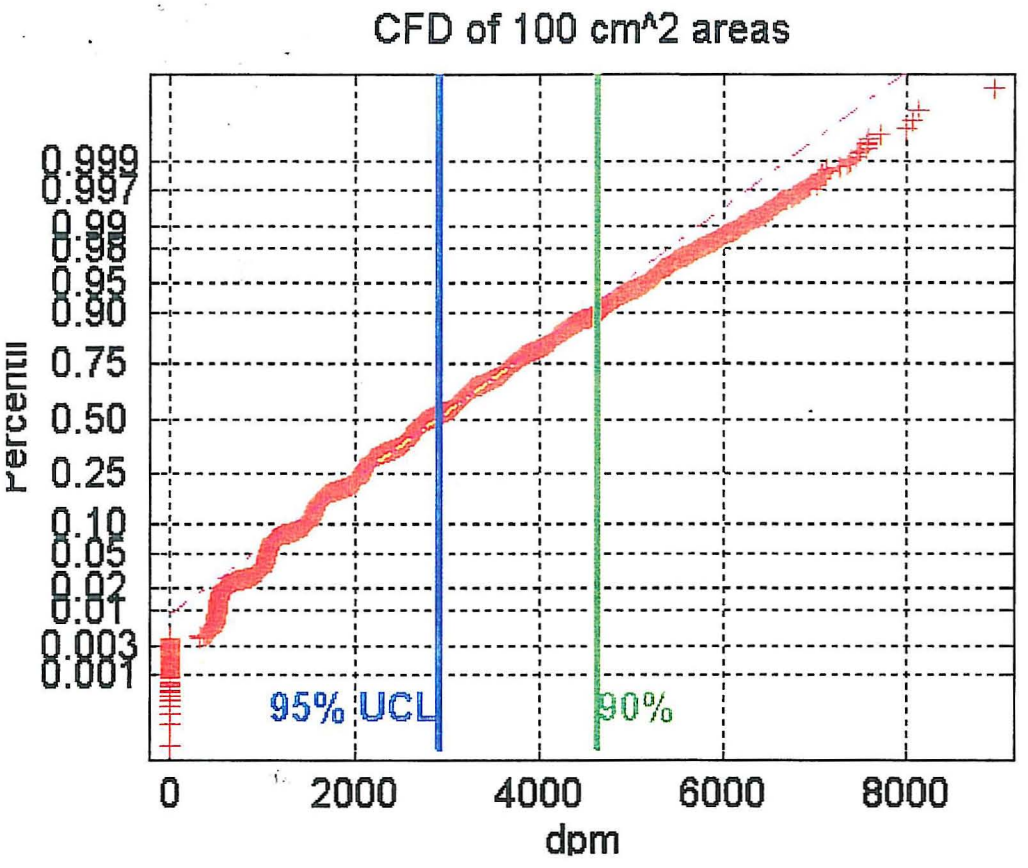


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

Ellis Island Support Pad 1

Surveys of the Ellis Island Support Pad 1 were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP00502A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Ellis Island Support Pad 1 are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP00502A	9667	1	(680,20)	(675,15)
MP00502A	9110	1	(750,35)	(745,30)
MP00502A	8572	1	(805,55)	(800,50)

Survey Report

Survey Location:	ELLIS ISLAND SUP PAD 1
Survey Unit Area Code:	N0099X
Survey File Name:	MP00502A
Survey Date:	May 19, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**9,667 dpm/100 cm^2**
Maximum m^2 Average:	3,308 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630MP00502A

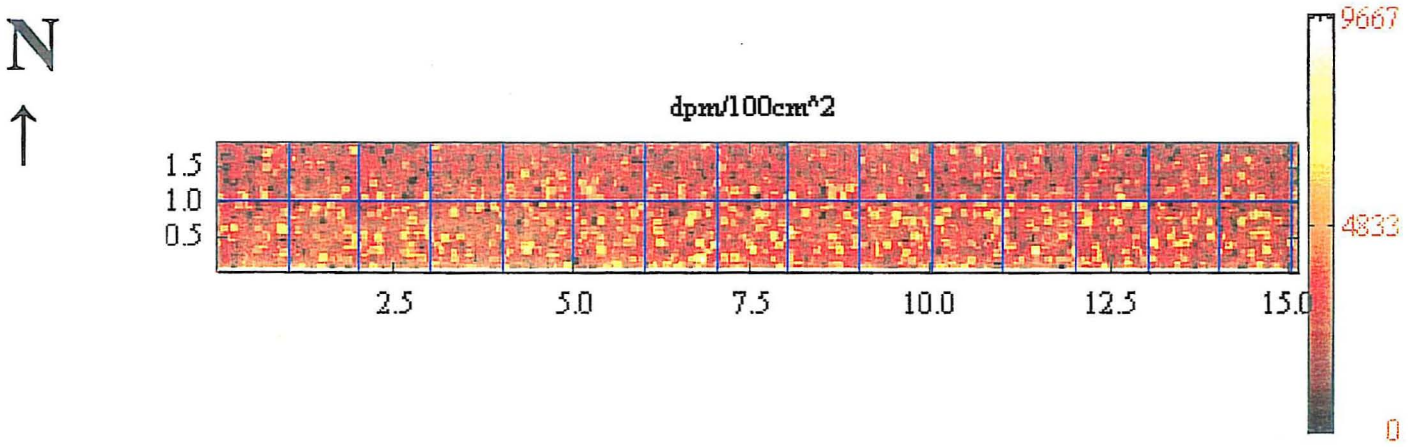


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

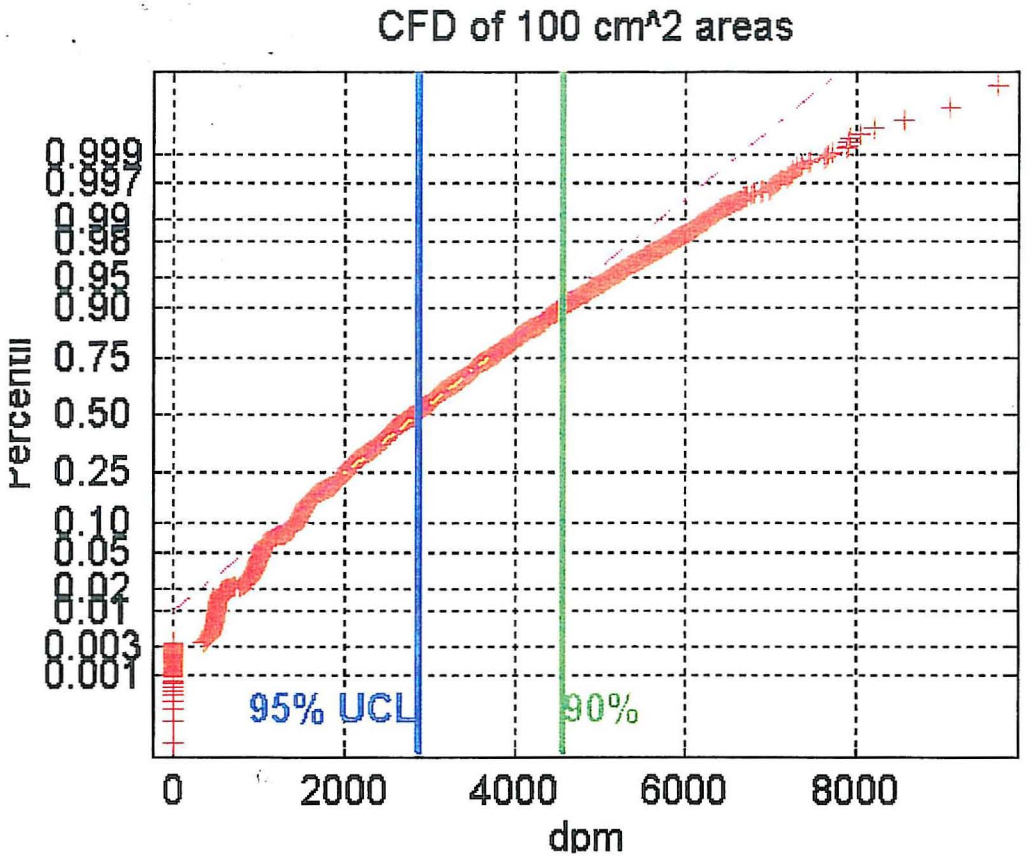


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

Ellis Island Support Pad 2

Surveys of the Ellis Island Support Pad 2 were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP00802A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Ellis Island Support Pad 2 are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP00802A	8109	2	(210,125)	(110,120)
MP00802A	7914	2	(175,90)	(75,85)
MP00802A	7879	2	(265,185)	(165,180)

Survey Report

Survey Location:	ELLIS ISLAND SUP PAD 2
Survey Unit Area Code:	N0099X
Survey File Name:	MP00802A
Survey Date:	May 19, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**8,109 dpm/100 cm^2**
Maximum m^2 Average:	3,187 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630MP00802A

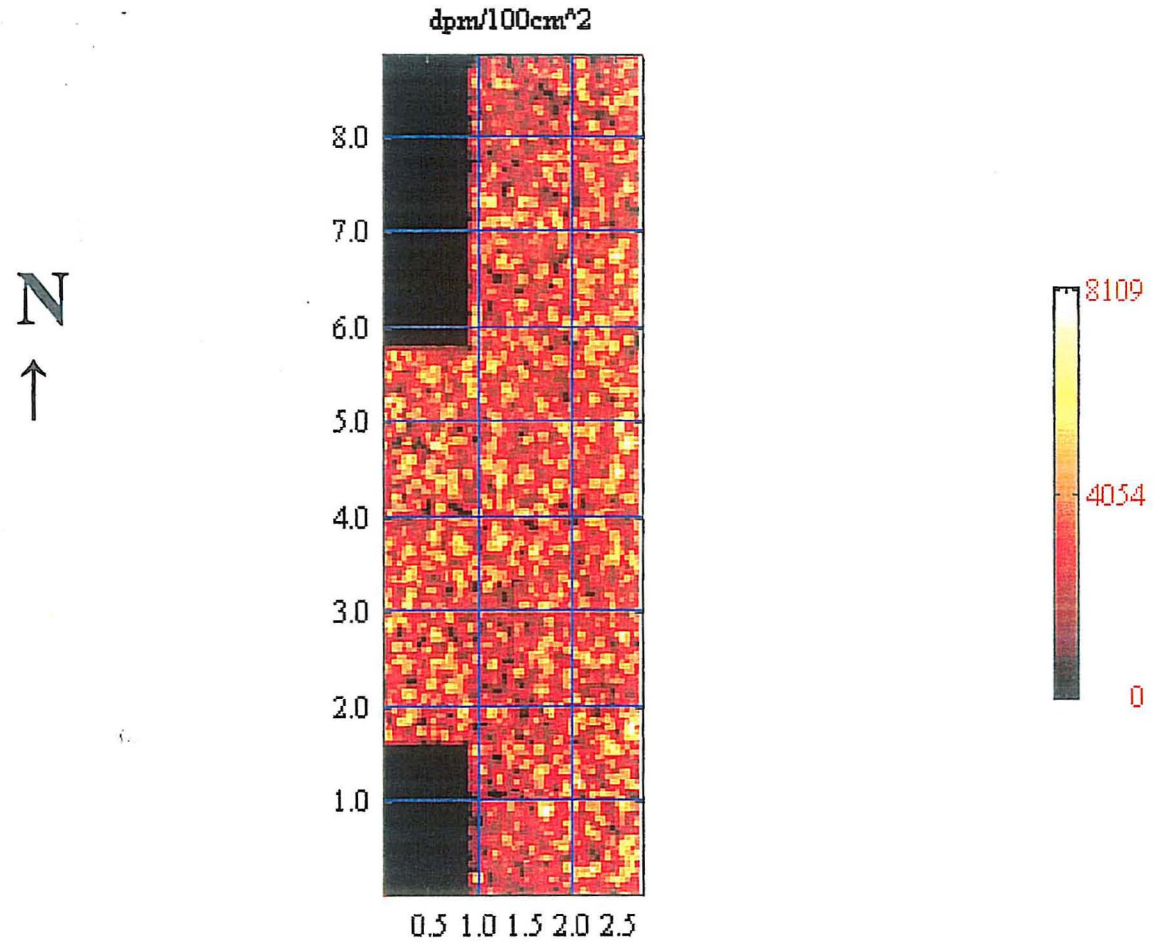


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

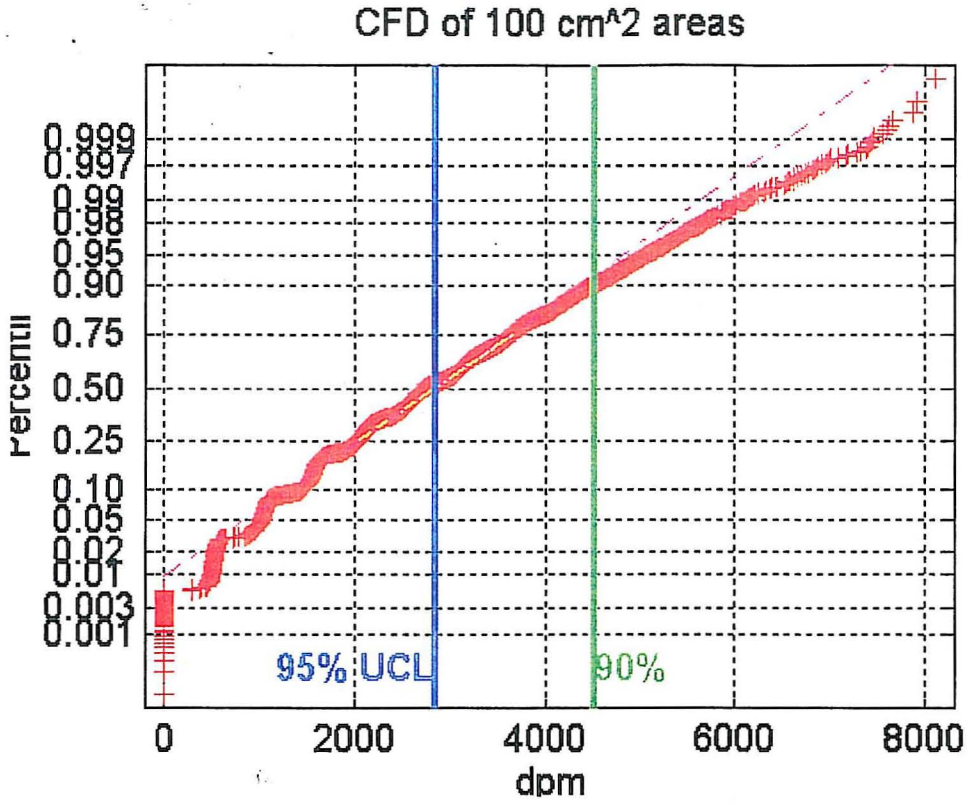


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

Surge Tank Pad

Surveys of the Surge Tank Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP20102A is the result of the SCM operating in the rolling mode. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 provides spatially correlated results from the survey with the (0,0) point representing the southwest corner of the survey area. Figure 2 provides a Cumulative Frequency Distribution Plot (CFD) of the data from survey MP20102A. The random distribution of survey results and the normal distribution of all data represented in Figure 2 are indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

Survey report MP20112B is the result of the SCM operating in the corner mode, used to survey those areas that are not accessible to the SCM in the rolling mode. The survey was performed with a static measurement time of 4 seconds. Figure 3 provides the non-spatial results. The low activity areas at the top of the survey strips are due to the detector extending above the surface being measured. That portion of the detector extending above the concrete was shielded to eliminate any response to background activity. The surveys are not geometrically stitched, however specific areas of elevated surface activity can be traced field location by use of the maps included in the Survey Record Forms. Figure 2 provides a Cumulative Frequency Distribution Plot (CFD) of the data from survey MP20112A. The random distribution of survey results and the normal distribution of all data represented in Figure 2 are indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the ~~TTA~~ Surge Tank Pad are identified in the table below. The first two values were taken from the rolling survey while the third value was obtained from the corner survey.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP20102A	9322	7	(730,265)	(70,80)
MP20102A	9306	6	(805,1305)	(145,670)
MP20112B	4334	210	(610,410)	(5,5)

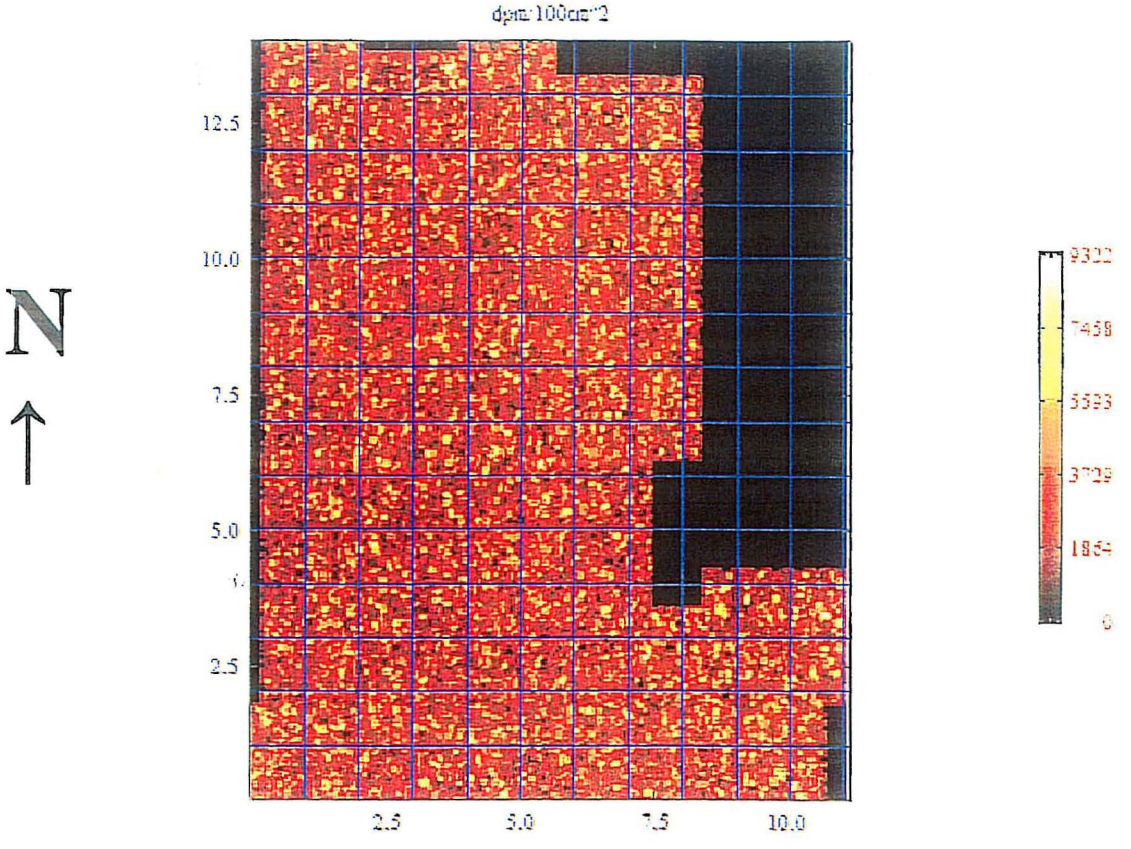


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

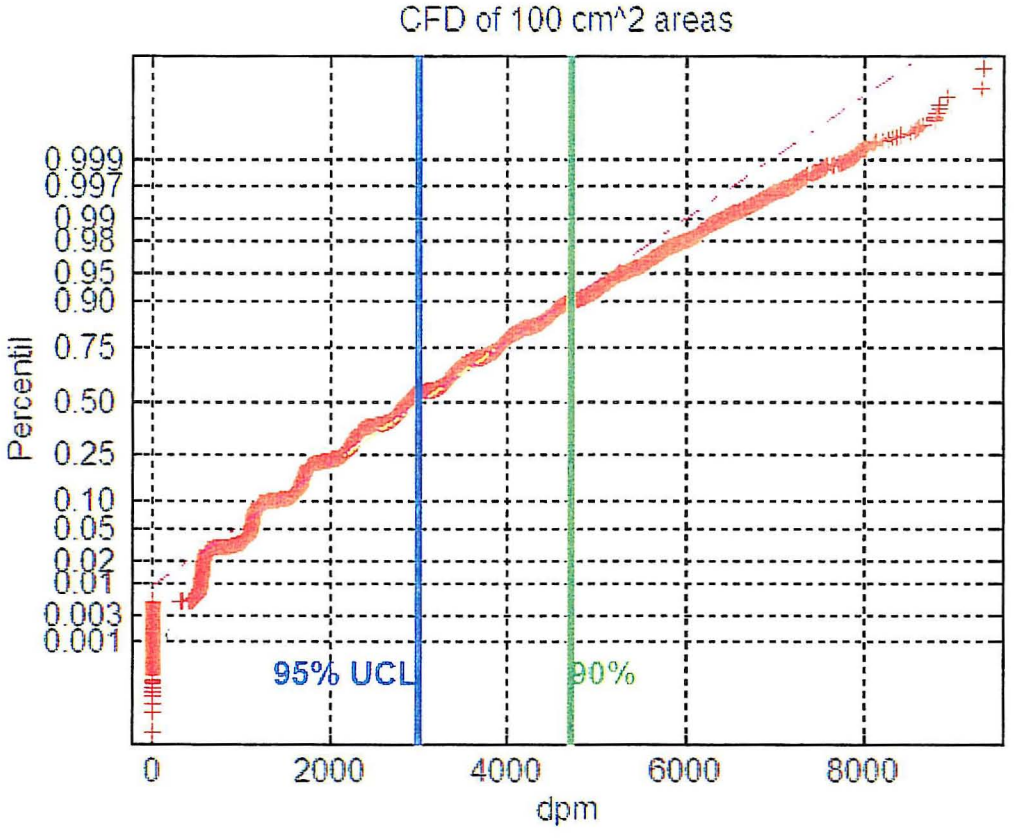


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x10^4 per 100cm^2.

