CERTIFICATION REPORT FOR SELECTED CONCRETE STRUCTURES IN THE SILOS 1 AND 2 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
OSDF	On-Site Disposal Facility
OU	Operable Unit
PCB	polychlorinated biphenyl
pCi/g	picoCuries per gram
PSP	Project Specific Plan
RAWP	Remedial Action Work Plan
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
TPU	total propagated uncertainty
TTA	Transfer Tank Area
UCL	upper confidence limit
V/FCN	Variance/Field Change Notice
V&V	verification and validation
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 the Silos 1 and 2 Project Area meet the final remediation levels (FRLs) established for soil and adopted for concrete. The concrete structures (Transfer Tank Building slab and Remediation Facility slab), rationale and strategy for concrete certification sampling was provided in the Certification Design Letter (CDL) and Certification Project Specific Plan (PSP) for Selected Concrete Structures in the Silos 1 and 2 Project Area (DOE 2006a).

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 certification unit 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 two concrete slabs, preparations began for construction of a parking and support area to serve the Multi-Use Education Facility that will be located in the nearby Silos Warehouse building.

This Certification Report includes details of the certification sampling, analysis, and validation that was performed for the two concrete slabs in the Silo 1 and 2 Project Area. As stated in the CDL/PSP regarding the potential for additions and deletions of concrete components from the plan, some areas originally identified for potential certification were removed from the scope due to the infeasibility of attaining certification for the concrete due to their location within the facilities and the demolition sequence. The concrete removed from the scope of the CDL 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 based on stains and surface cracks or seams. The sizes of the certification units were also substantially reduced compared to SEP requirements for soil.

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.

Of the three CUs presented in this report as candidates for certification, seven samples out of a total of 89 collected for certification failed the hotspot criteria for radium-226 (greater than two times the FRL). As a result, several areas of the Transfer Tank Building slab and the Remediation Facility slab were either scabbled or hammered to remove the concrete surface followed by resampling. The resample results were less than the certification hotspot criteria as well as the other certification criteria defined in the SEP and summarized in this report.

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 two concrete slabs in the Silos 1 and 2 Project Area meet established soil final remediation levels (FRLs) which have also been adopted for concrete. The concrete slabs to be certified to meet soil FRLs served as the foundation and floor of the Transfer Tank Building and the Remediation Facility constructed from 2002 to 2004 for treatment of the K-65 waste material. The concrete area for certification is 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 Fernald Closure Project (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. Certified concrete can be used to stabilize an area where soil erosion has occurred in the Southern Waste Units while providing an ideal habitat for amphibians and reptiles through properly placed layers of clean concrete debris. Additionally, the Transfer Tank Building and Remediation Facility slabs will serve as a base for a parking and support area for the Multi-Use Education Facility to be located in the nearby Silos Warehouse. The approved plan for beneficial re-use 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 2006b).

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 and approved via the Certification Design Letter (CDL)/Certification Project Specific Plan (PSP) developed for this purpose [the CDL and Certification PSP for Selected Concrete Structures in the Silos 1 and 2 Project Area (DOE 2006a)].

1.3 SCOPE AND DESCRIPTION

The scope of this Certification Report includes details of concrete certification sampling, analysis, data validation and the evaluation and presentation of analytical data compared to certification criteria. The concrete structures to be certified were reduced from the original scope proposed in the CDL due to the infeasibility of certifying portions of concrete (e.g., walls and upper decks). Figure 1-1 depicts the final concrete slabs for certification. The specific concrete area descriptions are as follows:

- Transfer Tank Area (TTA) Building foundation slab - floor slab is 22,500 square feet (ft^2) with concrete thickness ranging from 2.5 feet across most of the floor to 3.5 feet around the foundation perimeter; includes four tank pedestals (1.5 feet thick) with a sump in the center of each. A shallow floor trench oriented in the north to south direction runs through the floor leading to a center floor sump measuring 4 feet by 4 feet by 4 feet.

- Silo 1 and 2 Remediation Facility foundation slab - the floor slab surface area is approximately 65,800 total ft^2. The floor slab contains several sumps and shallow surface trenches, primarily in the waste processing and container fill rooms.