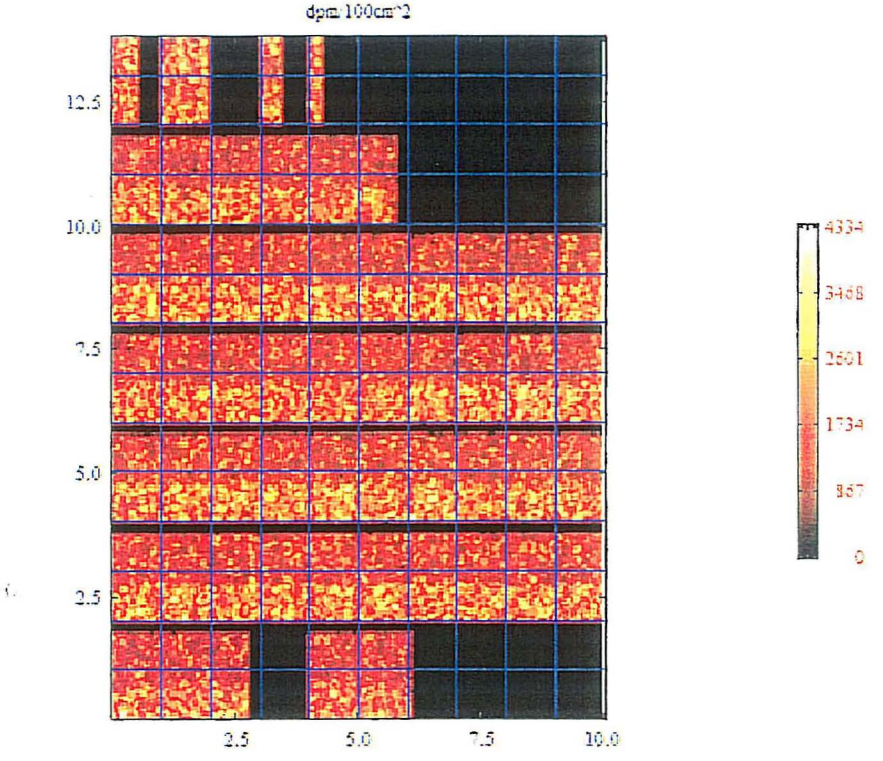


Figure 3: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

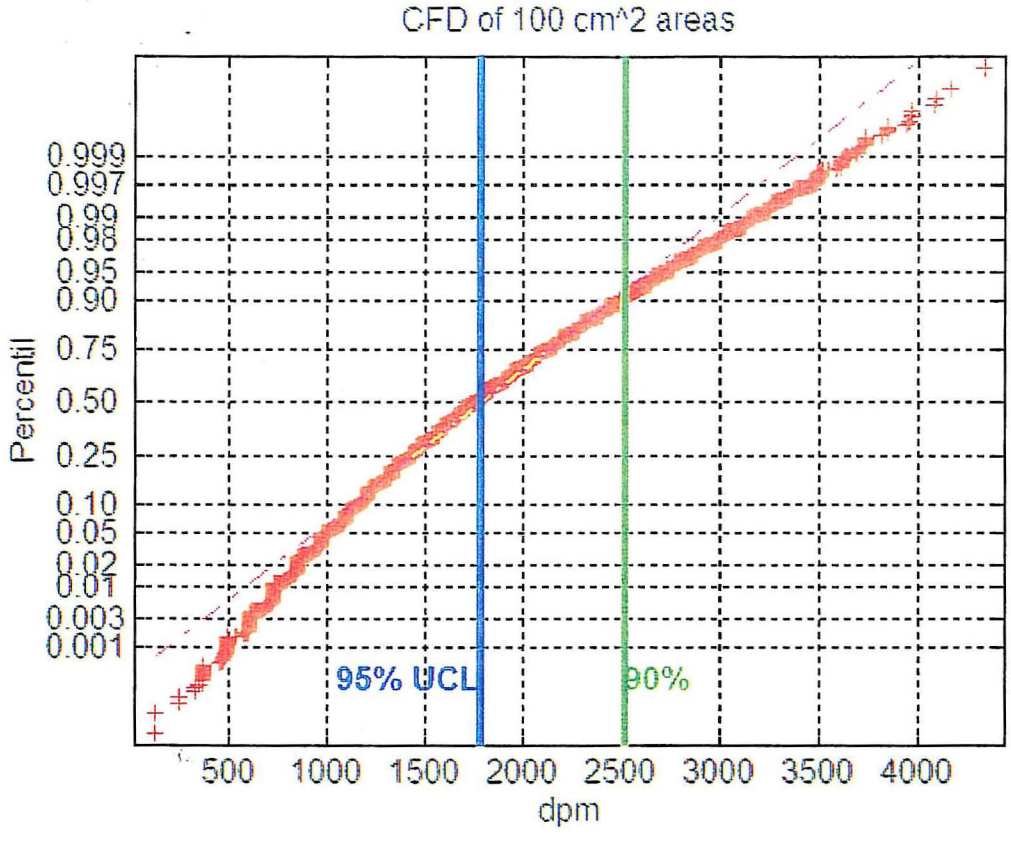


Figure 4: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

Ellis Island Tent Pad

Surveys of the Ellis Island Tent Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP00902A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. During the survey, the detector mylar was damaged requiring detector replacement. All quality control checks performed on both detectors were within the normal range, indicating consistent operation of the SCM during the entire survey. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Ellis Island Tent Pad are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP00902A	9967	9	(200,745)	(165,125)
MP00902A	9855	15	(775,260)	(280,90)
MP00902A	9838	3	(510,935)	(105,135)

Survey Report

Survey Location:	ELLIS ISLAND - TENT PAD
Survey Unit Area Code:	N0099X
Survey File Name:	MP00902A
Survey Date:	May 20, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**9,967 dpm/100 cm^2**
Maximum m^2 Average:	3,581 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630MP00902A

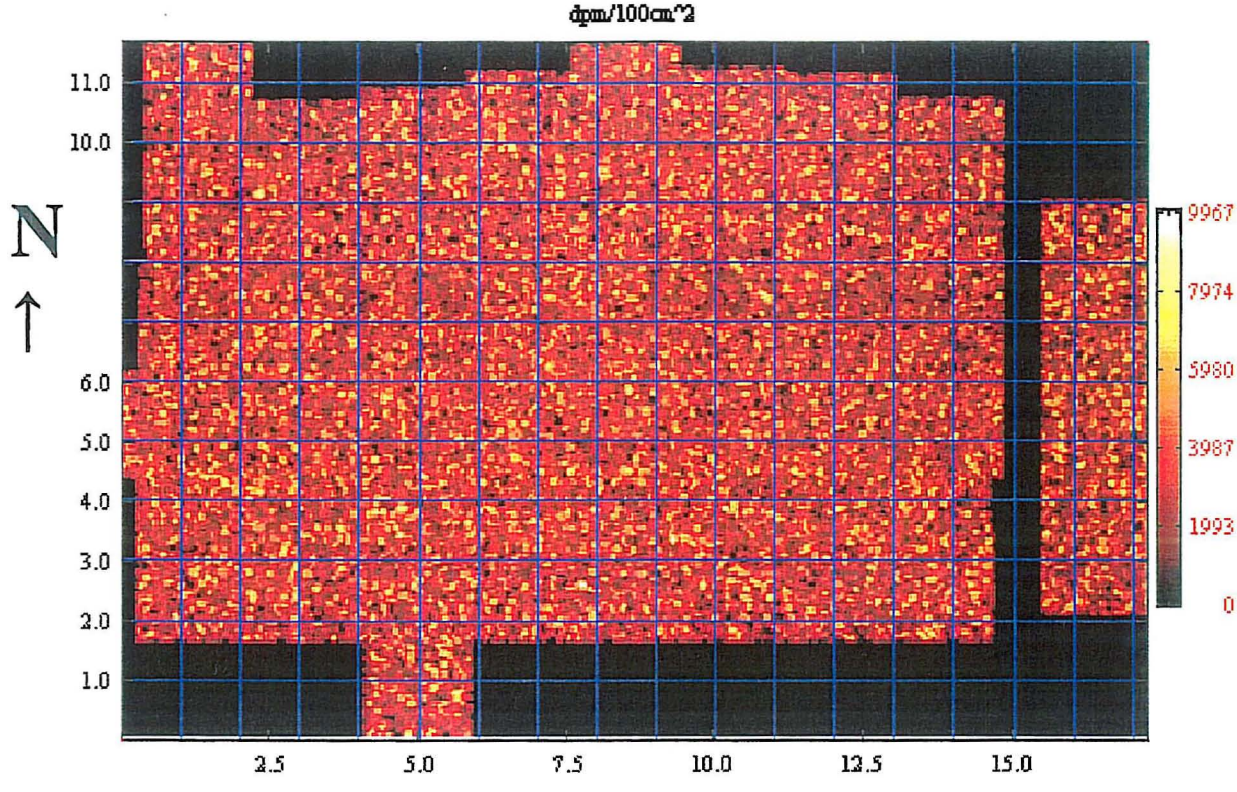


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad..

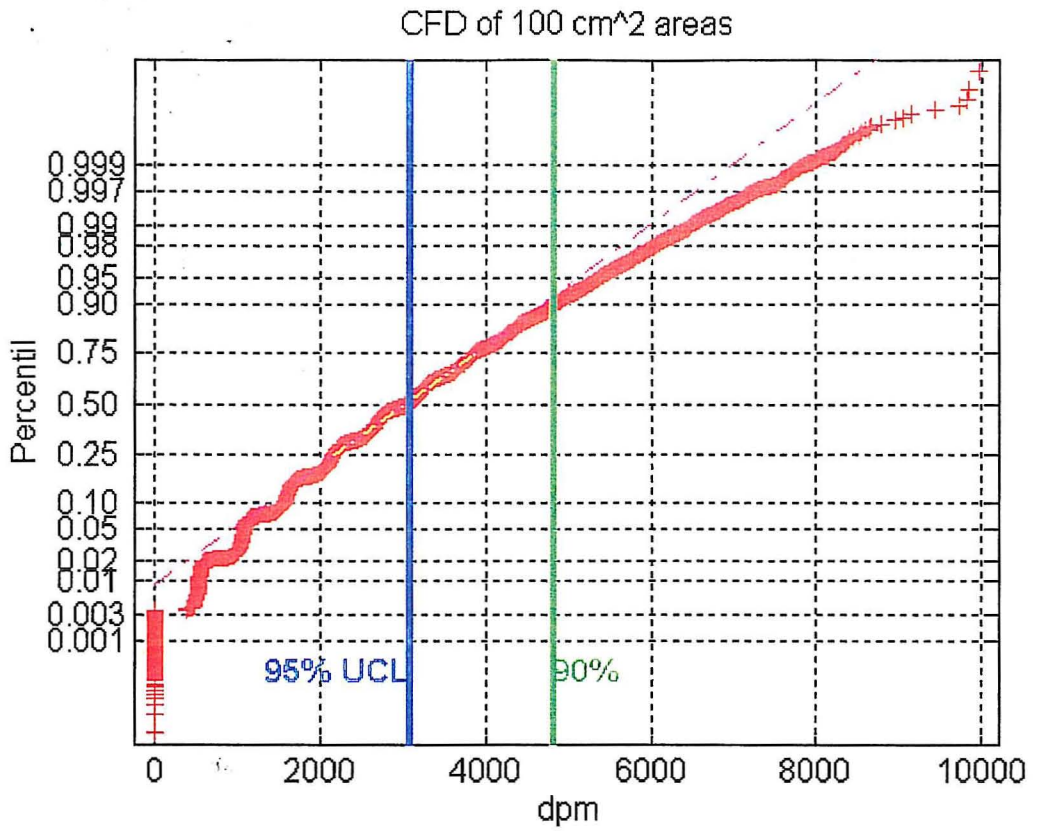


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

Fernald Closure Project

Survey Report

Ellis Island Gator Pad

Surveys of the Gator Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP00302A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Gator Pad are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP00302A	9184	1	(25,555)	(20,140)
MP00302A	8723	4	(20,330)	(15,315)
MP00302A	8659	4	(160,295)	(155,280)

Survey Report

Survey Location:	GATOR PAD
Survey Unit Area Code:	N0099X
Survey File Name:	MP00302A
Survey Date:	May 18, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**9,184 dpm/100 cm^2**
Maximum m^2 Average:	3,477 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630MP00302A

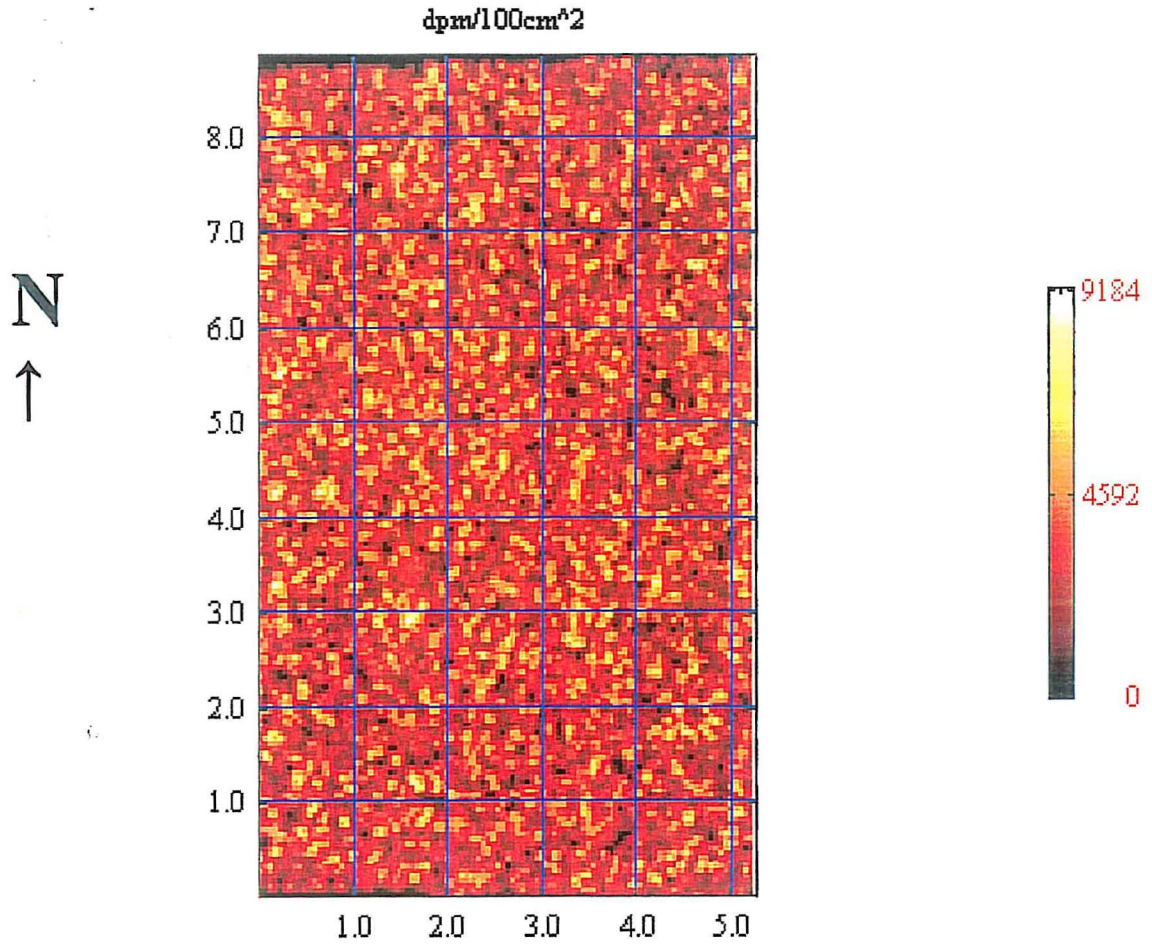


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

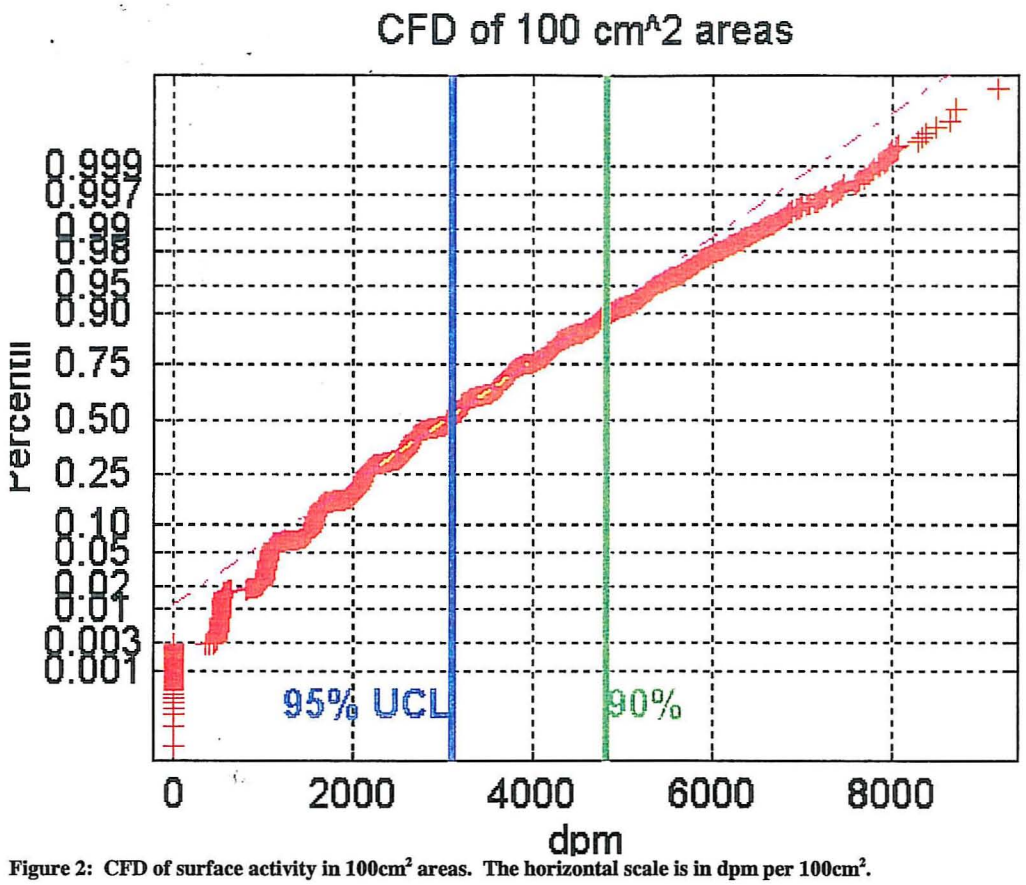


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

Ellis Island Tank Pad

Surveys of the Ellis Island Tank Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP00202A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Ellis Island Tank Pad are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP00202A	9113	6	(345,215)	(160,200)
MP00202A	8663	3	(415,690)	(50,340)
MP00202A	8589	2	(360,595)	(175,245)

Survey Report

Survey Location:	ELLIS ISLAND - TANK PAD
Survey Unit Area Code:	N0099X
Survey File Name:	MP00202A
Survey Date:	May 18, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**9,113 dpm/100 cm^2**
Maximum m^2 Average:	3,554 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630MP00202A

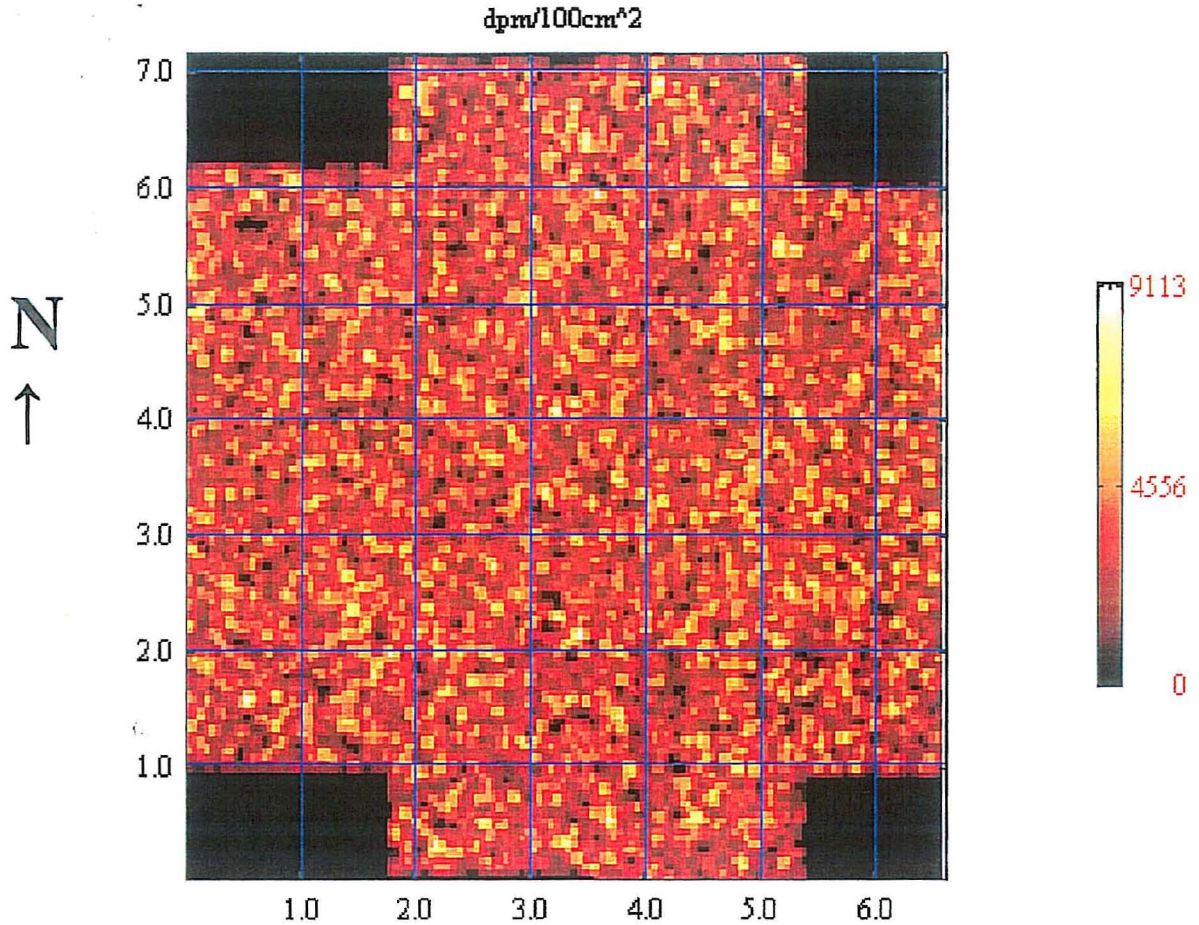


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

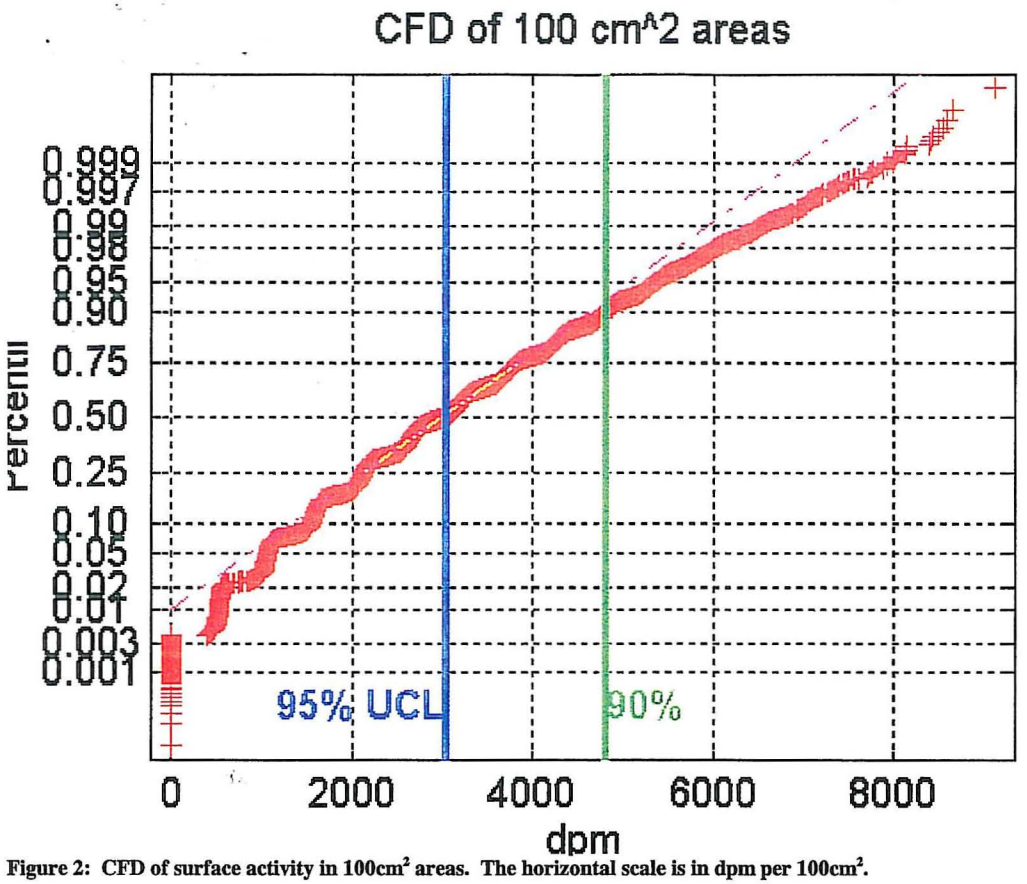
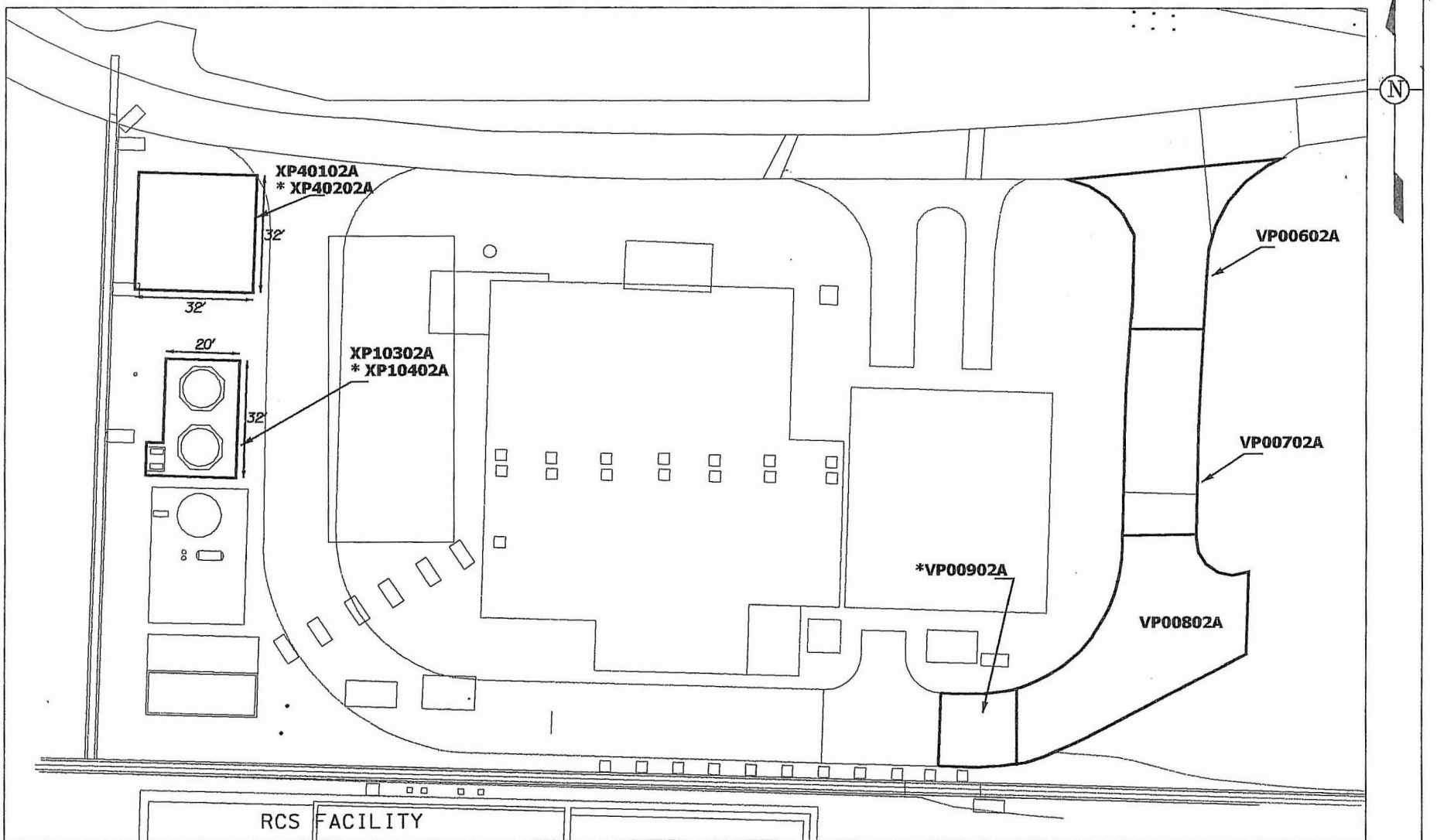


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².



LEGEND:

* CORNER SURVEY PERFORMED TO COVER SURFACE INACCESSIBLE WITH SCM IN DYNAMIC MODE.

SCALE

40 20 0 40 FEET

v:\2-fm12\dgn\a7_conc_cu9_a.dgn
STATE PLANAR COORDINATE SYSTEM 1983

19-OCT-2006

FIGURE C-7. RCS ANCILLARY PADS AND ROAD. SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-RCS-C01

006295

Fernald Closure Project

Survey Report

Air Building Pad

Surveys of the Air Building Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report XP40102A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad (Ambient Background Subtract Mode). Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

Survey report XP40202A is the result of the SCM operating in the corner mode, used to survey those areas that are not accessible to the SCM in the rolling mode. The survey was performed with a static measurement time of 4 seconds. Areas surveyed included the trench, exposed outer vertical surfaces of the pad, and small areas along the perimeter of the pad. During the initial surveys, several strips in XP40202A were found to have less than full data across the detector. This is typically a result of the SCM operator not allowing sufficient time for all data to be written to file before saving the data. Re-surveys of the strips in question were performed as XP40202B. The strips from the re-surveys replaced the bad strips in the "A" surveys. This information is detailed in the Survey Records for XP40202B. The results presented in Figure 1 are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey reports if necessary. The random distribution of survey results and the normal distribution of all data represented in Figure 2 are indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Air Building Pad are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
XP40102A	12,130	6	(525,445)	(165,255)
XP40102A	11,708	8	(820,280)	(100,90)
XP40102A	11,246	5	(250,440)	(70,250)

Survey Report

Survey Location:	Air Building Pad
Survey File Name:	XP40102A
Survey Date:	March 14, 2006
Survey Equipment:	SCM5
Detector(s):	R180 T180
Survey Mode	Rolling 4"/sec Ambient Gamma Bkg Subtract
Surveyor(s):	SAPP/KIMOKEO
Criteria	
System Information	
Efficiency (100 cm^2):	R180: 20.8% T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**12,130 dpm/100 cm^2**
Maximum m^2 Average:	2,302 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012830XP40102A

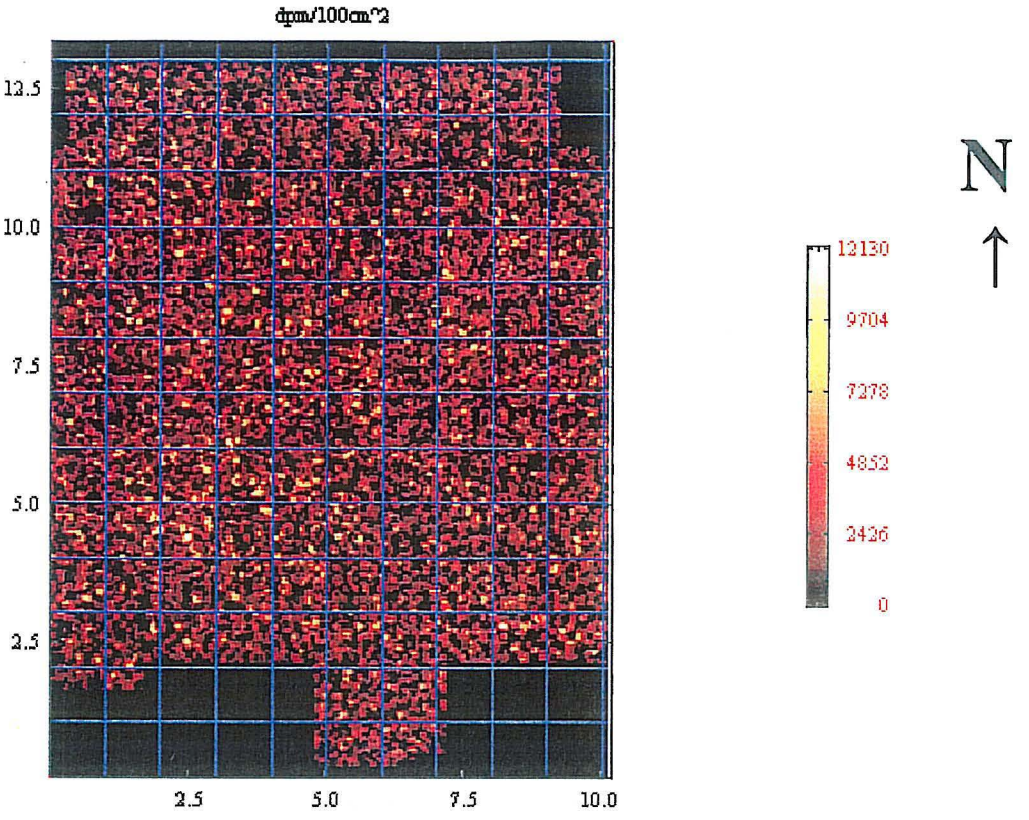


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

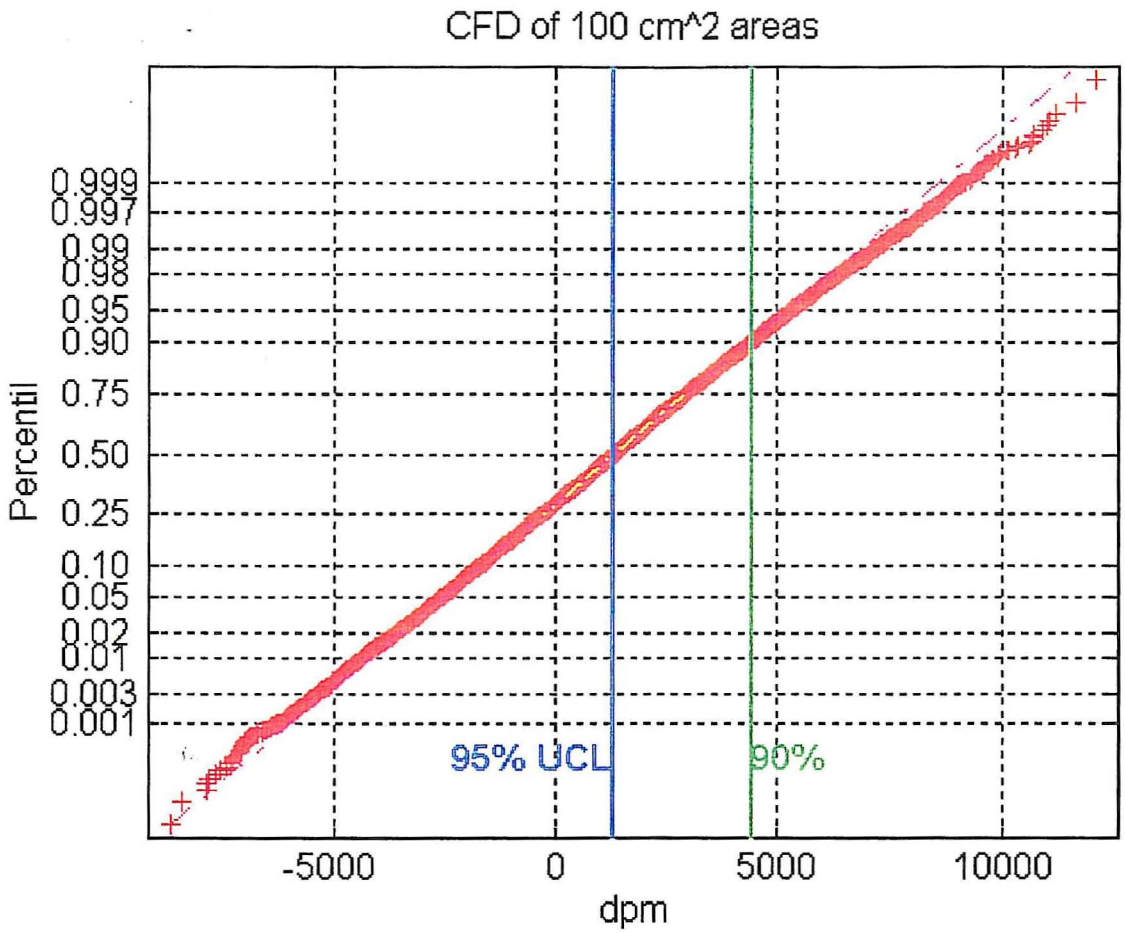


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Survey Report

Survey Location:	Air Building Pad
Survey File Name:	XP40202A
Survey Date:	March 15, 2006
Survey Equipment:	SCM5
Detector(s):	C180
Survey Mode	Static 4 sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	C180: 32.4%
SIMS Version:	V5.31
SCM Version:	V3.4a
Survey Results	
Maximum 100 cm^2:	**4,815 dpm/100 cm^2**
Maximum m^2 Average:	2,739 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012651XP40202A

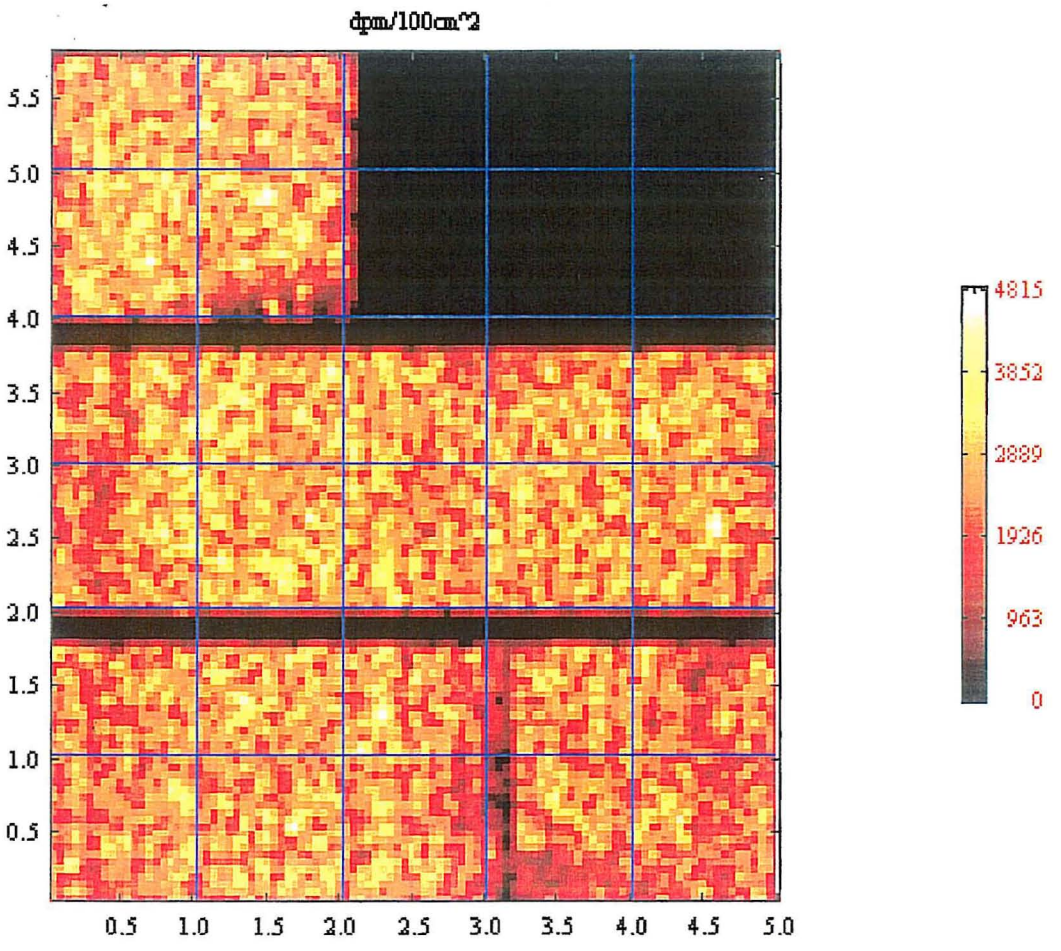


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

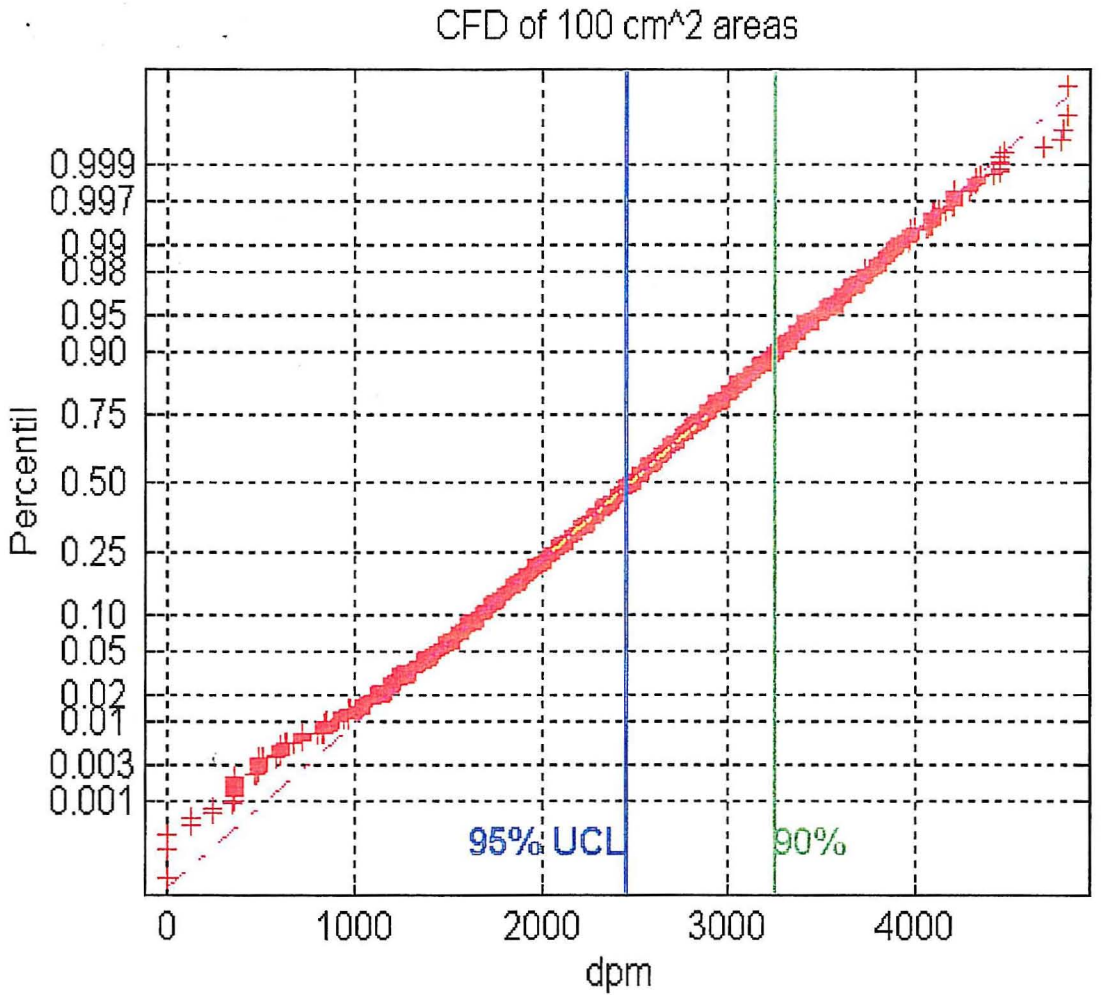


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

Vitrification Building Access Road

Surveys of the Vitrification Building Access Road, located on the east side of the building pad, were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the road for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey reports VP00602A, VP00702A, and VP00802A are the result of the SCM operating in the rolling mode which was able to cover most of the road. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the road. Figure 1 in each survey report provides spatially correlated results, with the (0,0) point representing the southwest corner of the surveyed area.The extra data strips in the southwest and northeast corners of the graphic display represent curved strips taken with the contour of the road in those locations to ensure complete survey coverage of the road. The random distribution of survey results and the normal distribution of all data represented in Figure 2 of each survey report are indicative of natural radioactivity within the concrete; no outliers representative of added contamination are noted.

Survey report VP00902A is the result of the SCM operating in the corner mode, used to survey an area covered by a sealand container that was are not accessible to the SCM in the rolling mode. The survey was performed with a static measurement time of 4 seconds. The results presented in Figure 1 of the survey report are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey report if necessary. The random distribution of survey results and the normal distribution of all data represented in Figure 2 of the survey report are indicative of natural radioactivity within the concrete; no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Vitrification Building Access Road are from the rolling mode surveys and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
VP00602A	11,849	6	(185,75)	(60,70)
VP00602A	11,806	6	(145,1350)	(20,1345)
VP00802A	11,412	14	(1290,870)	(55,115)

The data from survey reports VP00602A, VP00702A, and VP00802A were combined into one spatially correlated image, shown in Figure 1, and the data presented in a CFD, shown in Figure 2.

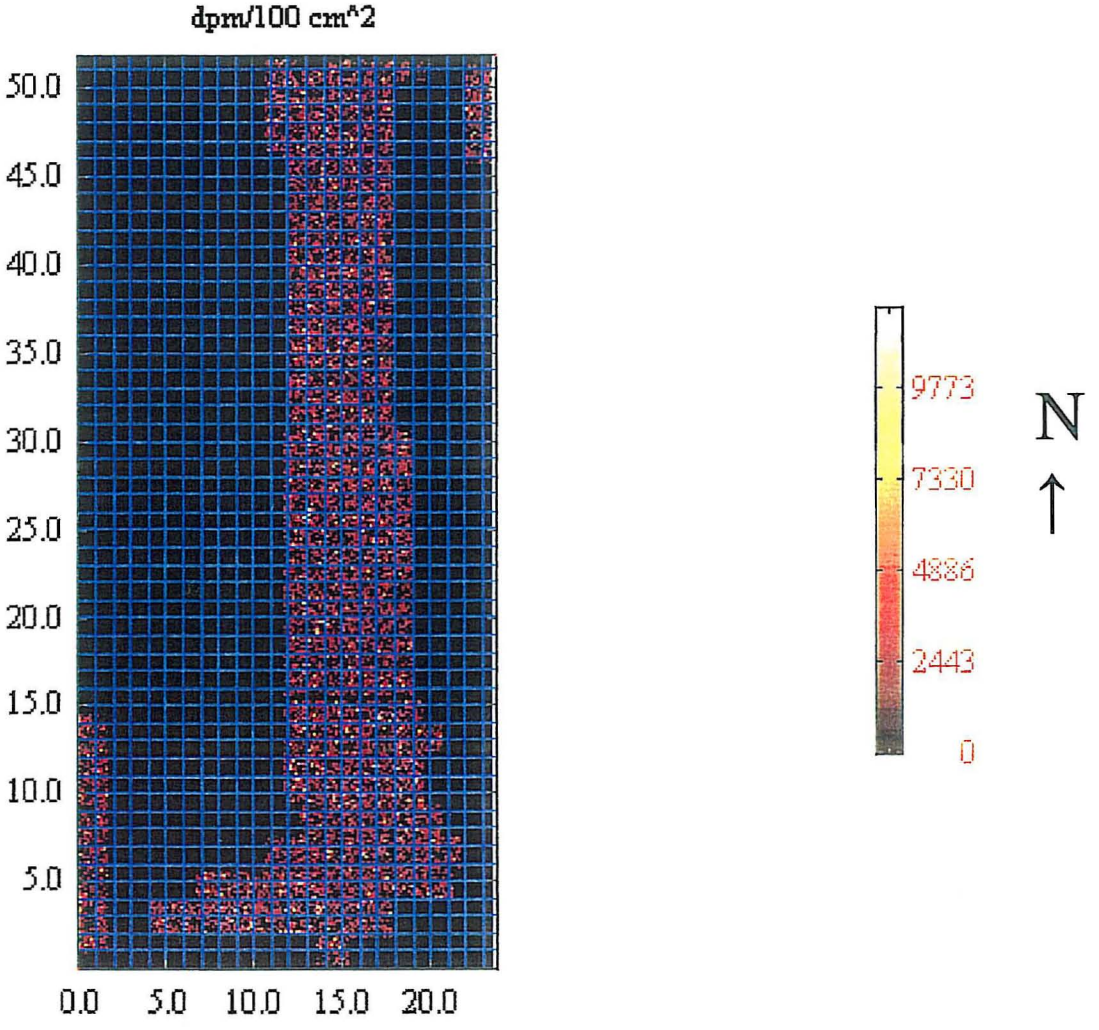


Figure 1: Meter grid overlaid onto image plot of 100 cm^2 areas. The color scale is in dpm/100cm^2 and the maximum has been set to the highest surface activity in the data set. The (0,0) point is the Southwest corner of the concrete pad.

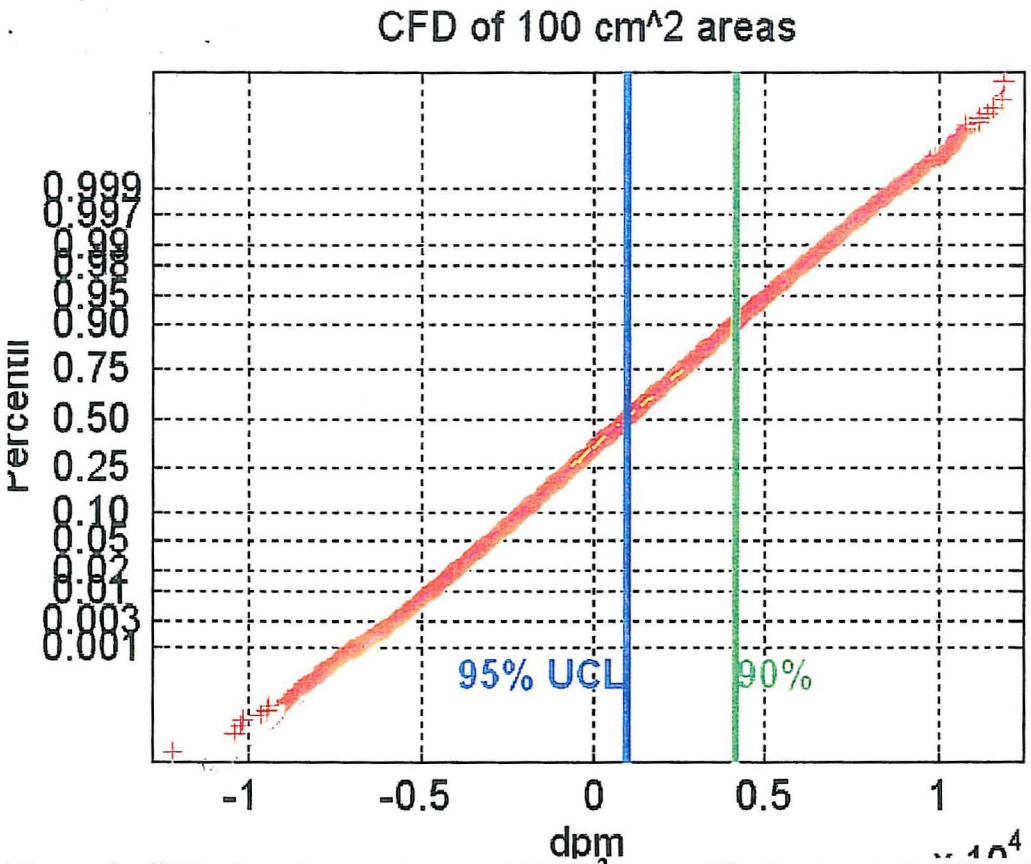


Figure 2: CFD of surface activity in 100 cm^2 areas. The horizontal scale is in dpm x 10^4 /100 cm^2.