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 certification units (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 Failing Preliminary Certification Statistics

Appendix B Certification Samples, Analytical Results and Final Statistics Tables

Appendix C Precertification Radiological Scan Maps and Results

Appendix D Variances/Field Change Notices (V/FCNs) for the CDL and Certification PSP for Selected Concrete Structures in Silos 1 and 2 Project Area

Appendix E Correction of 7-Day Radium-226 Results

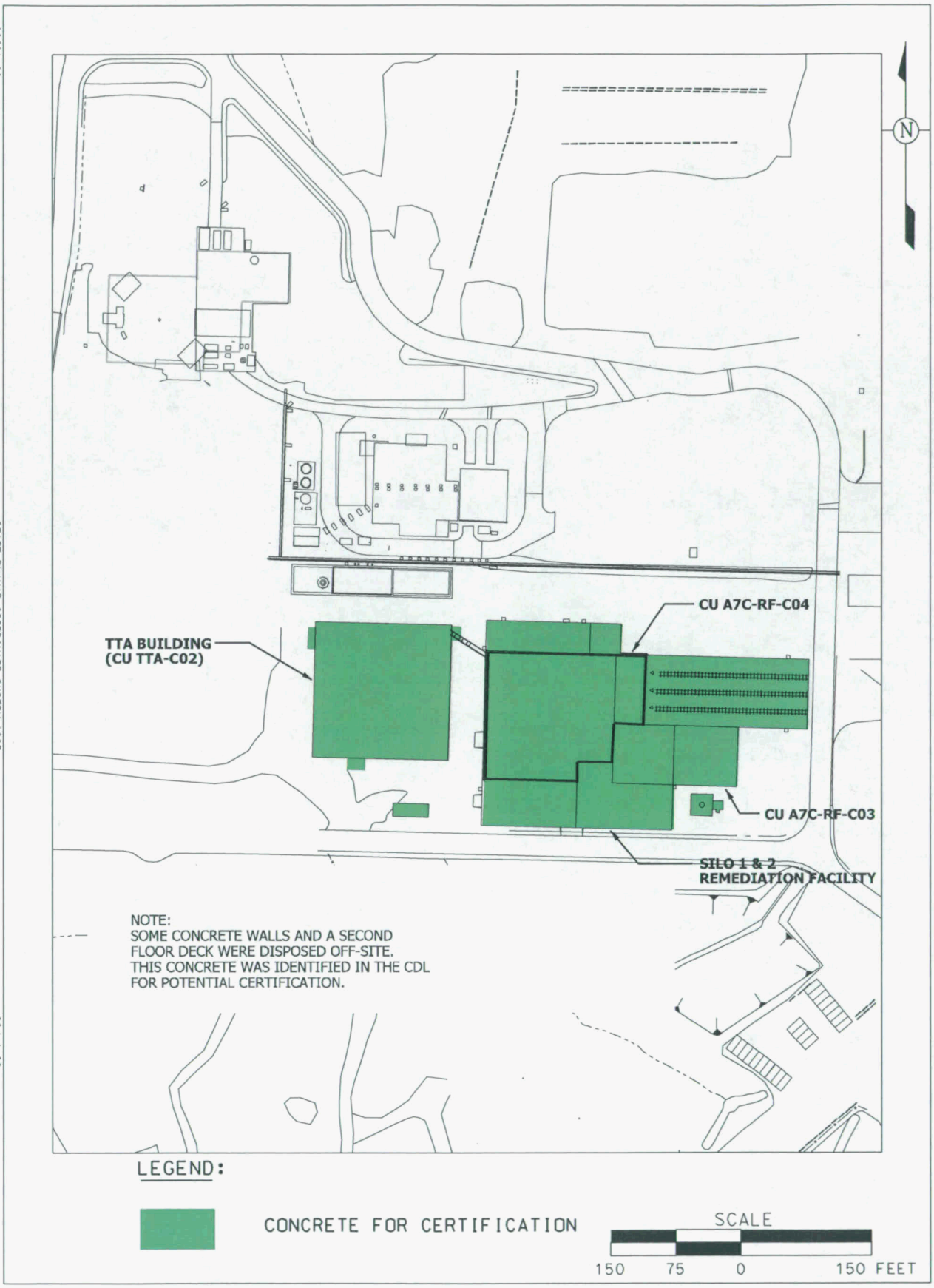


FIGURE 1-1. SILOS 1 & 2 PROJECT AREA -
SELECTED CONCRETE FOR CERTIFICATION

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 Selected Concrete Structures in the Silos 1 and 2 Project Area.