Fernald Closure Project

Survey Report

North Tank Pad

Surveys of the North Tank Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report XP10302A is the result of the SCM operating in the rolling (trap) mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in./sec.. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

Survey report XP10402A is the result of the SCM operating in the corner mode, used to survey those areas that are not accessible to the SCM in the rolling mode. The survey was performed with a static measurement time of 4 seconds. Areas surveyed the pedestals and areas adjacent to the pedestals that are not accessible to the SCM in the rolling mode. The results presented in Figure 1 are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey reports if necessary. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the North Tank Pad are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
XP10302A	8190	2	(155,620)	(50,320)
XP10302A	8175	3	(225,155)	(40,150)
XP10302A	8100	1	(35,360)	(35,360)

Survey Report

Survey Location:	North Tank Pad
Survey File Name:	XP10302A
Survey Date:	March 30, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode	Rolling 4"/sec
Surveyor(s):	SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
m^2 Correction Factor:	T180: 1.0
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**8,190 dpm/100 cm^2**
Maximum m^2 Average:	3,371 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630XP10302A

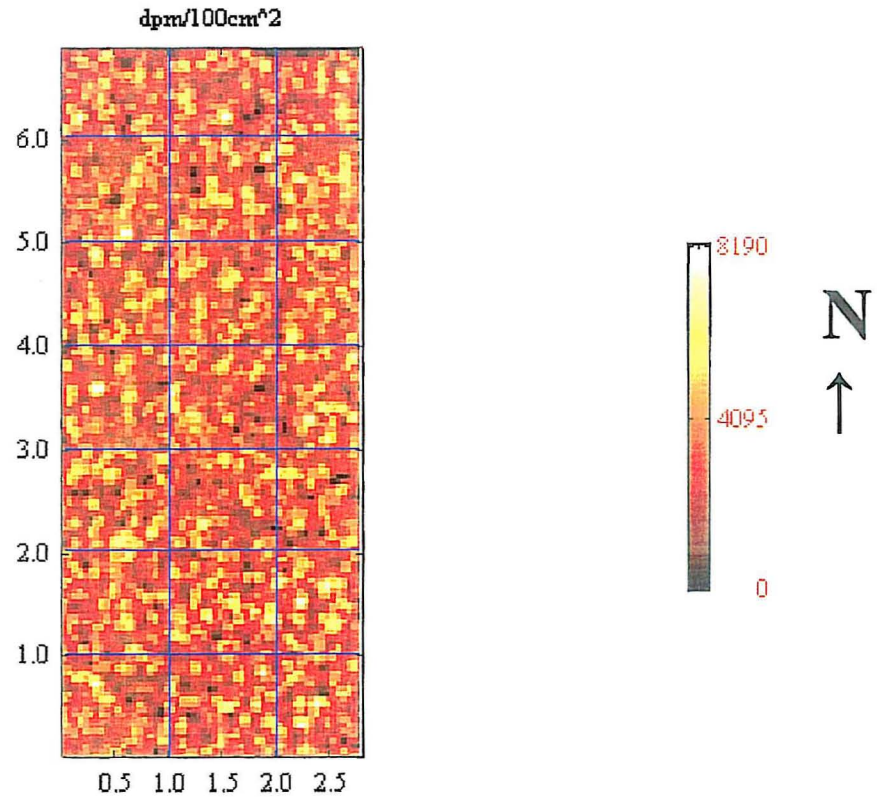


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

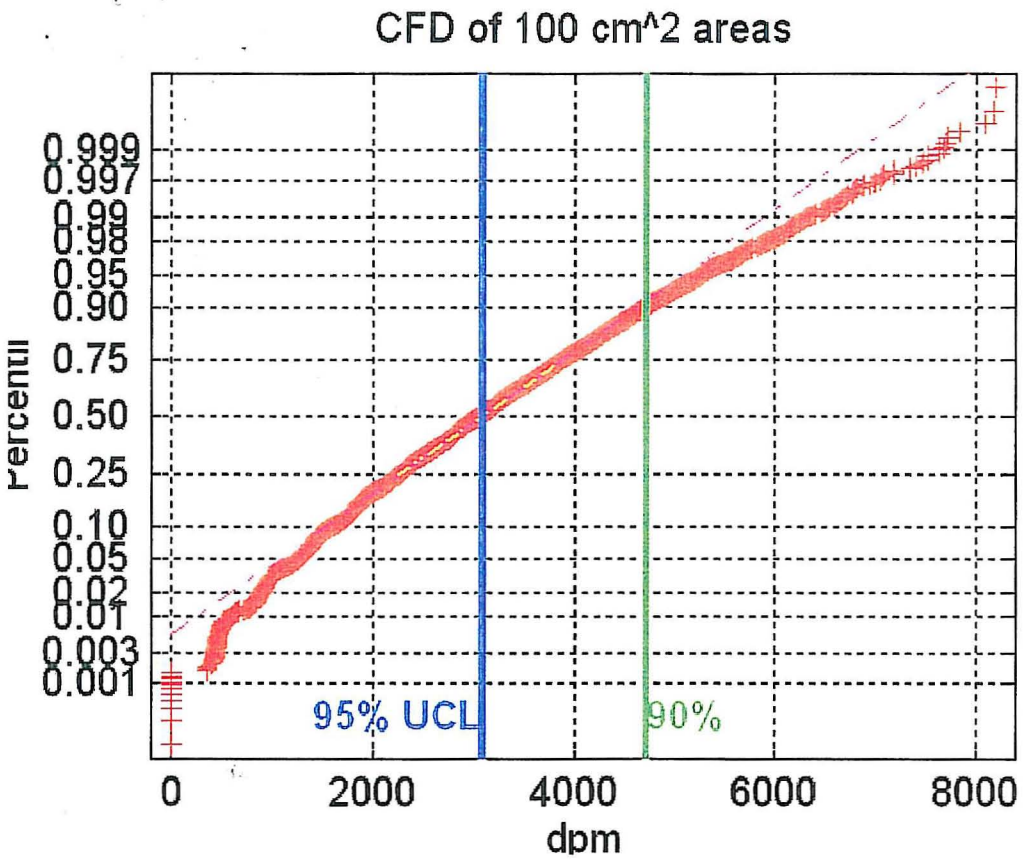


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Survey Report

Survey Location:	North Tank Pad
Survey File Name:	XP10402A
Survey Date:	March 29, 2006
Survey Equipment:	SCM5
Detector(s):	C180
Survey Mode	Static 4 sec
Surveyor(s):	SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	C180: 32.4%
m^2 Correction Factor:	C180: 1.0
SIMS Version:	V5.31
SCM Version:	V3.4a
Survey Results	
Maximum 100 cm^2:	**6,259 dpm/100 cm^2**
Maximum m^2 Average:	3,134 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012651XP10402A

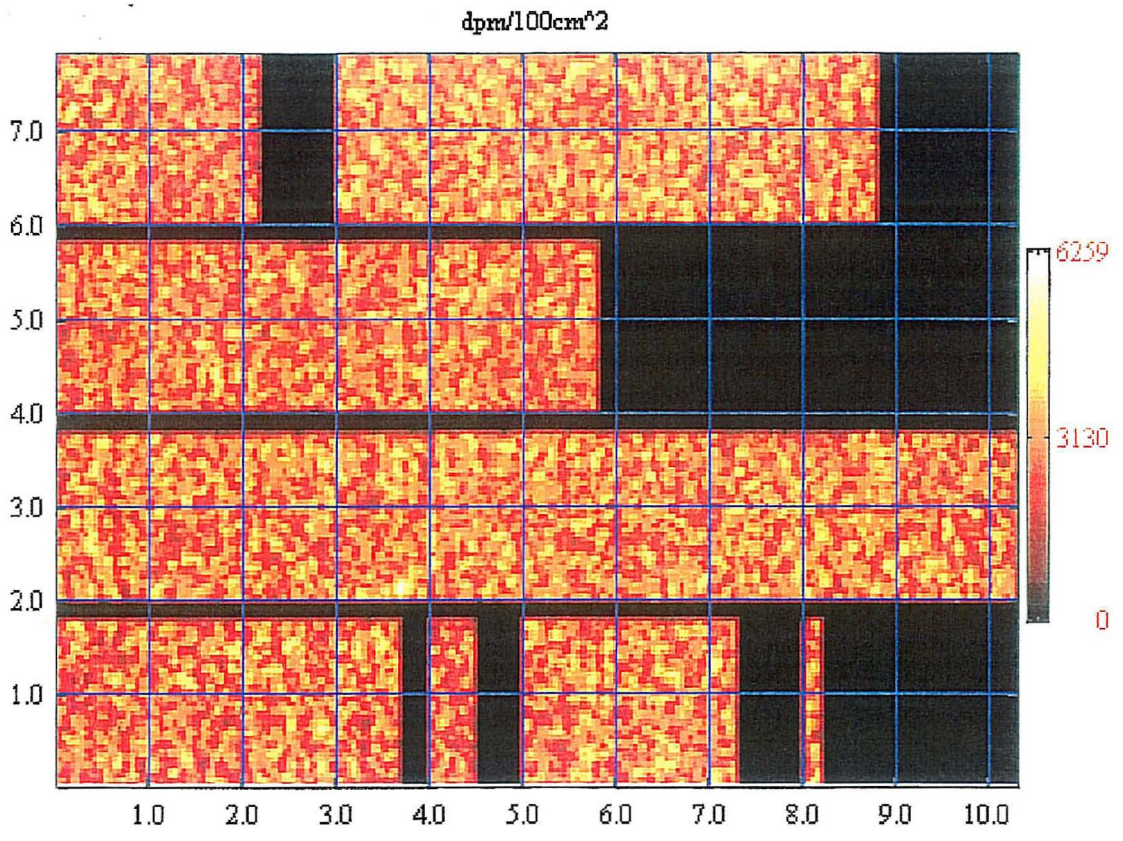


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

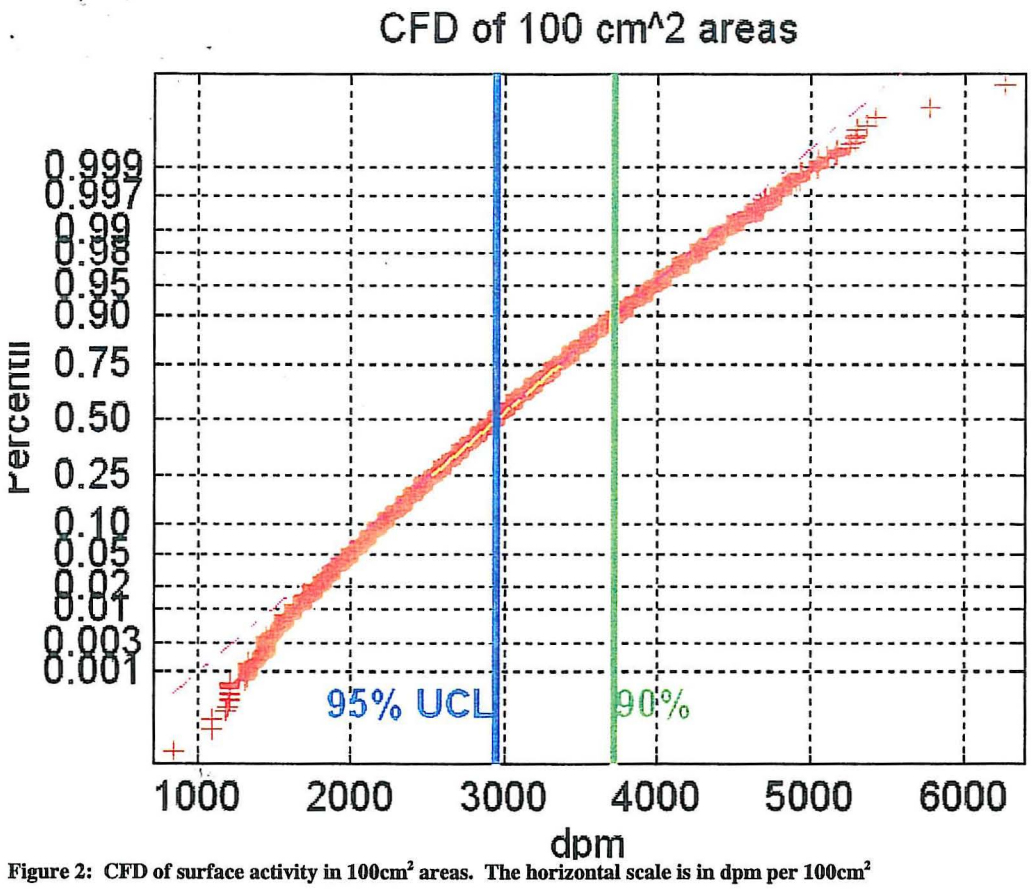


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2

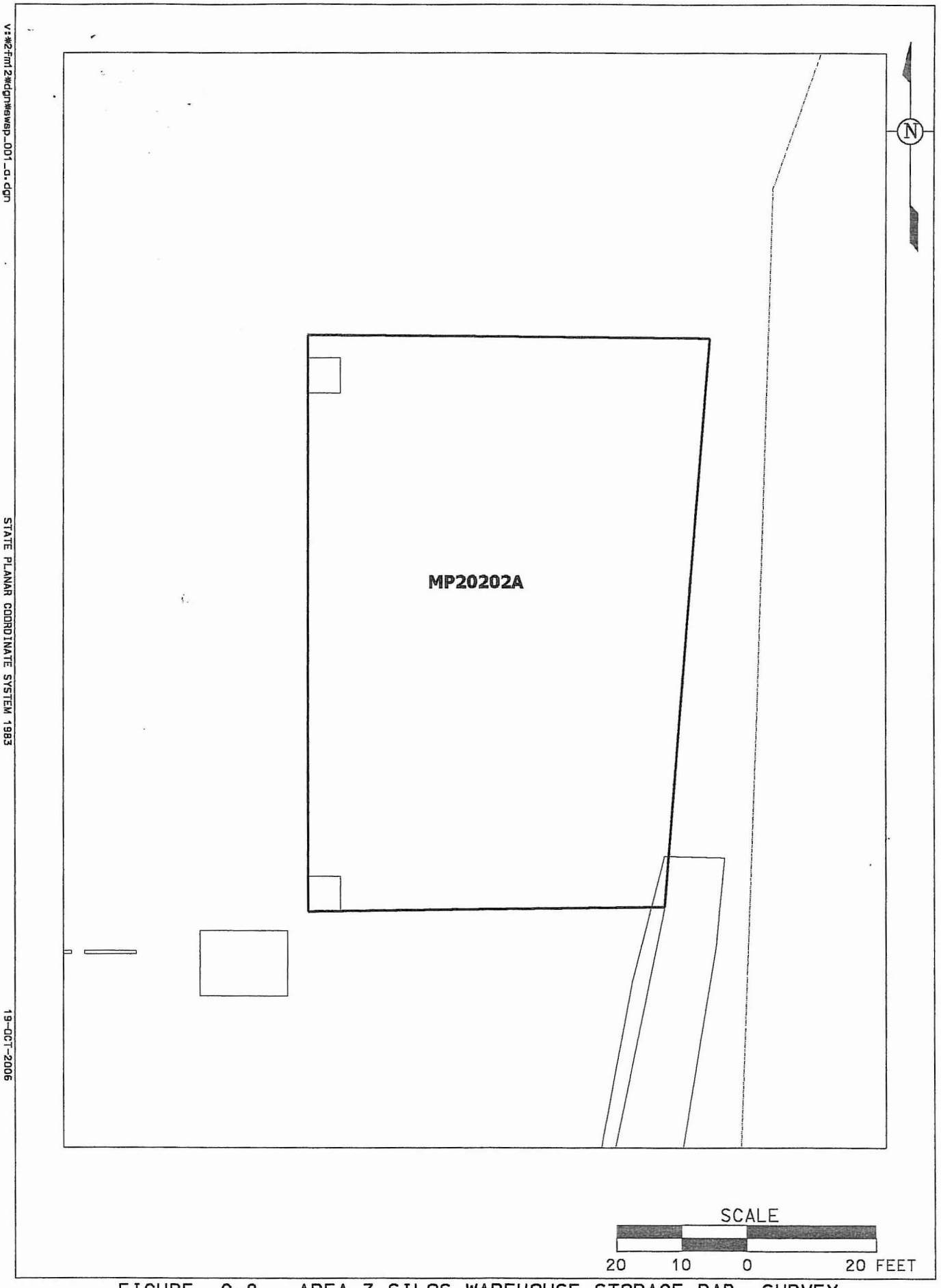


FIGURE C-8. AREA 7 SILOS WAREHOUSE STORAGE PAD. SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C_C05

Fernald Closure Project

Survey Report

Warehouse Pad East

Surveys of the Warehouse Pad East were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey report MP20202A is the result of the SCM operating in the rolling mode which was able to cover most of the concrete pad. The survey was performed at a dynamic speed of 4 in/sec. Figure 1 provides spatially correlated results, with the (0,0) point representing the southwest corner of the pad. The random distribution of survey results and the normal distribution of all data represented in Figure 2 is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Warehouse Pad East are from the rolling mode survey and are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
MP0202A	10990	13	(1545,2515)	(100,2330)
MP0202A	10459	9	(900,2430)	(175,2245)
MP0202A	10443	6	(185,2290)	(0,2105)

Survey Report

Survey Location:	WAREHOUSE PAD EAST
Survey Unit Area Code:	N0099X
Survey File Name:	MP20202A
Survey Date:	August 9, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP/KIMOKEO
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**10,990 dpm/100 cm^2**
Maximum m^2 Average:	4,590 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630MP20202A

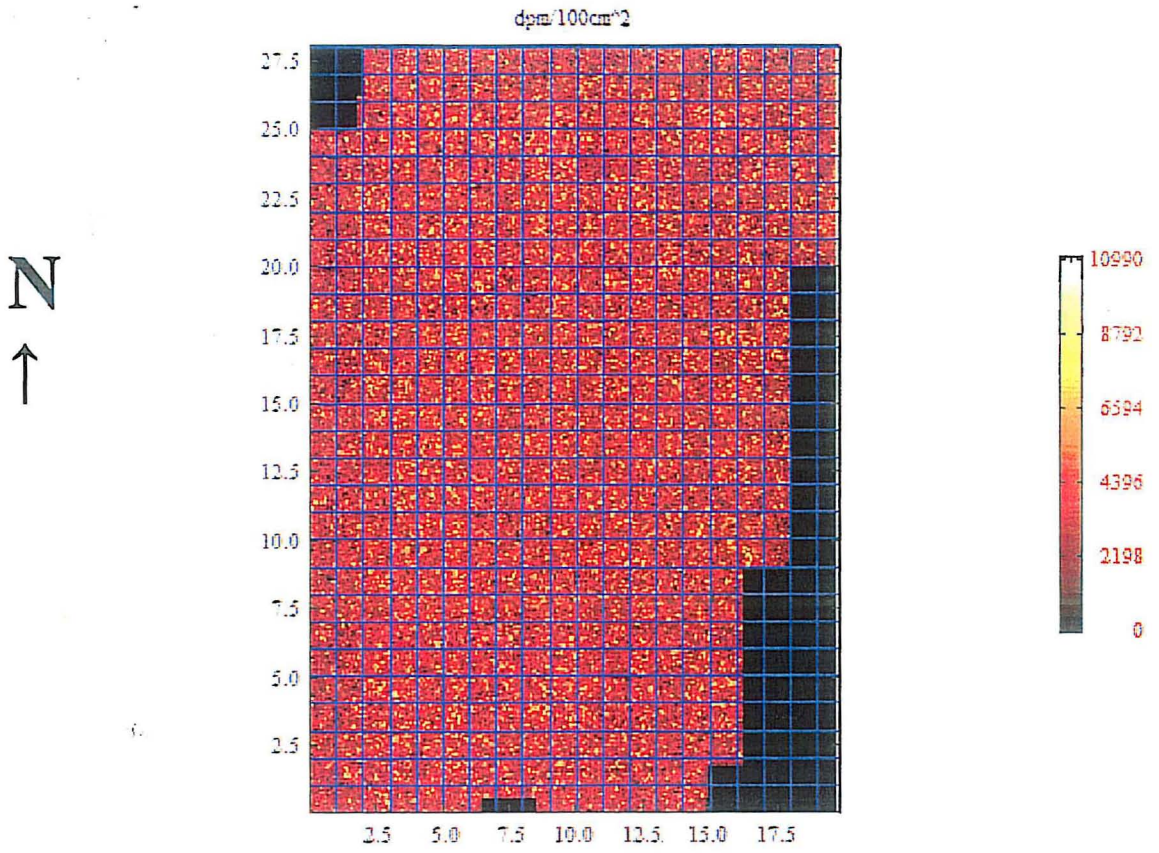


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

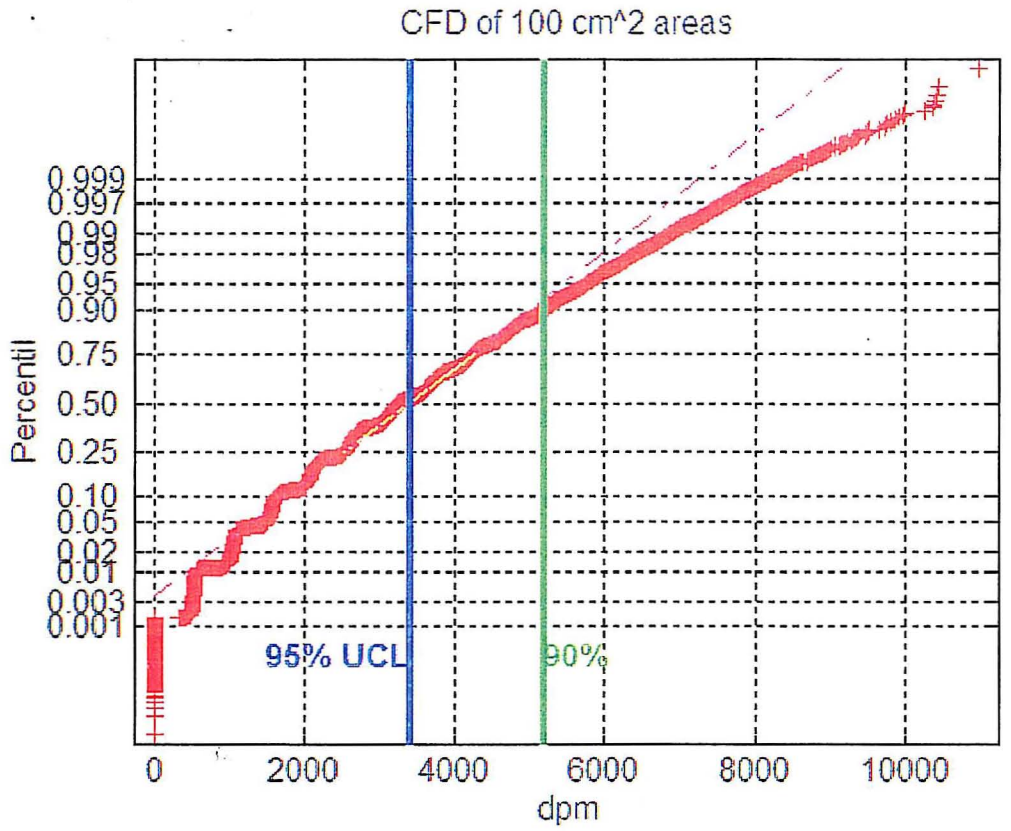


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

v:\21fm12\dgn\a7_conc_cu5_A.dgn
STATE PLANAR COORDINATE SYSTEM 1983
13-DEC-2006

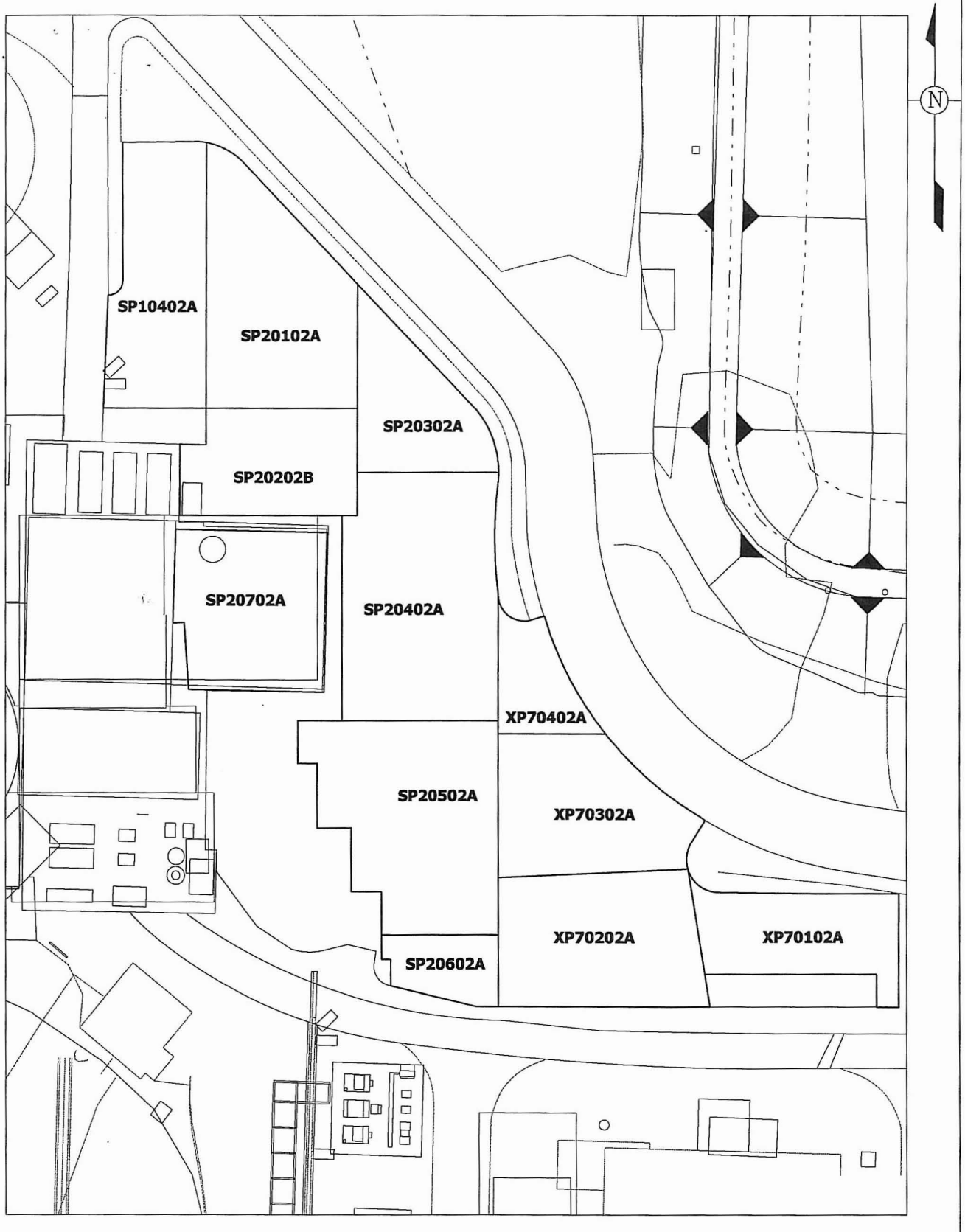


FIGURE C-9. SILO 3 STAGING PAD. SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-S3-C01

Fernald Closure Project

Survey Report

Silo 3 Pad

Surveys of the Silo 3 Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey reports SP10402A, SP20102A, SP20202B SP20302A, SP20402A, SP20502A, SP20602A and SP20702A are the result of the SCM operating in the rolling mode. The survey was performed at a dynamic speed of 4 in./sec. Figure 1 provides spatially correlated results from all eight of the surveys "quilted" into one image, with the (0,0) point representing the southwest corner of the survey area. Initial survey SP20202A was repeated as SP20202B following failure of the post survey Performance Based Check (PBC) and repair of counting gas leaks on the detector. Figure 2 provides a Cumulative Frequency Distribution Plot (CFD) of the data from all eight surveys. The random distribution of survey results and the normal distribution of all data represented the CFD is indicative of natural radioactivity within the concrete. Potential outliers are identified in the CFDs for survey units SP20202A, SP20402A and SP20702A, however none of the values is substantially above the distribution to conclude that they are separate from the rest of the normal distribution values. However, each of the potential outliers is identified as a location that will be sampled.