2.1.1 ASCOC Selection Criteria

The selection of ASCOCs for the Silos 1 and 2 Project concrete structures was accomplished by reviewing the analytical data set for the source K-65 waste processed within the subject buildings 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 re-use 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 K-65 waste 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 ASCOC Selection for the Silos 1 and 2 Project Area Concrete

The ASCOC list in Table 2-1 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 as 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 2-1. Table 2-2 includes the final ASCOC list applied to the concrete in the Silos 1 and 2 facilities.

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 (summarized in Section 4.0) and the provision to collect biased samples based on the radiological surface scan results. The scanning methodology was used to locate the highest radiological surface contamination that was present in a given CU so that biased core samples could be collected for laboratory analysis. Figures 2-1 and 2-2 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, 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 was generally defined as an area with a relatively high potential for interim contamination due to waste handling operations and/or demolition).

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 two 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.

Table 2-3 summarizes the actual samples collected from the two concrete slabs 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 retested. This process continued, until all 16 random locations met the minimum distance criteria. The sub-CUs and all final sampling locations are shown on Figures 2-1 and 2-2. 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.

- 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. 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). Neither of the two pads had significant organic or chemical-stained areas.
- One biased sample in the bottom of each floor sump or floor trench was collected.

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/PSP to collect a 1-inch thick by 3-inch diameter core for laboratory analysis for the COCs.

Below is a summary of the sampling that was performed in each concrete CU proposed for certification covered under this report:

Transfer Tank Building Slab (CU A7C-TT-C02)

Twenty random samples and twelve biased samples (including three biased based on radiological scans, five sump locations, and four crack locations) were collected for the Transfer Tank Building CU. This CU is depicted in Figure 2-1. Based on the first round of sampling at biased locations (based on radiological scans), three locations failed the hotspot criteria for radium-226 [>3.4 picoCuries per gram (pCi/g)]. The surface concrete in these three areas was removed and remediated using scabbling equipment and radiological scanning was repeated over the area. Refer to Section 4.0 for further discussion on hotspot removals. The resampling results at the three maximum alpha/beta locations passed the certification criteria for radium-226.

Remediation Facility - Former Waste Process Area (CU A7C-RF-C04)

Sixteen random samples and fourteen biased samples (including three biased based on radiological scans, ten sump locations, and two crack locations) were collected from this CU. This CU is depicted in Figure 2-2. Based on the first round of sampling, two locations failed the hotspot criteria for radium-226 (>3.4 pCi/g) and the general area surrounding the sample locations was found to have elevated surface contamination based on radiological scan results. This area of the slab was removed using a hydraulic hammer (mounted on a trackhoe) and scanning and surveying was repeated over the area. Refer to Section 4.0 for further discussion on hotspot removals. The resampling results at the locations passed the certification criteria for radium-226 following removal of the contaminated concrete surface.

Remediation Facility - Former Non-Waste Process Area (CU A7C-RF-C03)

Seventeen random samples and seven biased samples (including four biased based on radiological scans, one sump location, and two crack locations) were collected from this CU. This CU is depicted in Figure 2-2. Based on the first round of sampling, two locations failed the hotspot criteria for radium-226 (>3.4 pCi/g), including one random sample location (near the same hotspot area that was also observed in the adjacent CU A7C-RF-C04) and one biased location from the radiological scan results. The surface concrete in these areas was removed using a hydraulic hammer and radiological scanning and surveying was repeated over the area. The resampling results at both locations passed the certification criteria for radium-226.

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.

TABLE 2-1
ASCOC LIST FOR SILOS 1 AND 2 PROJECT CONCRETE STRUCTURES

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.	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 floor slabs of the Area 7 support 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 floor slabs of the Area 7 support 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

PCB - polychlorinated biphenyl

TABLE 2-2
FINAL ASCOC LIST FOR SILOS 1 AND 2 PROJECT CONCRETE STRUCTURES

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

mg/kg - milligrams per kilogram

TABLE 2-3
SUMMARY OF CONCRETE SLABS AND CERTIFICATION UNIT SAMPLING

CU Area	Surface Area (ft^2)	Number of CUs	Number of Samples	ASCOC Groups
Transfer Tank Building Slab CU A7C-TT-C02	22,500	1	20 random samples 3 locations biased to radiological scan results 5 sump locations 4 crack locations	Radium, thorium, uranium, lead-210, arsenic, beryllium, cobalt, lead, molybdenum
Remediation Facility Slab (former waste process area) CU A7C-RF-C04	23,600	1	16 random samples 3 locations biased to radiological scan results 10 sump locations 2 crack locations	Radium, thorium, uranium isotopes, lead-210; select metals and 1 PCB
Remediation Facility Slab (area not used for waste processing during operations) CU A7C-RF-C03	42,200	1	17 random samples 4 locations biased to radiological scan results 1 sump location 2 crack locations	Radium, thorium, uranium, lead-210, arsenic, beryllium, cobalt, chromium, lead, and manganese