The locations of the three highest readings obtained on the Silo 3 Pad are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
SP20702A	11,796	4	(1065,365)	(160,15)
SP20402A	11,155	3	(1650,285)	(170,110)
SP20202B	10,669	2	(1155,950)	(845,170)

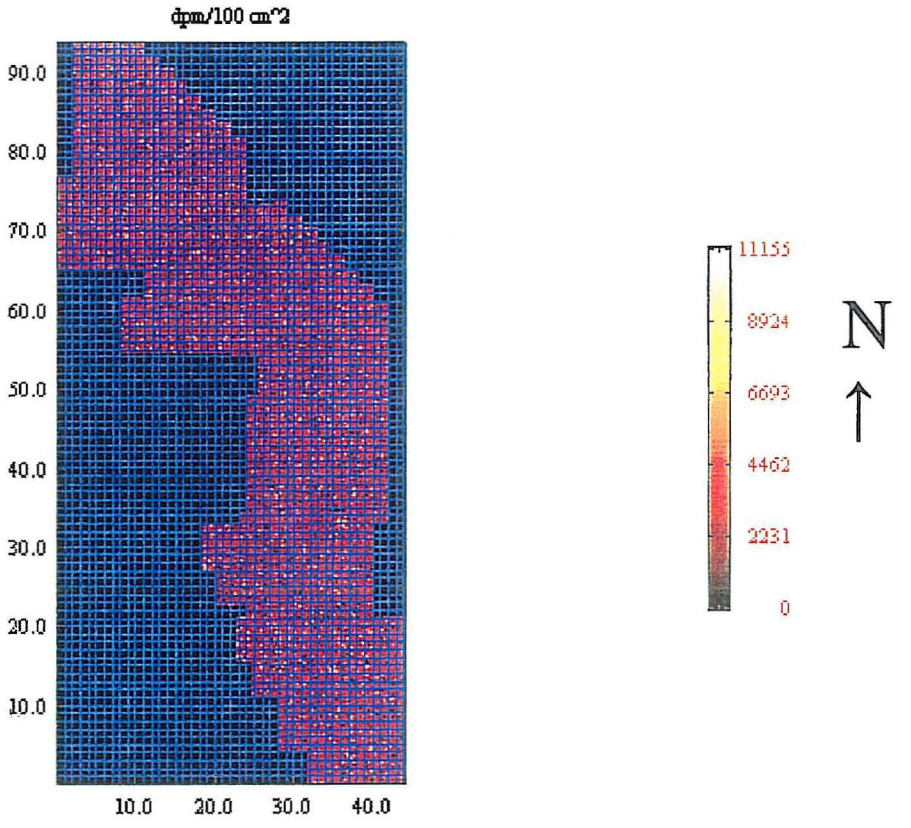


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the survey area.

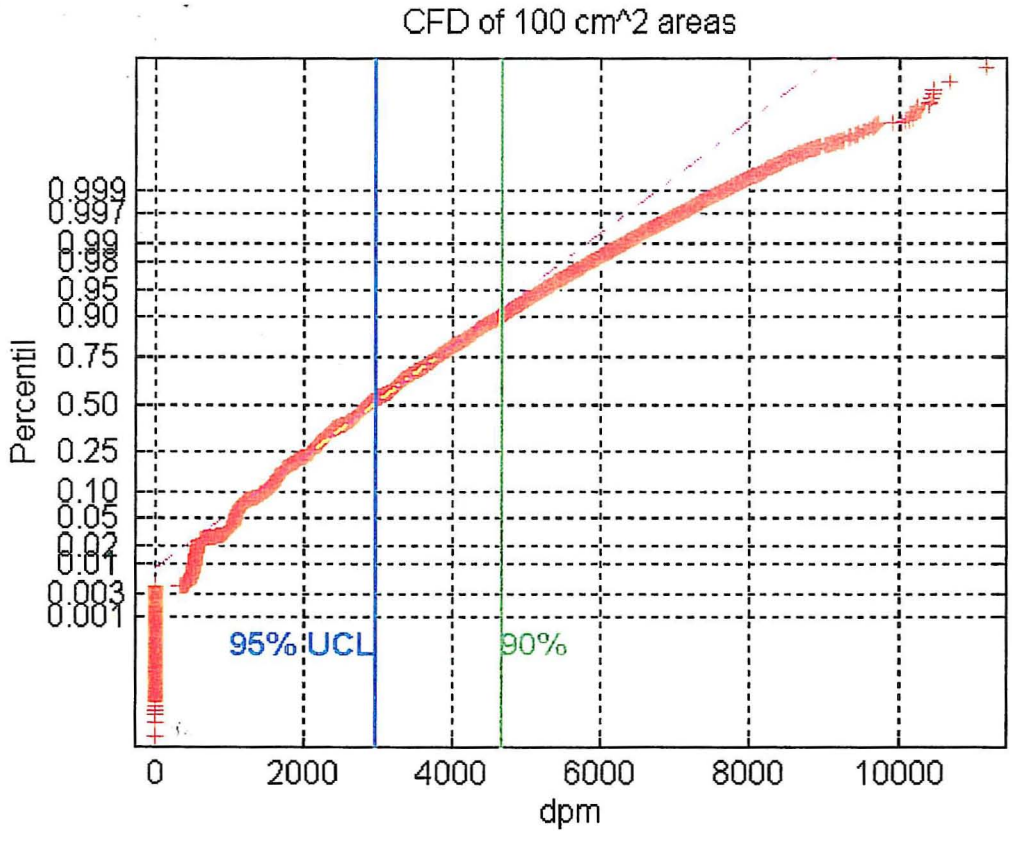


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Survey Report

Survey Location:	SILO 3 PAD
Survey File Name:	SP20702A
Survey Date:	April 1, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode	Rolling 4 "/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.31
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**11,796 dpm/100 cm^2**
Maximum m^2 Average:	4,020 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630SP20702A

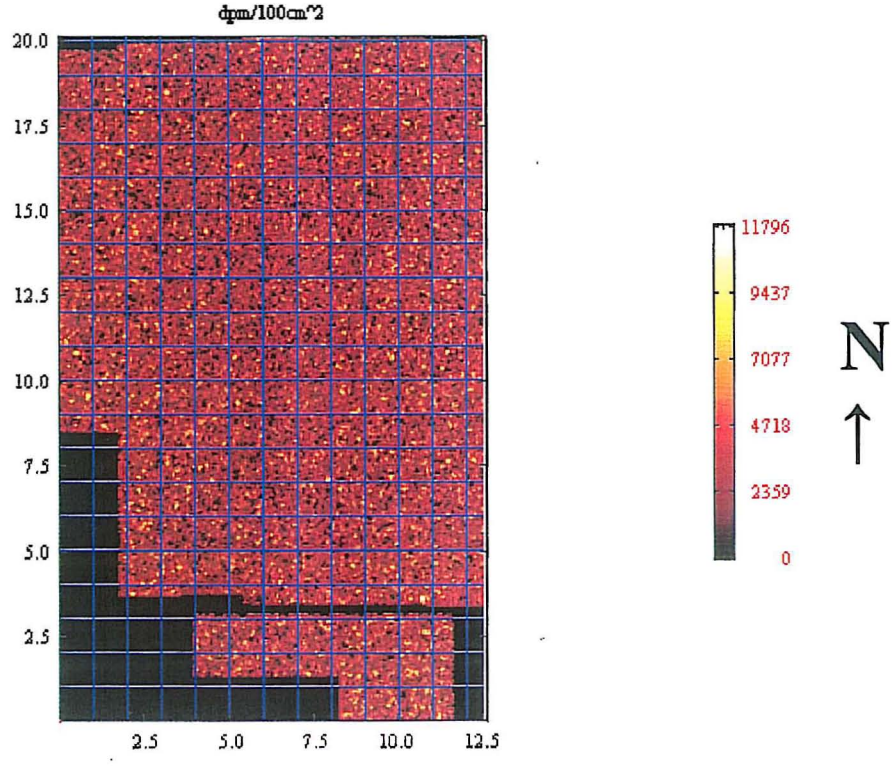


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

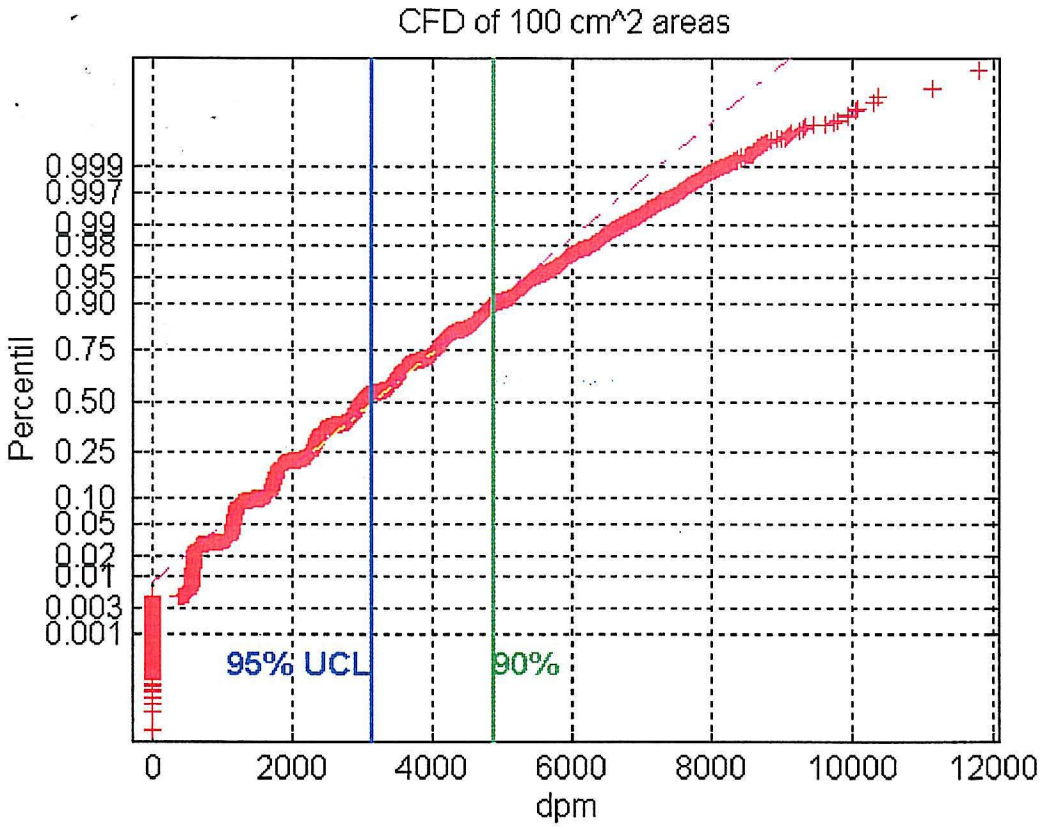


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

Fernald Closure Project

Survey Report

Silo 3 Storage Pad

Surveys of the Silo 3 Storage Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey reports XP70102A, XP70202A, XP70302A and XP70402A are the result of the SCM operating in the rolling mode. The survey was performed at a dynamic speed of 4 in./sec. The SCM employed a second detector, shielded from the concrete surface, to allow subtraction of gamma fields should the field vary across the pad (Ambient Background Subtract Mode). Figure 1 provides spatially correlated results from all four of the surveys "quilted" into one image, with the (0,0) point representing the southwest corner of the pad. The two short strips at location (17,31) of the image represent diagonal strips taken in the northeast corner of survey unit XP70303A. The single strip on the east side of the image, location (48,11) is from a ramp running diagonally from the northwest corner of survey XP70102A. Figure 2 provides a Cumulative Frequency Distribution Plot (CFD) of the data from all four surveys. The random distribution of survey results and the normal distribution of all data represented the CFD is indicative of natural radioactivity within the concrete, no outliers representative of added contamination are noted.

The locations of the three highest readings obtained on the Silo 3 Storage Pad are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
XP70302A	14,561	3	(880,1235)	(150,1230)
XP70202A	14,509	6	(590,925)	(505,20)
XP70302A	13,574	6	(250,1520)	(65,1105)

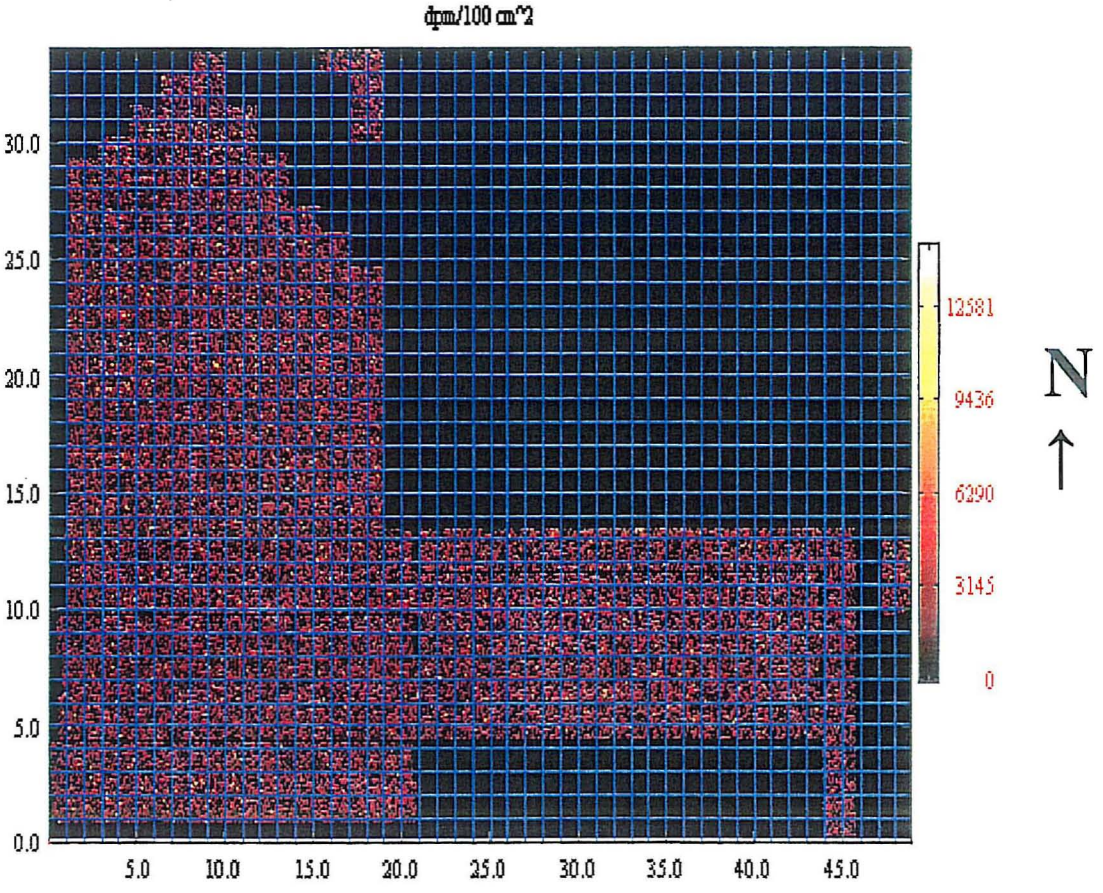


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

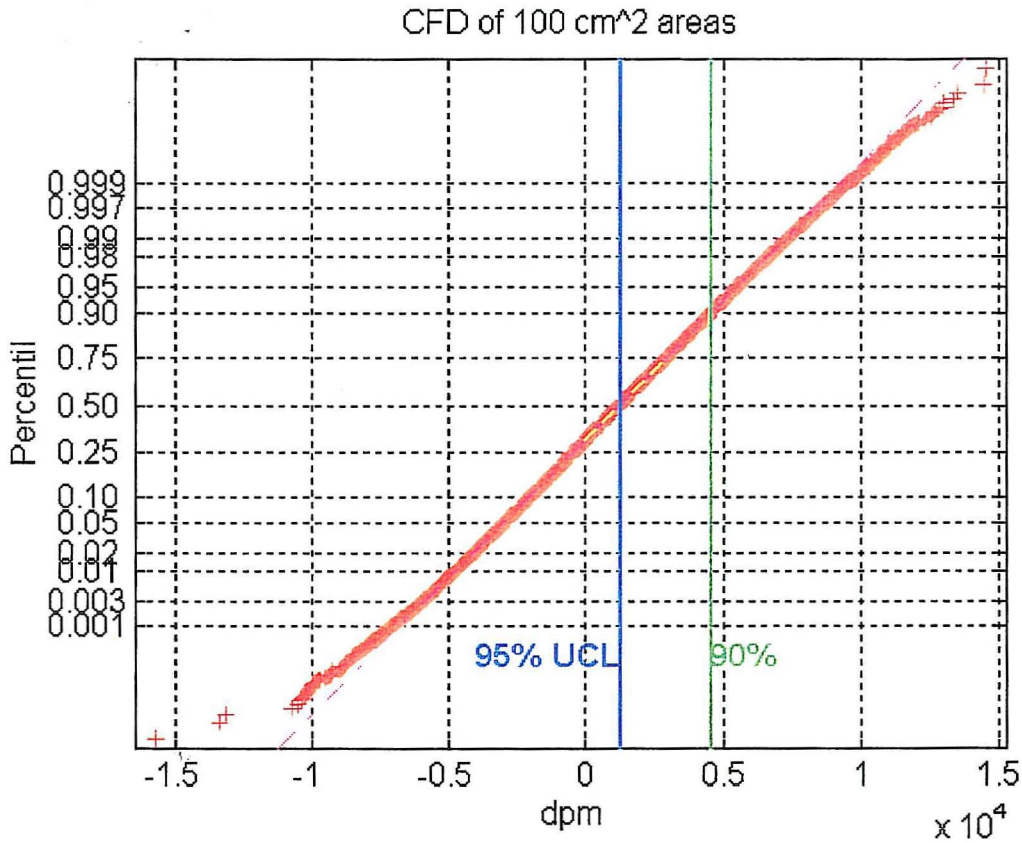
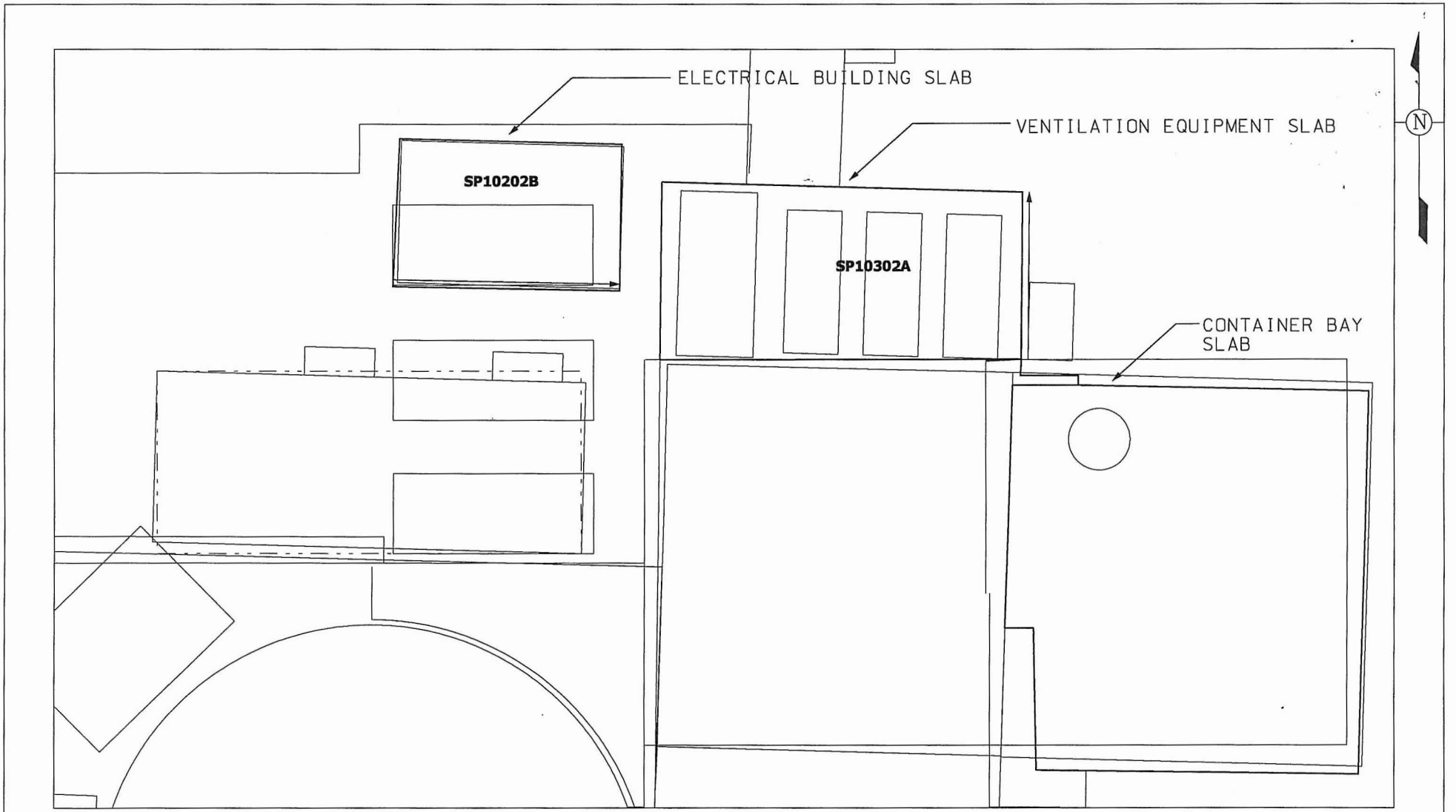


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.



v:*2fm12*dgn*a7_conc_cu6_a.dgn
STATE PLANAR COORDINATE SYSTEM 1983

13-DEC-2006

FIGURE C-10. SILO 3 CONTAINER BAY AND SUPPORT SLABS.
SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-S3-C03

006295

Fernald Closure Project

Survey Report

North Silo Pad

Surveys of the North Silo Pad were performed using the Surface Contamination Monitor (SCM). The objective of the surveys was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. The North Silo Pad surface was highly irregular, resulting in several small area surveys. Due to the geometries involved, a single "quilted" image of the activity results is impractical. However, each individual survey is evaluated for outliers in the data and to determine the locations for core sampling. Surveys were conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey reports provide the results of those surveys.

Survey reports SP10102A, SP10202A and SP10302A are the result of the SCM operating in the rolling mode which was able to cover most of the pads. However, surveys SP10102A and SP10202A are not representative of the pads due to the fact that the pads were potentially re-contaminated after the surveys were performed. Therefore, a subsequent survey (SP10202B) was performed on the former electrical building pad. Several areas of contamination were detected. The surveys were performed at a dynamic speed of 4 in./sec. Figure 1 in each survey report provides spatially correlated results, with the (0,0) point representing the southwest corner of the surveyed area.

For survey SP10302A (location of former HVAC equipment north of Silo 3), the random distribution of survey results and the normal distribution of all data represented in Figure 2 of each survey report are indicative of natural radioactivity within the concrete. A potential outlier in survey SP10302A was identified, however investigation determined it to be due to grounding of the SCM detector on metal. Surveys with hand held instrumentation found no elevated activity in the area of the metal clip. The elevated reading from the grounding, 16,912 dpm/100 cm^2, is not included in the three highest measurements.

Survey report SP10502A was the result of the SCM operating in the corner mode. However, this survey is not representative of the final concrete surface due to the same potential re-contamination event as described above. Therefore, SP10502A survey data is not presented.

The locations of the three highest readings obtained on the North Silo Pad from SCM rolling surveys are identified in the table below.

Survey Filename	Value dpm/100 cm^2	Strip	Location From SW of Survey (X,Y)cm	Location From SW of Strip (X,Y)cm
SP10202B	53196	10	(315,195)	(135,175)
SP10202B	37936	3	(635,560)	(450,165)
SP10202B	18882	10	(265,180)	(85,160)

Survey Report

Survey Location:	North Silo Pads
Survey Unit Area Code:	N0099X
Survey File Name:	SP10202B
Survey Date:	August 18, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode	Rolling 4"/sec
Surveyor(s):	SAPP/KIMOKEO
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**53,196 dpm/100 cm^2**
Maximum m^2 Average:	6,144 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630SP10202B

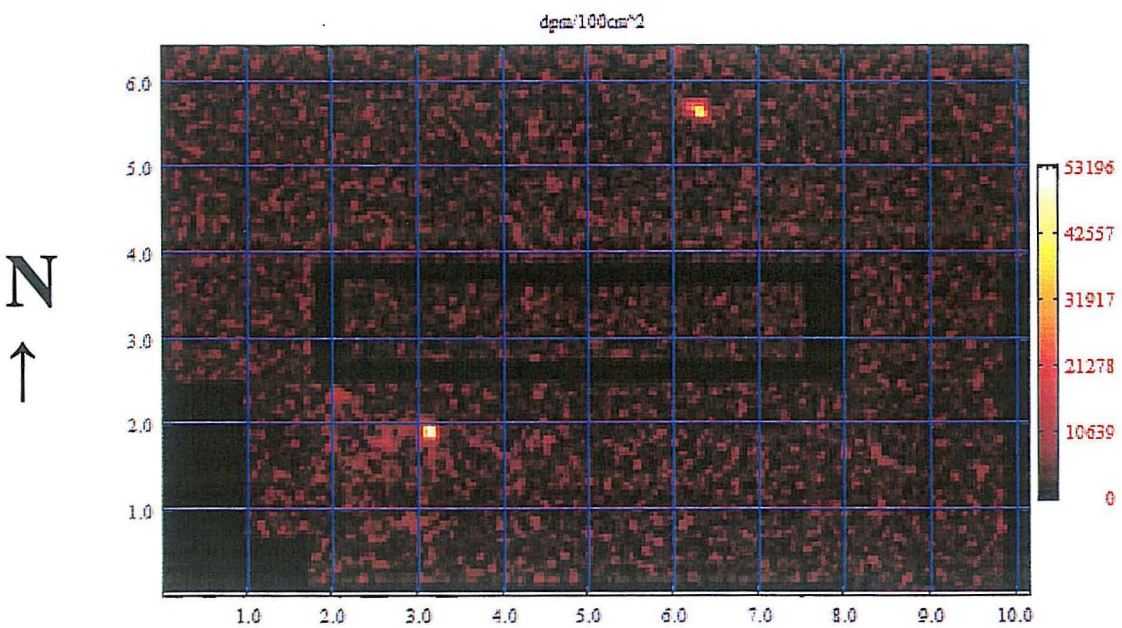


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

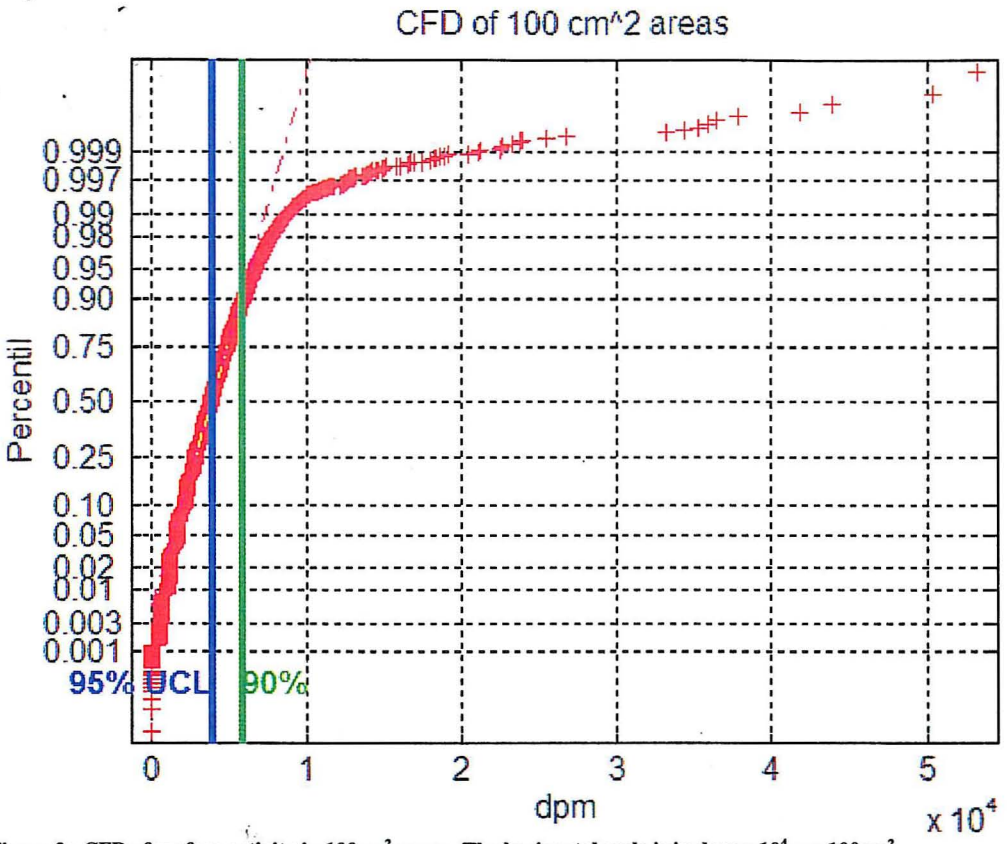


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.

Survey Report

Survey Location:	North Silo Pad
Survey File Name:	SP10302A
Survey Date:	March 30, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
System Information	
Efficiency (100 cm^2):	T180: 28.0%
m^2 Correction Factor:	T180: 1.0
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**16,912 dpm/100 cm^2**
Maximum m^2 Average:	3,434 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630SP10302A

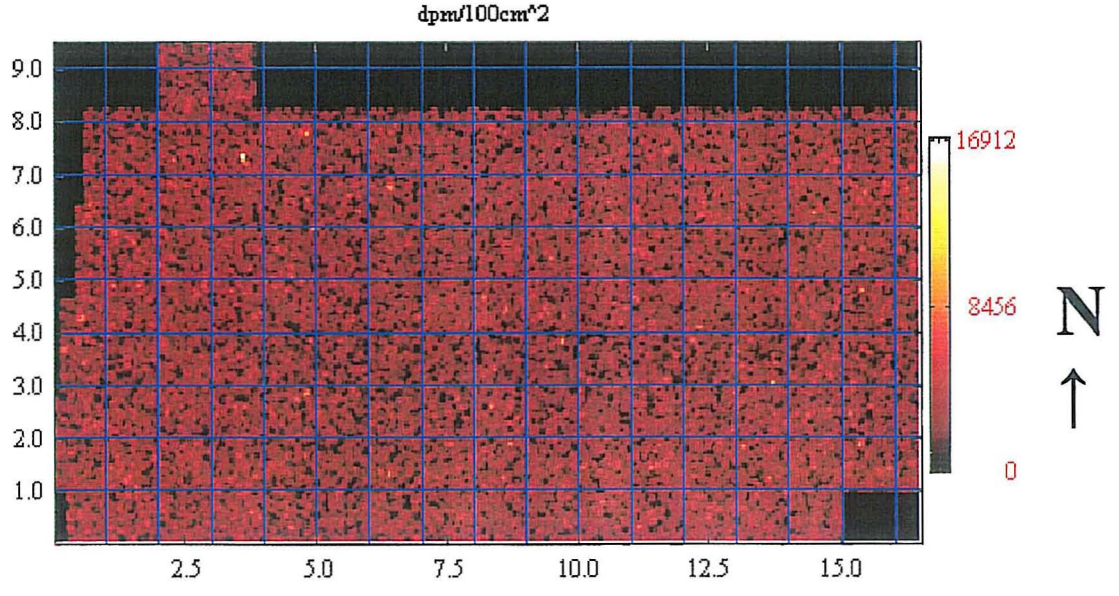


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

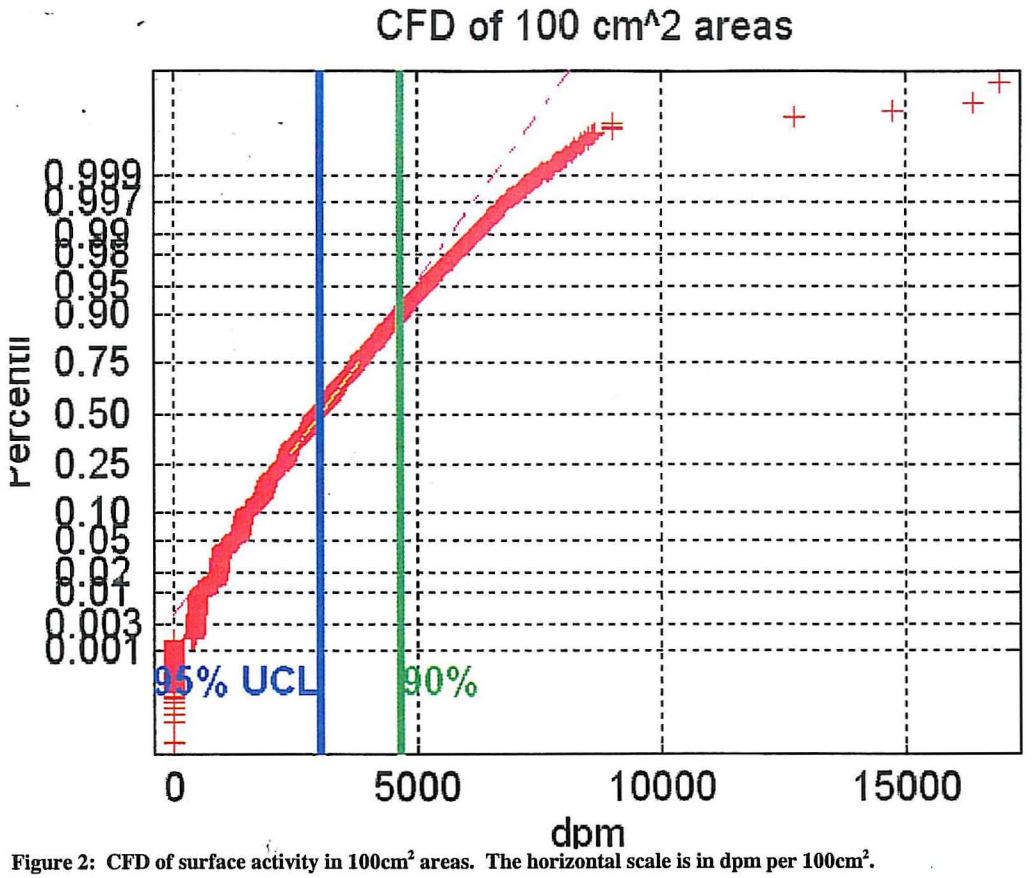


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Attachment C.1

Date Quality Review Summary

Fernald Closure Project

Surface Contamination Monitor Survey

Data Quality Review for Surveys Performed March 21, 2006 through October 5, 2006

Surveys were performed on various concrete surfaces at the Fernald Closure Project during the period March 21, 2006 through October 5, 2006. Several mobilizations occurred during the period to support project schedules and availability of the concrete pads. The objective of the surveys was to determine if areas of radioactivity existed that were distinguishable form natural activity normally distributed throughout the concrete, and to identify the location of the 3 highest surface activity values for sampling, analysis and comparison to volumetric end point criteria.

Quality control requirements for surveys performed with the Surface Contamination Monitor (SCM) with data processed by the Survey Information Management system (SIMS) are defined in procedure SCM III OR-007. Initial set-up of the SCM included verification of the alpha + beta voltage plateau, performed prior to mobilization to the Fernald site. Those voltage plateaus are included as an attachment to this review. Source Response checks (SRC) are performed at the start of each day for each SCM and detector type used that day. Performance based checks (PBC) are performed at the beginning and end of each shift and at least once every 4 hours of operation for each SCM and detector type used. PBCs are performed in the same functional mode as the surveys that they are supporting.

For (SCM/SIMS) surveys performed at the Fernald Closure Project during the period March 21, 2006 through October 5, 2006, a single SCM was used (Manufacturer's ID# SCM 5). System efficiency determinations and all SRC and PBC results were based on the use of a single source. The source is a 10 cm by 10 cm plated Cs-137 source, ID FY-865. A copy of the NIST certification for the source is attached. Since the objective of the survey was to identify the highest recoded values, the choice of isotope for efficiency determination was not a critical factor. A Cs-137 source was chosen due a mid range beta particle emission.

Three SCM operational modes were employed during these surveys. The primary SCM operational mode was the Trap Mode (T-180). The trap mode was employed with the rolling speed set at 4 "/sec. The trap mode was used extensively on horizontal pads. A second operational mode, the recount mode, was used in areas that were potentially affected by radioactive sources in the vicinity. The recount mode employs a second detector, identical to the lead detector, but with a shield over the face of the detector.

The second, or recount detector will only be impacted by ambient gamma radiation, while the primary detector with respond to both ambient gamma radiation and particles emitted from the surface.

The third SCM operational mode, corner mode (C-180), was used in areas that were not accessible to the recount mode. These areas include wall and bottom surfaces of pits, and troughs, adjacent to obstructions, as well as the outer edge of the pads. PBCs are performed with the SCM system operating in the mode that is used for the actual survey. Therefore, three sets of PBC data are generated.

For each mode, control charts are established that identify the mean value and standard deviation (σ) of at least 25 measurements of the source. A minimum of 3 measurements are obtained during field PBCs. A PBC is determined to have failed if 2 measurements exceed the $\pm$ 2σ value or 1 measurement exceeds $\pm$ 3σ. Failure of a PBC requires evaluation of the data obtained during the interval covered by the PBC. Other means can be employed to determine if the SCM system was performing normally (ex. normal CFD for clean concrete based on other recent concrete surveys completed). If normal performance of the SCM during the interval cannot be verified , surveys are invalid and must be repeated.

Evaluation

All SRCs performed for each mode within the bounds of this survey were within the $\pm$ 20% requirements of the procedure. Copies of the SRC records are provided separately.

Recount Mode PBCs

The PBC chart for the R-180, are include as attachment 1. The bottom scale of the PBC chart indicates the sequential number of PBCs performed. Attachment 2 correlates the PBC sequential number with the date of performance. All PBCs performed met the acceptance criteria. The recount mode was used during the period March through June. Subsequent surveys did not require the use of the recount mode.

Trap Mode PBCs

The PBC chart for the T-180, are include as attachment 3. The bottom scale of the PBC chart indicates the sequential number of PBCs performed. Attachment 4 correlates the PBC sequential number with the date of performance. The trap mode PBCs satisfied the acceptance criteria, except as discussed below:

1. T-180 PBC results on April 1, 2006, close out PBC #61, #62, and #63 failed low. Subsequent adjustments to the detector carriage resolved the problem.

Measurements #61, #62 and #63 bounded survey SP20202. The survey was repeated with acceptable bounding PBCs.

2. T-180 PBC result on September 25, 2006, PBC #262 and #263, include only 2 measurements. The PBC performance was stopped after 2 measurements due to suspected equipment problems and high localized surface contamination. The data was evaluated and the PBCs accepted based on:
    a. Both PBC #262 and #263 were within $\pm 2\sigma$, and
    b. Survey data obtained prior to the PBC was considered normal for the concrete pad being surveyed (i.e. mean value consistent with other concrete surveys)

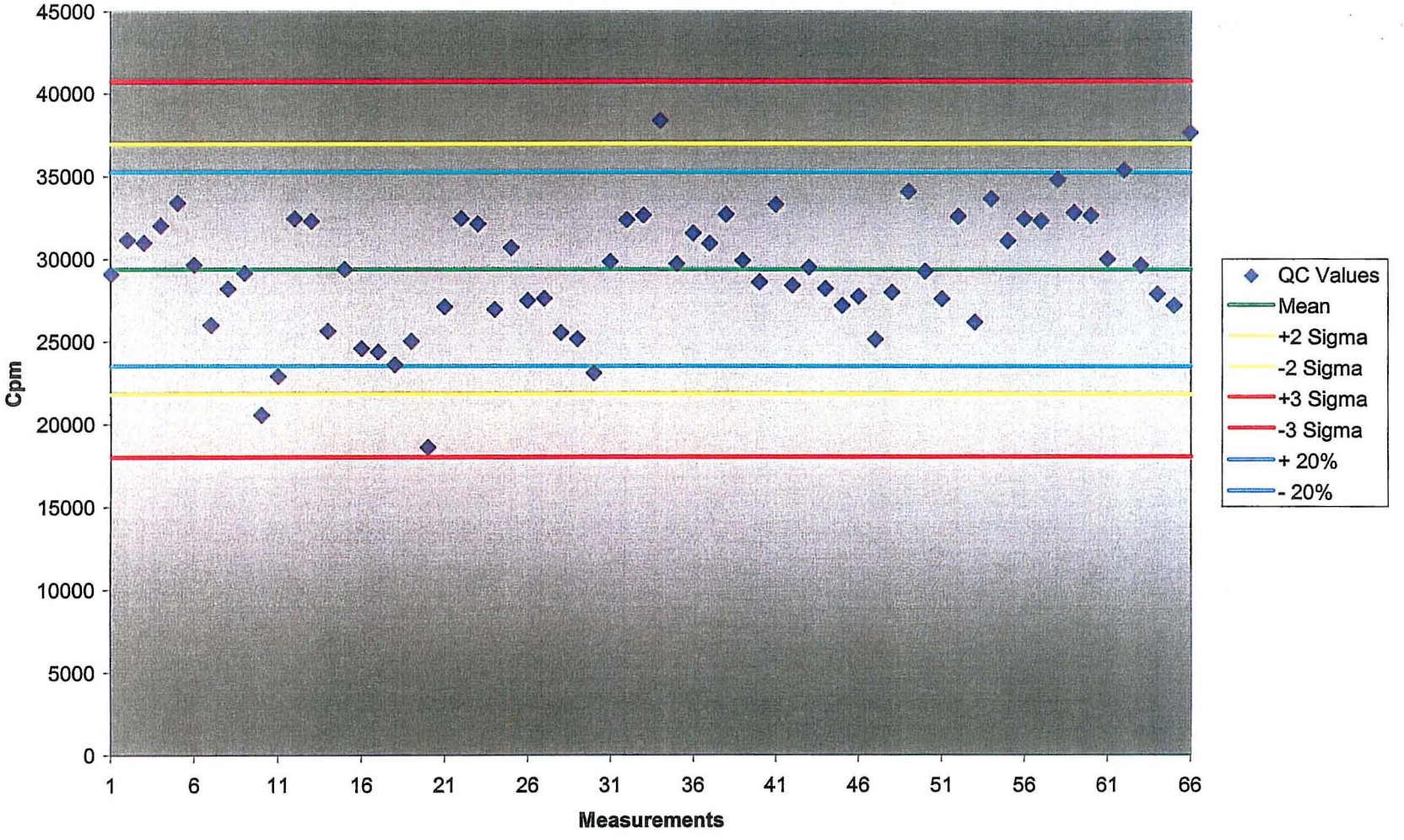
Corner Mode PBCs

The PBC chart for the C-180, are include as attachment 5. The bottom scale of the PBC chart indicates the sequential number of PBCs performed. Attachment 6 correlates the PBC sequential number with the date of performance. The corner mode PBCs satisfied the acceptance criteria, except as discussed below:

1. C-180 PBC results of March 15, 2006 (B503156A) had a single point below -3σ and a second point between -2σ and -3σ. Investigation of the cause identified that the detector was likely not to have been fully purged with P-10. The associated SRC was within specification but also below the target value. Subsequent PBC data showed normal response. Review of data collected with the C-180 detector on concrete surfaces identified normal distribution and mean values compared with the results of surveys with the same detector at other times. The concrete "signature" can be used as an alternate means of determining normal operation of the SCM.
2. C-180 PBC close out on March 15, 2006 not performed. The PBC was not performed at the end of the day due to haste in getting equipment secured and out of the weather. Subsequent PBC at the start of the next day, and data recorded form the actual surveys were normal. SRC and PBC data was within acceptable ranges, and concrete background distribution and mean are consistent with other data obtained in this mode within the bounds of the survey.
3. C-180 PBC results of August 9, 2006, post PBC survey for survey MP20112A failed. The survey was repeated. The data from the failed PBC is in Attachment 6, but was not included in the PBC chart.

Based on the SRC and PBC results, as amplified by investigations performed and detailed above, the SCM operated consistently in all operational modes during the period of this survey.

Richard W. Dubiel, CHP

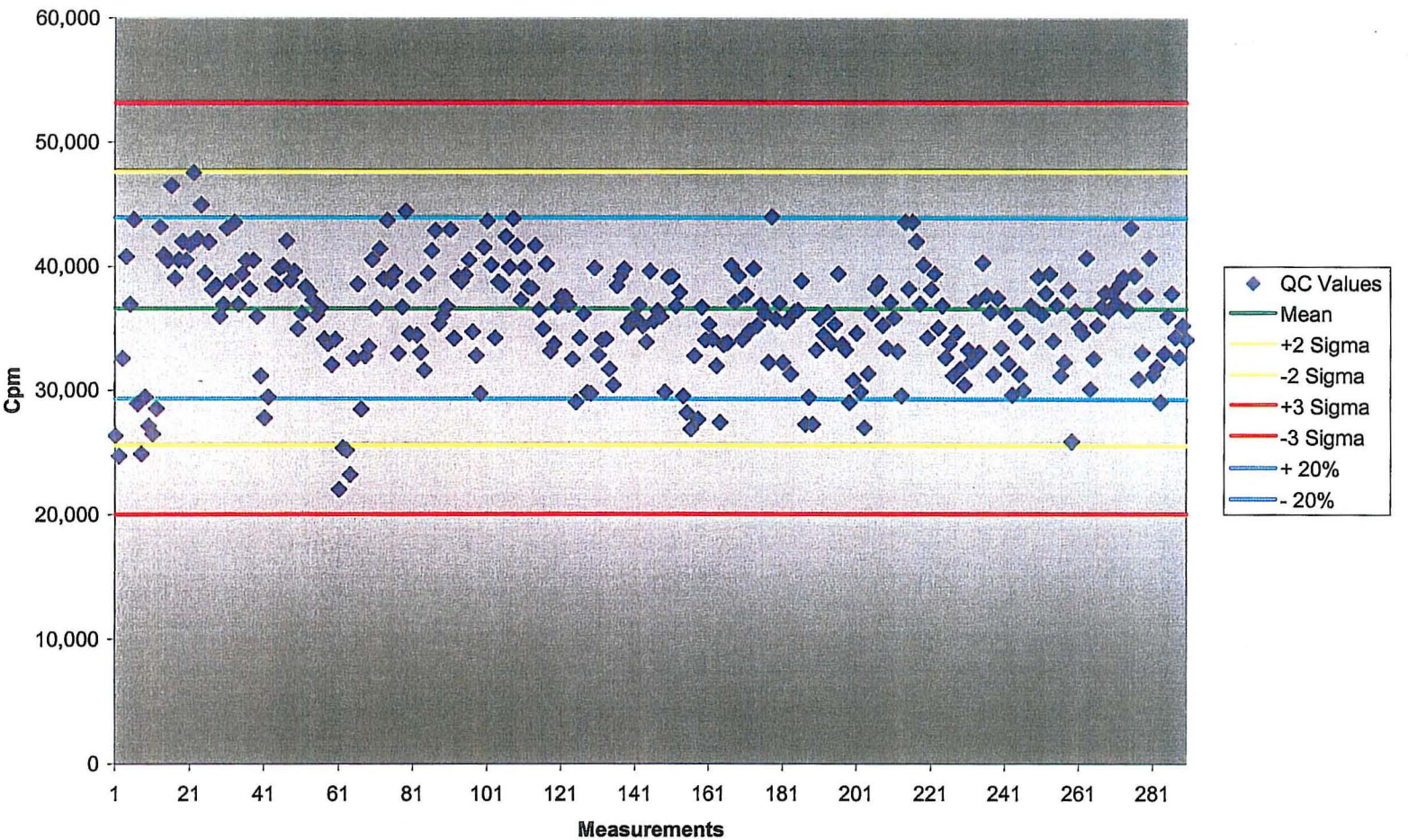


Attachment 1

006295

R-180 Date and PBC # Correlation

Date Time	PBC #	File Name	Gross cpm
3/21/2006	1	B503136A	29087
	2		31161
	3		31010
3/21/2006	4	B503136B	32048
	5		33414
	6		29667
3/21/2006	7	B503146A	25988
	8		28218
	9		29176
3/21/2006	10	B503146B	20539
	11		22898
	12		32464
3/21/2006	13	B503146C	32324
	14		25633
	15		29396
3/21/2006	16	B503156C	24598
	17		24381
	18		23609
3/21/2006	19	B503156D	25036
	20		18606
	21		27112
3/21/2006	22	B503176C	32472
	23		32156
	24		26944
3/21/2006	25	B503176D	30712
	26		27491
	27		27615
3/21/2006	28	B503176E	25527
	29		25159
	30		23092
5/19/2006	31	B505196C	29846
	32		32380
	33		32671
5/19/2006	34	B505196D	38374
	35		29711
	36		31577
5/19/2006	37	B505196E	30943
	38		32719
	39		29913
5/19/2006	40	B505196F	28613
	41		33306
	42		28407
6/7/2006	43	B506076A	29501
	44		28203
	45		27175
6/7/2006	46	B506076B	27739
	47		25126
	48		27988
6/7/2006	49	B506076C	34078
	50		29259
	51		27583
6/7/2006	52	B506076D	32578
	53		26158
	54		33634
6/7/2006	55	B506076E	31095
	56		32421
	57		32312
6/8/2006	58	B506086A	34810
	59		32797
	60		32638
6/8/2006	61	B506086B	30007
	62		35374
	63		29619
6/8/2006	64	B506086C	27872
	65		27182
	66		37645



Attachment 3

006295

SCM5 T-180 PBC # and Date Correlation

Date	PBC #	File Name	Gross cpm	Date	PBC #	File Name	Gross cpm
3/28/2006	1	B503106B	26320	3/30/2006	49	B503306G	39586
	2		24674		50		34928
	3		32538		51		36201
3/28/2006	4	B503126B	40786	3/30/2006	52	B503306H	38315
	5		36930		53		37964
	6		43738		54		37248
3/28/2006	7	B503166A	28904	4/1/2006	55	B504016A	36083
	8		24858		56		36668
	9		29435		57		34113
3/28/2006	10	B503166B	27118	4/1/2006	58	B504016B	33729
	11		26454		59		32042
	12		28502		60		34086
3/28/2006	13	B503186A	43141	4/1/2006	61	B504016C	21977
	14		40875		62		25330
	15		40479		63		25166
3/28/2006	16	B503186B	46475	4/1/2006	64	B504016D	23197
	17		39040		65		32554
	18		40518		66		38569
3/28/2006	19	B503186E	41966	4/1/2006	67	B504016E	28474
	20		40468		68		32730
	21		41708		69		33492
3/29/2006	22	B503296A	47517	4/1/2006	70	B504016F	40543
	23		42187		71		36646
	24		44944		72		41412
3/29/2006	25	B503296B	39446	4/1/2006	73	B504016G	38967
	26		41925		74		43692
	27		38144		75		38775
3/29/2006	28	B503296C	38469	4/1/2006	76	B504016H	39504
	29		35957		77		32956
	30		36910		78		36695
3/30/2006	31	B503306A	43060	4/1/2006	79	B504016I	44425
	32		38764		80		34522
	33		43528		81		38438
3/30/2006	34	B503306B	36922	4/1/2006	82	B504016J	34410
	35		39399		83		33026
	36		40450		84		31589
3/30/2006	37	B503306C	38185	4/1/2006	85	B504016K	39436
	38		40471		86		41250
	39		35961		87		42868
3/30/2006	40	B503306D	31146	4/1/2006	88	B504016L	35349
	41		27767		89		36041
	42		29450		90		36752
3/30/2006	43	B503306E	38567				
	44		38515				
	45		39870				
3/30/2006	46	B503306F	40020				
	47		42028				
	48		38874				

SCM5 T-180 PBC # and Date Correlation

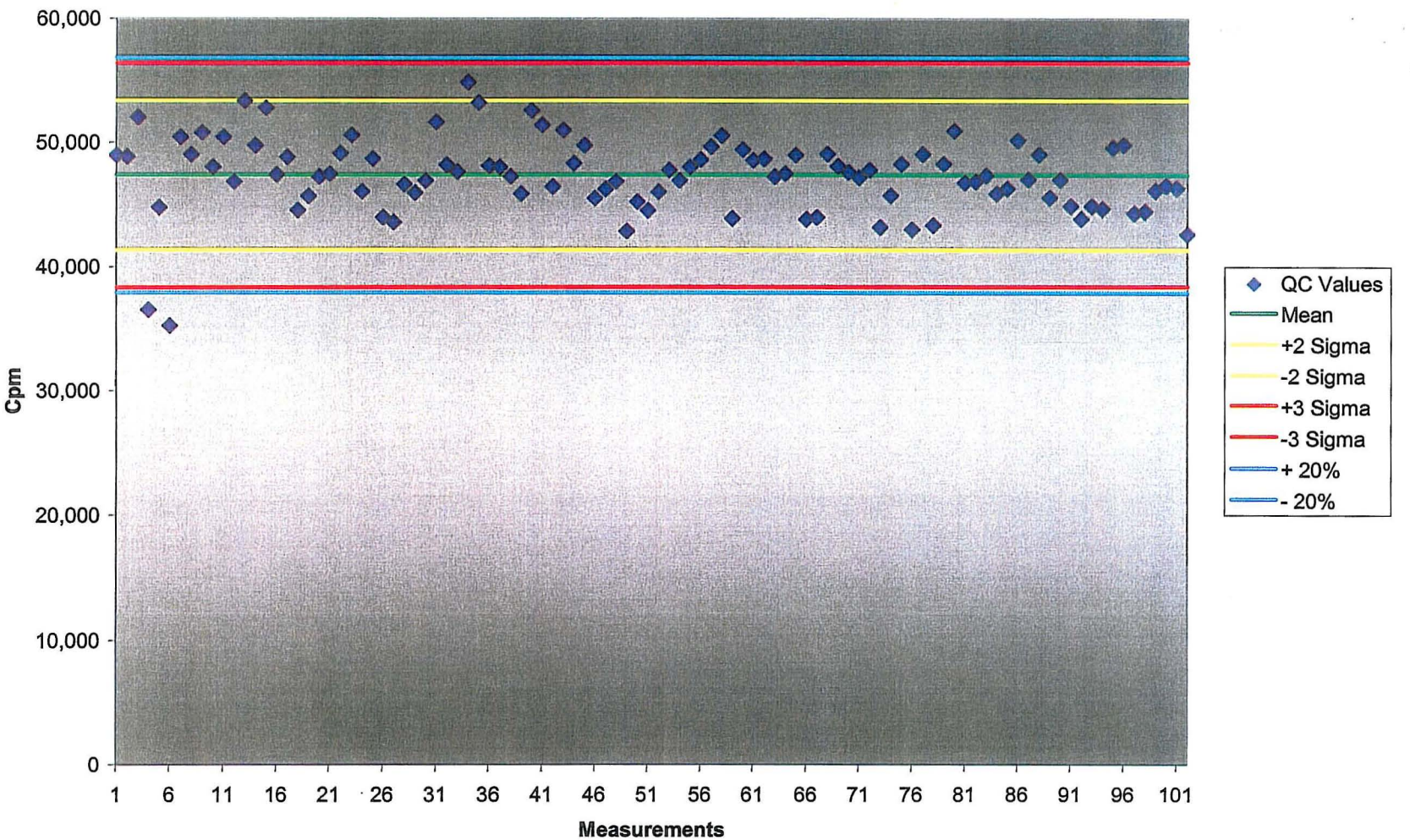
Date	PBC #	File Name	Gross cpm
4/2/2006	91	B504026A	42953
	92		34175
	93		39127
4/2/2006	94	B504026B	38774
	95		39274
	96		40493
4/2/2006	97	B504026C	34685
	98		32769
	99		29714
4/2/2006	100	B504026D	41533
	101		43641
	102		40106
4/2/2006	103	B504026E	34181
	104		38735
	105		38495
4/2/2006	106	B504026F	42378
	107		39914
	108		43814
4/2/2006	109	B504026G	41582
	110		37271
	111		39880
4/3/2006	112	B504036A	38345
	113		38218
	114		41657
4/3/2006	115	B504036B	36503
	116		34922
	117		40161
5/18/2006	118	P505186C	33104
	119		33707
	120		36770
5/18/2006	121	B505186D	37556
	122		37523
	123		36881
5/19/2006	124	B505196A	32463
	125		29012
	126		34178
5/19/2006	127	B505196B	36136
	128		29791
	129		29716
5/20/2006	130	B505206A	39850
	131		32802
	132		34025
5/20/2006	133	B505206B	34082
	134		31683
	135		30393
5/20/2006	136	B505206C	38402
	137		39201
	138		39772
5/20/2006	139	B505206D	35086
	140		35713
	141		35822
6/9/2006	142	B506096A	36868
	143		35160
	144		33868
6/9/2006	145	B506096B	39596
	146		35546
	147		36398
6/9/2006	148	B506096C	35897
	149		29827
	150		39086
6/9/2006	151	B506096D	39167
	152		36780
	153		37898
6/12/2006	154	B506126A	29510
	155		28160
	156		26858
6/12/2006	157	B506126B	32740
	158		27634
	159		36676
6/12/2006	160	B506126C	34032
	161		35283
	162		34108
6/12/2006	163	B506126D	31946
	164		27388
	165		33631
8/9/2006	166	B508096A	33790
	167		40032
	168		37082
8/9/2006	169	B508096B	39210
	170		34056
	171		37696
8/9/2006	172	B508096C	34746
	173		39776
	174		35196
8/18/2006	175	B508186A	36819
	176		36178
	177		32220
8/18/2006	178	B508186B	43955
	179		35757
	180		37002

SCM5 T-180 PBC # and Date Correlation

Date	PBC #	File Name	Gross cpm	Date	PBC #	File Name	Gross cpm
8/24/2006	181	B508246A	32203	9/5/2006	226	B508316C	33749
	182		35534		227		31156
	183		31284		228		34642
8/24/2006	184	B508246B	36318	9/14/2006	229	B509146A	31719
	185		36419		230		30423
	186		38813		231		33227
8/24/2006	187	B508246C	27261	9/14/2006	232	B509146B	32319
	188		29416		233		37102
	189		27238		234		33000
8/24/2006	190	B508246D	33219	9/14/2006	235	B509146C	40265
	191		35722		236		37638
	192		34449		237		36274
8/25/2006	193	B508246E	36257	9/14/2006	238	B509146D	31272
	194		33793		239		37420
	195		35292		240		33404
8/25/2006	196	B508256A	39370	9/22/2006	241	B509196A	36253
	197		33686		242		32120
	198		33232		243		29607
8/25/2006	199	B508256B	28988	9/22/2006	244	B509196B	35128
	200		30767		245		31265
	201		34598		246		29975
8/25/2006	202	B508256C	29849	9/22/2006	247	B509196C	33885
	203		26961		248		36788
	204		31325		249		36533
9/5/2006	205	B508306A	36199	9/22/2006	250	B509196D	39130
	206		38215		251		36084
	207		38664		252		37814
9/5/2006	208	B508306B	35231	9/22/2006	253	B509196E	39379
	209		33377		254		33939
	210		37080		255		36823
9/5/2006	211	B508306C	35835	9/22/2006	256	B509196F	31166
	212		33114		257		32220
	213		29545		258		38052
9/5/2006	214	B508306D	43554				
	215		38169				
	216		43537				
9/5/2006	217	B508306E	41988				
	218		36935				
	219		40095				
9/5/2006	220	B508316A	34205				
	221		38129				
	222		39370				
9/5/2006	223	B508316B	35022				
	224		36799				
	225		32602				

SCM5 T-180 PBC # and Date Correlation

Date	PBC #	File Name	Gross cpm
9/25/2006	259	B509206C	25852
	260		36350
	261		35027
9/25/2006	262	B509206D	34574
	263		40655
9/25/2006	264	B509216A	30081
	265		32521
	266		35239
9/25/2006	267	B509216B	36705
	268		37834
	269		36427
9/25/2006	270	B509216C	37839
	271		37005
	272		38566
10/4/2006	273	B510036A	39103
	274		36462
	275		43096
10/4/2006	276	B510036B	39241
	277		30879
	278		33002
10/4/2006	279	B510046A	37625
	280		40673
	281		31249
10/4/2006	282	B510046B	31864
	283		29013
	284		32937
10/4/2006	285	B510046C	35969
	286		37786
	287		34269
10/5/2006	288	B510046D	32643
	289		35193
	290		34064



Attachment 5

006295

C-180 Date and PBC # Correlation

Date Time	PBC #	File Name	Gross cpm	Date Time	PBC #	File Name	Gross cpm
3/21/2006	1	B503106D	48945	4/4/2006	46	B504046A	45474
	2		48818		47		46207
	3		52000		48		46839
3/21/2006	4	B503156A	36528	4/4/2006	49	B504046B	42848
	5		44772		50		45201
	6		35226		51		44499
3/21/2006	7	B503156B	50388	4/4/2006	52	B504046C	45981
	8		48984		53		47736
	9		50751		54		46929
3/21/2006	10	B503166C	48016	5/18/2006	55	B505186A	47970
	11		50388		56		48594
	12		46828		57		49608
3/21/2006	13	B503166D	53337	5/18/2006	58	P505186B	50505
	14		49725		59		43874
	15		52767		60		49387
3/21/2006	16	B503166E	47385	8/9/2006	61	B508086A	48529
	17		48789		62		48647
	18		44538		63		47217
3/21/2006	19	B503176A	45669	8/9/2006	64	B508086B	47463
	20		47229		65		48945
	21		47455		66		43797
3/21/2006	22	B503176B	49101	8/9/2006		B508086C	44850
	23		50547				33133
	24		46019				34650
3/21/2006	25	B503176F	48672	8/9/2006	67	B508086D	43953
	26		43953		68		49023
	27		43574		69		48060
3/21/2006	28	B503186C	46617	8/10/2006	70	B508096D	47580
	29		45928		71		47151
	30		46917		72		47758
3/21/2006	31	B503186D	51597	8/10/2006	73	B508096E	43173
	32		48150		74		45708
	33		47619		75		48216
3/29/2006	34	B503296D	54809	8/10/2006	76	B508096F	42978
	35		53164		77		49010
	36		48087		78		43329
3/29/2006	37	B503296E	47970	9/5/2006	79	B508316D	48243
	38		47246		80		50895
	39		45840		81		46737
3/30/2006	40	B503306I	52532	9/5/2006	82	B508316E	46814
	41		51363		83		47315
	42		46422		84		45864
3/30/2006	43	B503306J	50934				
	44		48282				
	45		49722				

C-180 Date and PBC # Correlation

Date Time	PBC #	File Name	Gross cpm
9/11/2006	85	B509086A	46254
	86		50115
	87		46995
9/11/2006	88	B509086B	48995
	89		45552
	90		46974
9/11/2006	91	B509086C	44853
	92		43836
	93		44850
9/28/2006	94	B509276A	44623
	95		49542
	96		49764
9/28/2006	97	B509276B	44290
	98		44421
	99		46110
9/28/2006	100	B509276C	46488
	101		46293
	102		42588

Attachment C-2

Supplemental Information on Measurement Methodology and Measurement Variability

Surface Contamination Monitor (SCM) System Approach and Variability of Measurements

From a statistical standpoint, radioactive decay is a random process. It is not possible to tell in advance which atoms will decay in a given time interval. Furthermore, attempting to determine the "true" decay rate by repeatedly counting the number of atoms that decay in a fixed time interval, will not yield a single value, but rather a distribution of values that may be predicted by the binomial distribution function. Radiation counting statistics are basically binomial in nature because any given atom either decays, or does not, in a given time interval. However, under the conditions that apply to the vast majority of radioactivity counting situations (i.e., a very large number of radioactive atoms present and a very small probability of detecting single decay events) the mathematically simpler Poisson distribution may be used to make predictions. It should also be noted that in most circumstances of interest to those performing counting measurements the Poisson distribution is very similar to the Gaussian or normal distribution.

When using the SCM to scan large surfaces for radioactivity, it must be recognized that there are two possible reasons for variability in the measurement results: variation of the amount of radioactivity from place to place on the surface, and variation due to the randomness of the decay and detection processes. Even in situations where there is no radioactivity in the materials from which the surface is made, or the radioactivity is uniformly distributed throughout the material (e.g., natural radioactivity in asphalt or concrete) the measurement results will vary from place to place because of the statistical nature of radioactive decay.

Fortunately, there are several ways to distinguish between the statistical variability of results due to the random decay process and the variability caused by spatially localized contamination incidents. In the former case, the results will be normally distributed in a statistical sense, whereas in the latter case, the results will deviate from a normal distribution. If data are normally distributed in a statistical sense, then about 68.3 percent of the values will be within one standard deviation of the mean of the data set, about 95.5 percent of the values will be within two standard deviations, and about 99.7 percent will be within three standard deviations of the mean. Data that are normally distributed in a statistical sense will form a straight line when plotted on a cumulative frequency diagram. Subsets of the data that are non-normal because they result from spatially localized surface contamination will not fall on the straight line formed by the rest of the data on the cumulative frequency diagram. Plotting the data on color pixel diagrams provides a third means of distinguishing contamination from ordinary random variability in measurement results. The color pixel diagram is a visual display of the measurement results in proper spatial relationship to one another and with different activity ranges represented by different colors. When the pixel diagram displays the results of a scan of an uncontaminated surface, the colors of the pixels are randomly distributed over the diagram. That is, there is no evident spatial pattern or grouping of colors because the measurement results are not spatially correlated. However, if the surface contained one or more localized contamination spots, the measured values from these spots would be spatially correlated. These spots would show up in the color pixel plot as distinct islands of a particular color surrounded by a sea of random colors. The application of these concepts will be discussed more fully later. At this time, however, it is important to stress that several techniques are available to distinguish between expected random variability of measurement results from uncontaminated surfaces and variability indicative of surface contamination.

By design, the SCM accumulates large numbers of measurements during a typical survey, each measurement being tagged with position coordinates relative to an X-Y grid system. Thorough coverage of the scanned surfaces is assured because each measurement result is tied to a very small surface area. However, it is the properties of the data set as a whole that are used to decide whether or not a surface is contaminated. Under these circumstances, individual measurement uncertainties are less important than the statistical properties of the entire data set. Thus, while uncertainties are typically reported with the radioactivity measurement results, this is not the case for SCM measurements. The large amount of data generated, and the diminished importance of individual measurement uncertainties in assessing the quality of SCM measurements, both contributed to the decision to omit individual measurement uncertainties from SCM data reports.

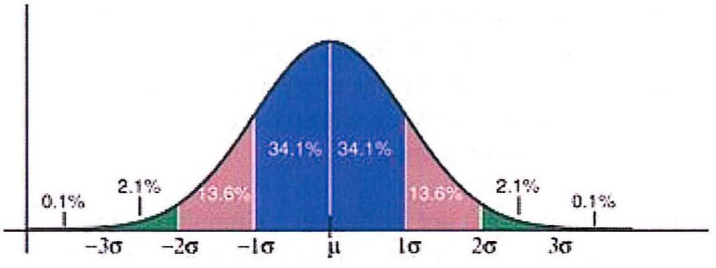
Application of the Surface Contamination Monitor and Survey Information Management System at the Fernald Closure Project

Introduction

The Surface Contamination Monitor (SCM) and Survey Information Management System (SIMS) has been selected to perform surface activity monitoring of selected concrete pads and structures to identify locations for biased sampling. The samples at the locations identified through use of SCM/SIMS, combined with random samples, will be analyzed for evaluation against applicable final remediation levels. The SCM is a gas flow proportional counter utilizing large area detectors with position sensitivity. The SCM probes used at the Fernald Closure Project are 180 cm in length with an active area approximately 10 cm wide. With the large area detectors, the SCM is capable of rapidly surveying large surfaces with essentially 100 percent of the accessible surface included. The output of the SCM is the collection of tens of thousands of measurements, position correlated, each measurement collected for a short period of time. The output from the SCM is processed through proprietary software, SIMS. SIMS is designed to maintain appropriate position correlation, mathematically manage the data, and present results in a color-graphic image, a graphic display of Cumulative Frequency Distribution of the data, and a spreadsheet of critical output parameters. Data processing is typically performed with surface contamination end point criteria defined, such that any specific measurement that exceeds defined criteria is flagged. However, to satisfy the objective of this survey, a spot report has been generated that details, in descending order, the 100-cm^2 areas with the highest recorded values. This document is intended to discuss the application of the various modes of operation of the SCM at the Fernald Closure Project, and interpretation of the output data to meet the objectives of the SCM survey program.

SCM System General Approach

The process of radioactive decay is not constant, but varies in time following Poisson statistics. Each measurement of a radioactive source should be considered as a value within a possible distribution of values that follow the probabilities defined by Poisson statistics. If a surface is not contaminated but contains natural radioactivity such as concrete or asphalt, the activity will be distributed during the mixing or preparation process. Measurements taken on those surfaces will then be normally distributed. The distribution of those measurements is predictable. If the data is normally distributed, then about 68.26% of the values would be within 1 standard deviation of the mean, about 95.46% of the values within two standard deviations and about 99.73% within three standard deviations. This is known as the "68-95-99.7 rule". Typically, however, this assumption becomes less accurate in the tails.



The standard deviation of the data is impacted by several factors. They include the variability in the activity distribution on the surface, the variability of radioactive decay, the consistency of the measurement interval, and the consistency of the source to detector distance. SCM operations will minimize the variations in the measurement time and source to detector distance. In each case the variability is typically unbiased. The measurement time interval is based on a 5 cm travel distance, the SCM driven by a constant torque drive motor and the distance measured by a precision wheel encoder.

Although there will be differences in the speed during individual 5 cm increments due to surface impacts, the average speed over the total distance surveyed will be close to the defined survey target speed. Hence, as many short time intervals will exist as long time intervals. Similarly, the source to detector distance may vary based on surface irregularities. However, a large detector with a flat surface will result in as many high spots as low spots over the full survey surface.

For low activity measurements, the largest impact on the standard deviation is the variability of radioactive decay. The standard deviation associated with radioactive decay is related to the square root of the events measured. Therefore, for high activity sources, measurements are typically more precise since there are large numbers of particles or gamma rays available to detect, the square root of the measured value being a smaller percentage of the value. For measurements made of low activity sources or for short periods of time, the precision of an individual measurement is greatly reduced. However when a large number of measurements are obtained of a low activity source, the resultant data is predictable (Poisson Distribution) and the mean value is precise. The associated precision (standard error) is indirectly proportional to the square root of the number of measurements obtained to determine the mean. The larger the number of measurements, the greater the precision of the mean value.

The SCM design basis includes the accumulation of large numbers of measurements during a survey. A 20 meter by 20 meter area, surveyed with the SCM, will generate 160,000 individual measurements of 100 cm^2. With that quantity of measurements recorded, one can anticipate that 0.1%, or approximately 160 of the measurements, will exceed $+3\sigma$ greater than the mean. With the large number of measurements recorded and the understanding of the statistical nature of radioactive decay, the accuracy of any individual measurement is less critical. Uncertainty of individual measurement becomes unimportant and not addressed. The critical issue is the determination of whether or not measurements obtained fall within the expected normal distribution, and the identification of those that do not, the survey outliers.

The SCM is frequently used in Final Status Surveys, when the activity of the survey is expected to be below acceptance criteria and determination of compliance or if small areas exceed the criteria is the objective. The design basis of the SCM is to accumulate large amounts of spatially correlated data and display those results as both two dimensional color-graphic plots, a statistical representation of the data for comparison against normal distributions, and a spread sheet that details maximum, mean and standard deviation data for specified areas. The SCM output allows for a simple comparison of residual activity against the acceptance criteria.

The color-graphic provides a visual display of the measurement data, presented in dpm/100 cm^2. The values are determined by applying the time of the measurements to the counts obtained in each area, then applying an efficiency factor determined through the use of a known source. Contamination in excess of the natural activity is not typically distributed uniformly. If an area exhibits background radioactivity, values presented in the color-graphic display will be randomly distributed, and no pattern will be evident. A pattern of elevated values, even if the values are within the normal range of other measurements is indicative of non-background material in the area.

All measurements from a SCM survey unit are include in a Cumulative Frequency Distribution (CFD) graph. The graph presents the data of all measurements on the abscissa, while the ordinate is the cumulative percentile of measurements on a standard deviation scale. If the data obtained in a survey unit has normal distribution (e.g. concrete or asphalt natural radioactivity) the CFD will be a straight line with a left to right slope. The slope of the line reflects the standard deviation of the data set. A more vertical line represents a lower standard deviation, while a more horizontal line represents a larger standard deviation. Figure 1 below represents a more familiar display of data the follows Poisson statistics. The data was generated in Excel. Figure 2 is a CFD of the data from Figure 1, representative of a normal distribution.

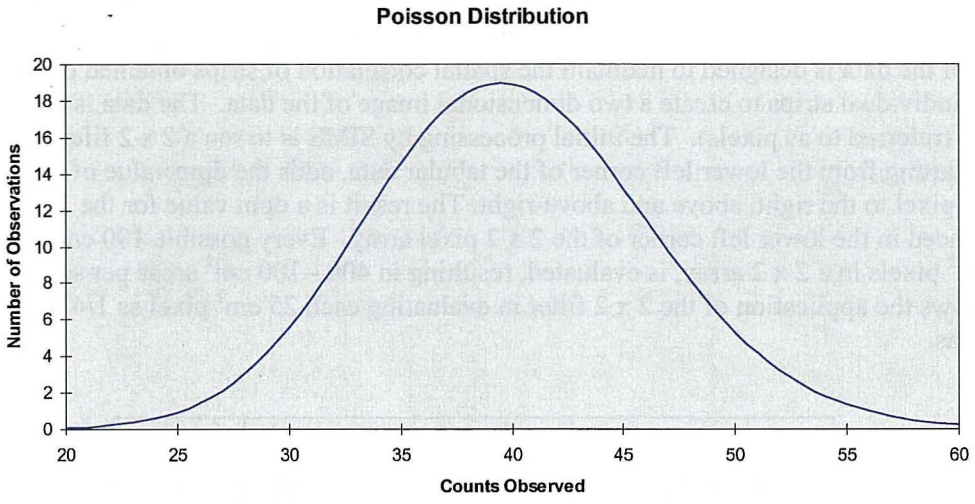


Figure 1: Normal Distribution Plot

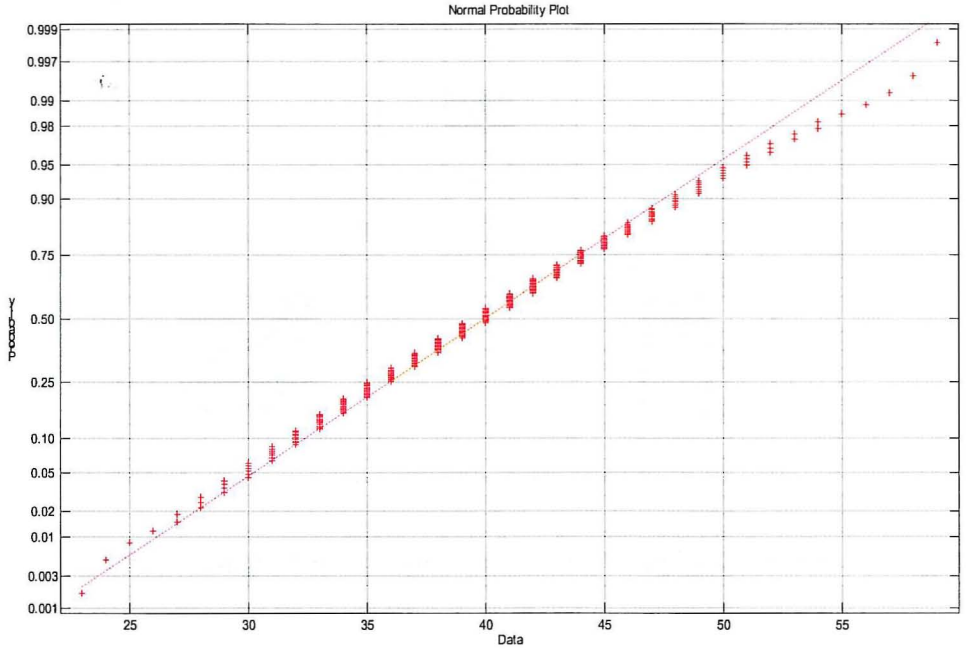


Figure 2: Cumulative Frequency Distribution Plot using data from Figure 1.

SCM Operational Modes

The SCM has been operated in three modes while at the Fernald site. First is the standard rolling mode, referred to as the "trap" mode referring to the trapezoidal cross section of the detector. The detector has an active length of 180 cm, and a width of approximately 12 cm. Due to the trapezoidal design, the efficiency of the outer 1 cm on each side is diminished, resulting in an effective sensitive width of approximately 10 cm. The detector, a Position Sensitive Proportional Counter (PSPC) collects data in 5 cm wide "bins" and accumulates data for every 5 cm of system travel as measured by a precision wheel encoder attached to the SCM axel. The trap mode is used for open, unobstructed surfaces. The SCM

speed was set at 4 inches per second, a speed that satisfies the sensitivity requirements for surface contamination limits in both DOE (DOE Order 5400.5) and NRC (Reg. Guide 1.86) regulations. SIMS processing of the data is designed to maintain the spatial correlation of strips obtained by the SCM. SIMS stitches the individual strips to create a two dimensional image of the data. The data is created as dpm per 25-cm^2 area (referred to as pixels). The initial processing by SIMS is to run a 2 x 2 filter through the data. The filter, starting from the lower left corner of the tabular data, adds the dpm value of each pixel to the value in the pixel to the right, above and above-right. The result is a dpm value for the 100-cm^2 area with the value placed in the lower left corner of the 2 x 2 pixel array. Every possible 100 cm^2 area, comprised of 4 - 25 cm^2 pixels in a 2 x 2 array, is evaluated, resulting in 400 - 100 cm^2 areas per square meter. Figure 3 shows the application of the 2 x 2 filter in evaluating each 25 cm^2 pixel as $1/4^{th}$ of four separate 100 cm^2 areas.

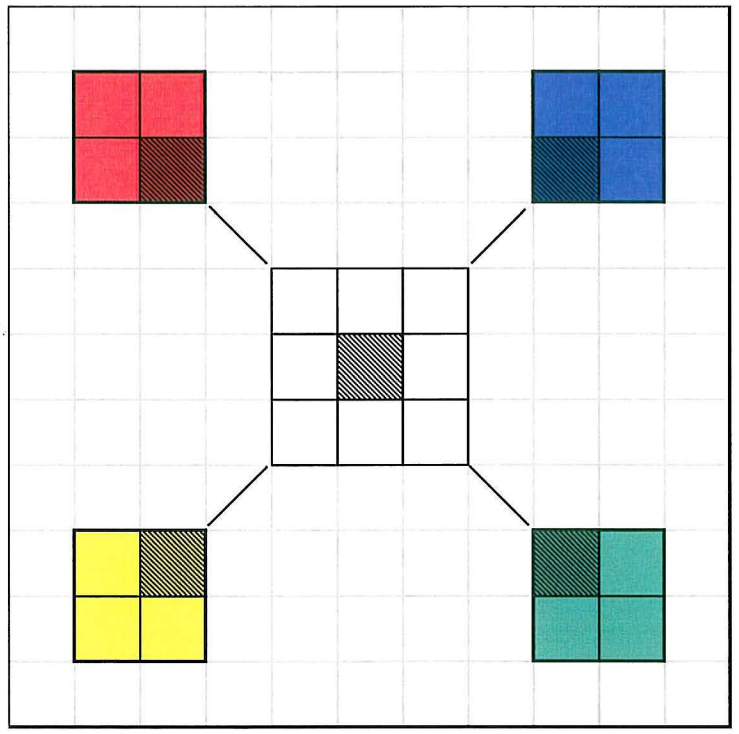


Figure 3: Each 25 cm^2 pixel is considered as $1/4^{th}$ of 4 separate 100 cm^2 areas

The second mode of operation of the SCM is rolling, but incorporates a second detector, with an aluminum plate over the detector face, mounted behind the first. This mode is referred to as Ambient Gamma Background Subtract mode. Events recorded in the second detector are the result of gamma radiation penetrating the aluminum walls of the detector. This mode is used in areas that have a varying gamma field. SIMS processes the data in a similar manner to the trap mode, but for each pixel of data recorded by the first detector, the data recorded in the second detector for the same bin at the same location is subtracted. This mode allows for consistent measurement of surface activity in an area of varying gamma fields. All operational parameters and data processing of the Ambient Gamma Background Subtract mode are identical to the trap mode except that the values identified in each pixel are the first detector minus the second detector measurement values. The Ambient Gamma Background Subtract mode is used at Fernald for several concrete pad surveys that were impacted by varying gamma fields from nearby material storage areas.

The third mode is the corner mode, named for the original application of surveying in the corners of rooms that were not accessible to the trap mode. The corner mode uses detectors that are 180 cm in length, but are box shaped, 10 cm wide. The box shape allows the detector to get close to walls or other objects that restrict use of the trap detectors. The corner mode is use to survey locations that are hard to access with the rolling SCM, such as trenches, edges of a floor against walls, or at heights that can't be reached with the rolling system. The corner mode operates on a timer controlled by SCM computer. Data acquisitions are maintained in 5 cm wide bins, similar to the bins of the rolling trap mode. Measurements obtained in the corner mode are processed in SIMS in a similar manner to the rolling trap mode. If areas, such as walls, are surveyed in a simple pattern, the image created can be spatially correlated. However, for some areas, such as the vertical concrete edges around the circumference of a slab, processing the data to portray the physical layout would be difficult and result in loss of resolution in the color-graphic display. In these situations, the data is aligned sequentially and stitched as if the image were of a rectangular area. Correlation of data to locations in the field is performed through maps generated by technicians at the time of the survey. The count time for surveys at the Fernald site has been set at 4 seconds. This acquisition time has been shown to be optimum for technician performance in the field. The acquisition time with a corner detector is longer than the time of survey of a small area than with a rolling system moving at 4 inches per second, therefore better sensitivity results (lower standard deviation of the data).

For all surveys at the Fernald site, the PSPC detectors were operating on the alpha + beta plateau. In each mode, system efficiency is determined with a NIST traceable source. A 137 Cs source, mid-energy range beta emitter, was used for the efficiency determination. The choice of the 137 Cs source is based on the mid-energy range of the betas emitted. Since the Fernald surveys are intended to determine the highest activity area for sampling, the choice of source was not critical. Results could have been presented in counts per minute with the efficiency not considered.

Evaluation of Data and Determination of Maximum Activity

The results of each survey unit are presented in three separate manners. First, survey results are assembled with proprietary software to create a meter-by-meter grid map of the surveyed surface, with the origin (0,0) located in the southwest corner of the survey (Figure 4). Each 25-cm^2 cell, representing the lower left corner of a 100-cm^2 area, is plotted on this grid to create a pixel map of surface activity (Figure 4). Contiguous black areas on the map represent structural obstacles (e.g., remnant of a wall, pillar, trench, etc.) for which there is no data for this survey. The image is auto-scaled, the maximum value measured for this survey is assigned white, the minimum value assigned dark brown. The randomly distributed speckles of white and yellow are indicative of the randomness of radioactive decay in a homogenous background media (concrete, in this case). If a single small area of contamination is present (e.g., greater than 20,000 dpm/100 cm^2), the hotspot will be the only white and yellow pixels on the map, with the remaining background counts dark brown. Areas of contamination are identifiable by distinct white/yellow areas, or by a pattern of white/yellow pixels.

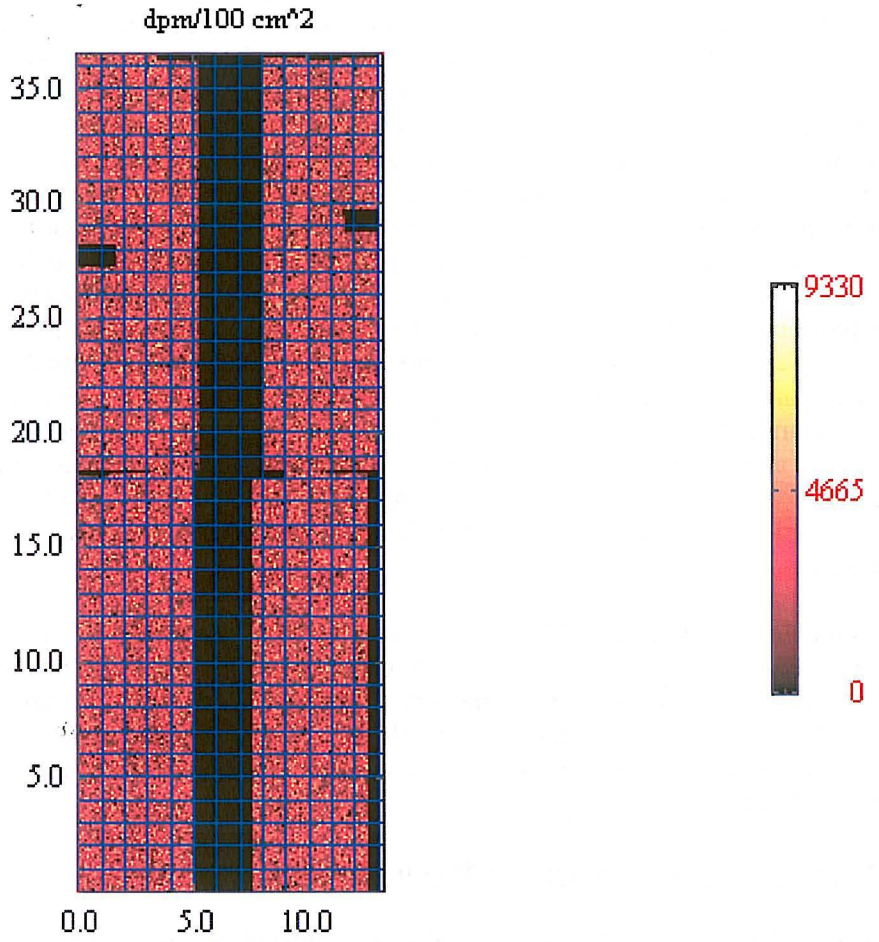


Figure 4: Example of a pixel map for a background survey on concrete. Activity color bar is scaled between the lowest and highest values in dpm per 100 cm^2 reported for the survey.

Second, the CFD plots each dpm/100 cm^2 value in the survey. The result is a large sample population (N) for each survey. When the sample points are ranked and plotted against a percentile scale, most sample points lie along a straight line, indicating the data are normally distributed (see Figure 5). Data points that are not part of normal distribution will appear as outliers and are readily identifiable. As the data follow a normal distribution, the mean and the median (0.5 percentile) are approximately equal. Additionally, the large number of sample points (N) result in the 95% UCL of the mean lying very close to the mean (95% UCL = mean + t*s/$\sqrt{N}$; where t is the student's t statistic, s is the standard deviation and N is the sample size). This is shown by the intersection of the 95% UCL line with the sample trend at the 0.5 percentile line. The 0.9 percentile line indicates that 90% of the samples have a value less than 4400 dpm/100 cm^2. Examples of CFDs from each of the SCM operational modes are provided below.

The SCM, operating in the trap mode at 4 "/sec without background subtract, produces a CFD similar to Figure 5. On the low end of the CFD, zero counts are recorded for less than 1% of the data set, due to the relatively fast scanning speed. The wave pattern at low activities is caused by duplicate counting results for many sample points, due to an increase in integer values (i.e., 1 count, 2 counts, 3 counts, etc.) as activity varies randomly across the area. This pattern is typical of clean concrete surveyed at 10 cm/s. The trend could be smoothed out at the low end by surveying at a slower speed.

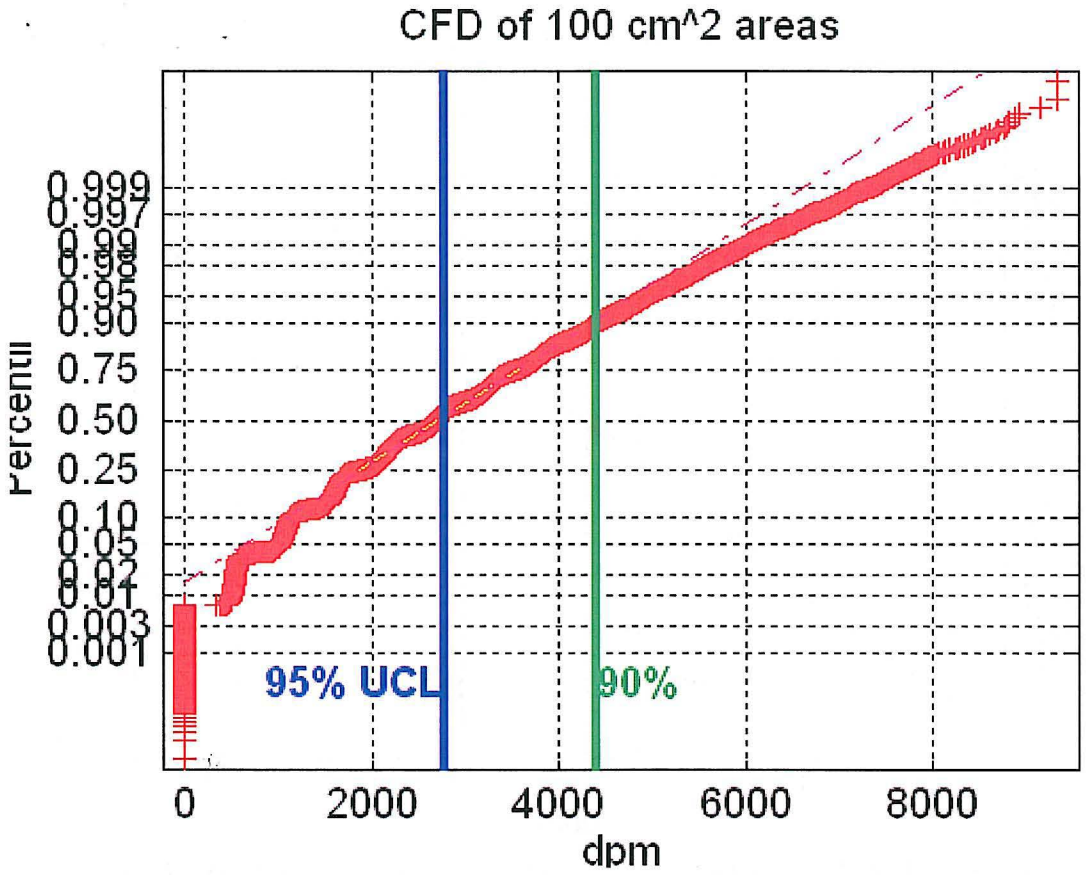


Figure 5: Trap Mode at 4 "/sec CFD of surface activity in 100 cm^2 areas. The horizontal scale is in dpm per 100 cm^2.

The SCM operating in the trap mode at 4 "/sec with Ambient Gamma Background Subtract will produce a CFD similar to Figure 6. The low end of the CFD has been extended to negative numbers and the curve is smooth. This is a result of subtracting a gamma background component that is normally distributed and random from the surface measurements that would be represented by the data used to generate Figure 5. The higher measurements that result from this mode of operation are due to slightly lower efficiency. Although relatively insensitive to gamma, the PSPC will have a slight response to gamma. The efficiency of the system is determined in the same manner as the survey to be performed. By subtracting the small gamma component during efficiency determination, the efficiency is reduced.

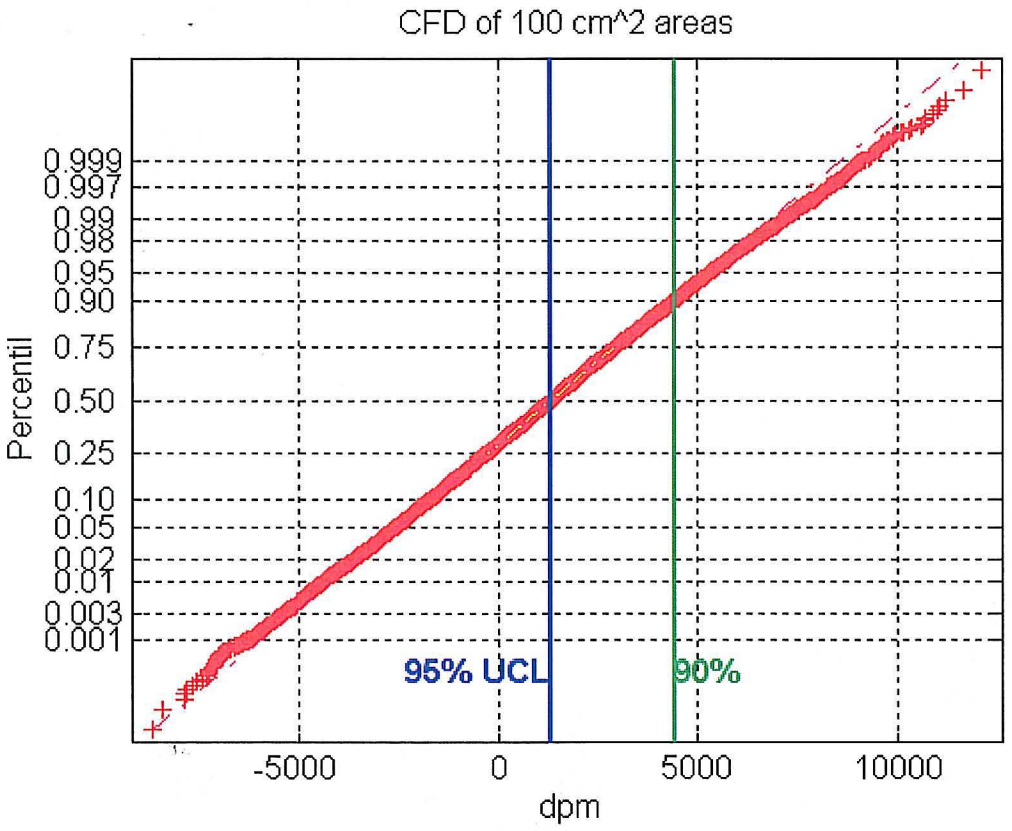


Figure 6: Trap Mode at 4"/sec with Ambient Gamma Background Subtract CFD of surface activity in 100 cm^2 areas. The horizontal scale is in dpm per 100 cm^2.

The SCM operating in the corner mode with a 4 second count time results in a CFD similar to Figure 7. The 4 second count time will reduce the number of 100 cm^2 areas that have zero counts resulting in a smoother curve at the low activity end. The standard deviation will be lower than data produced in the trap mode, due primarily to the longer count time.

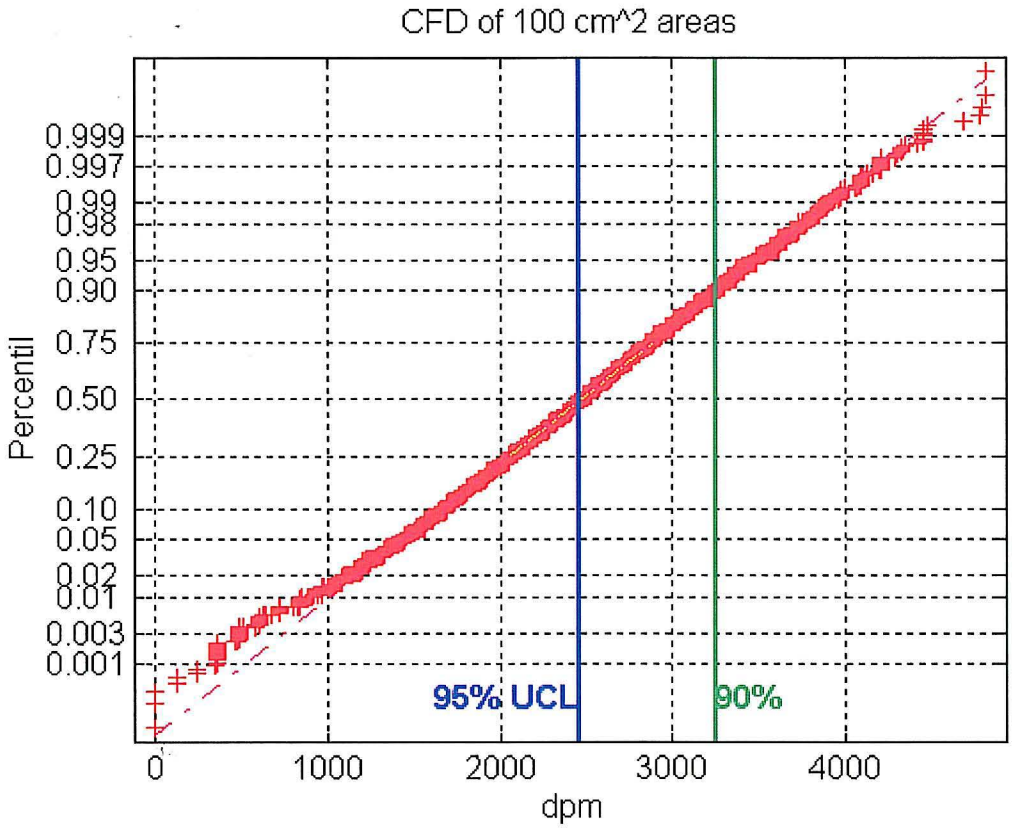


Figure 7: Corner Mode with 4 Sec Count Time CFD of surface activity in 100 cm^2 areas. The horizontal scale is in dpm per 100 cm^2.

In each operating mode, the CFD provides a graphic display of the data, allowing an assessment of the normalcy of the data, existence of outliers and the activity level at which outliers would be recognizable. The CFDs are similar, but differ slightly based on system speed or count time, PSPC efficiency and application of background subtract.

Finally, data is presented in a spreadsheet, summarizing the mean, maximum, standard deviation and area covered based on a 1 square meter grid computer imposed on the two-dimensional graphic image. Included with the spreadsheet is a summary, in descending order of each 100-cm^2 area exceeding a pre-defined value. The spot report identifies the coordinates of the spot relative to the (0,0) point of the image as well as the survey strip number and coordinates relative to the (0,0) point (southwest corner) of the strip. When the highest value is selected, the eight cells in the "halo" (eight pixels immediately adjacent to that pixel) surrounding the highest value are eliminated from further consideration because they were used to determine the selected dpm/100 cm^2 when the 2x2 filter was run through the raw data. This process is repeated to locate the second and third highest dpm/100 cm^2; and the execution of this protocol ensures that three spatially separated areas are marked for the collection of biased samples.

APPENDIX D

CORRECTION OF 7-DAY RADIUM-226 RESULTS

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CORRECTION OF 7-DAY RADIUM-226 RESULTS

On July 10, 2006, OEPA approved DOE's July 6, 2006 request to reduce the in-growth period for radon, with the stipulation that additional soil samples would be collected from non-certified areas to verify initial assumptions and finalize the documentation of the process. This attachment to the certification report presents the analytical results for 7- and 21-day in-growth periods for samples collected from non-certified areas, as described in Variance 20810-PSP-0004-36.

Figure 1 summarizes the results for 48 samples collected from non-certified areas. A regression of the data ($R^2 = 0.9969$) yields the following equation for the estimate of the 21-day value:

21-day value = 1.053*7-day value - 0.0156

This correction will be applied to 7-day analytical results to yield an estimate of the 21-day result. If statistical calculations are performed in the certification report, the estimate for 21-day results will be used to determine the pass/fail criteria for the certification units.

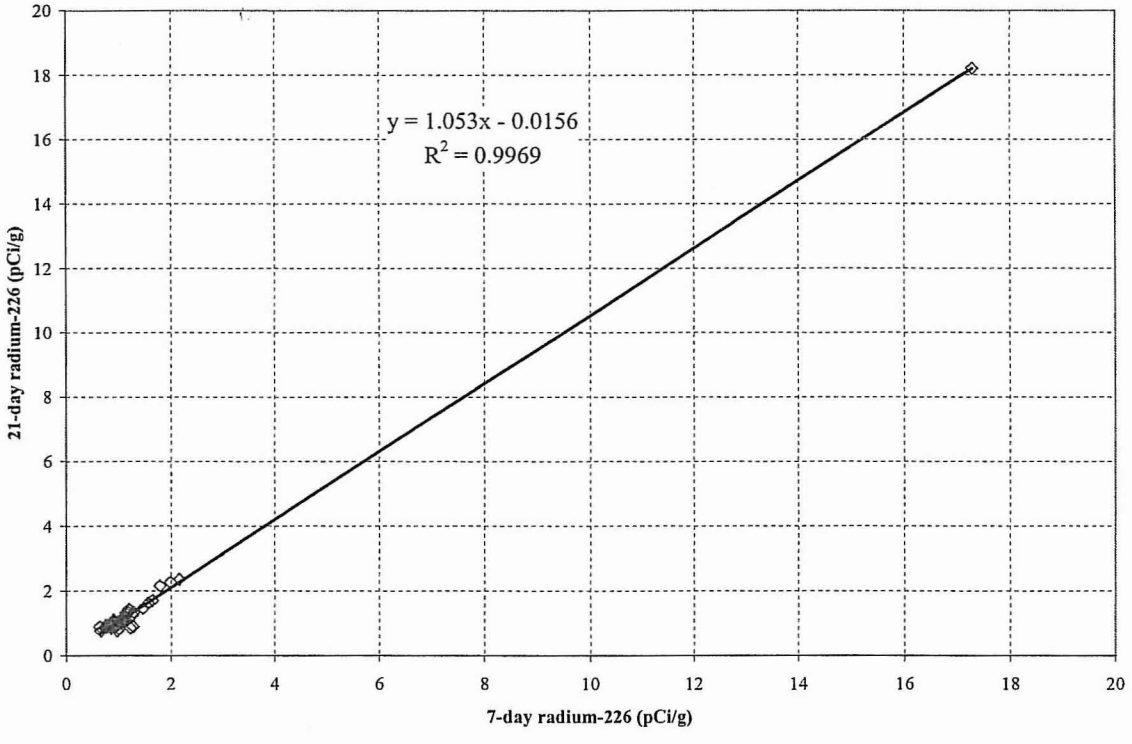

FIGURE 1. Regression analysis of radium-226 data based on 7- and 21-day in-growth period for radon-222