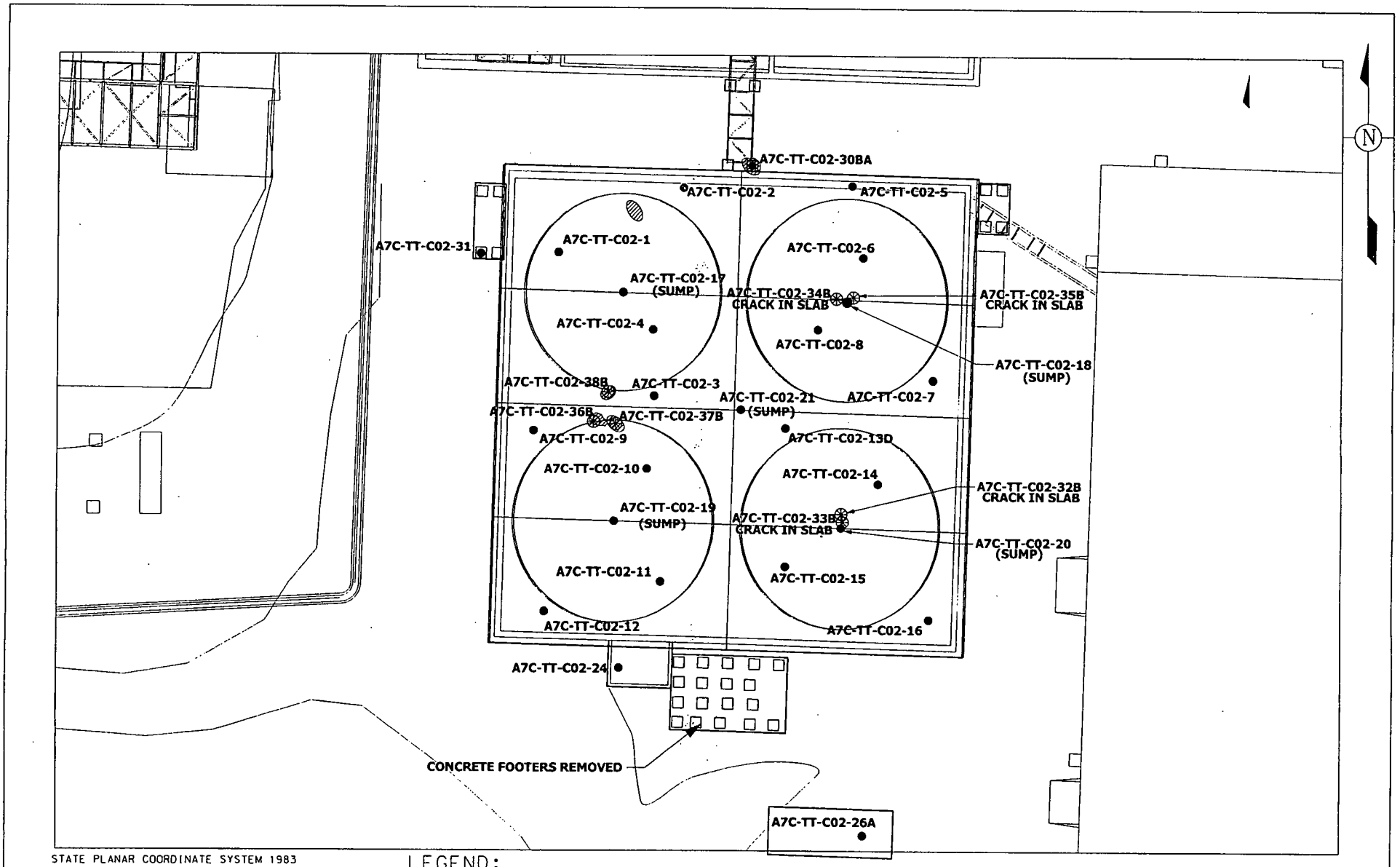
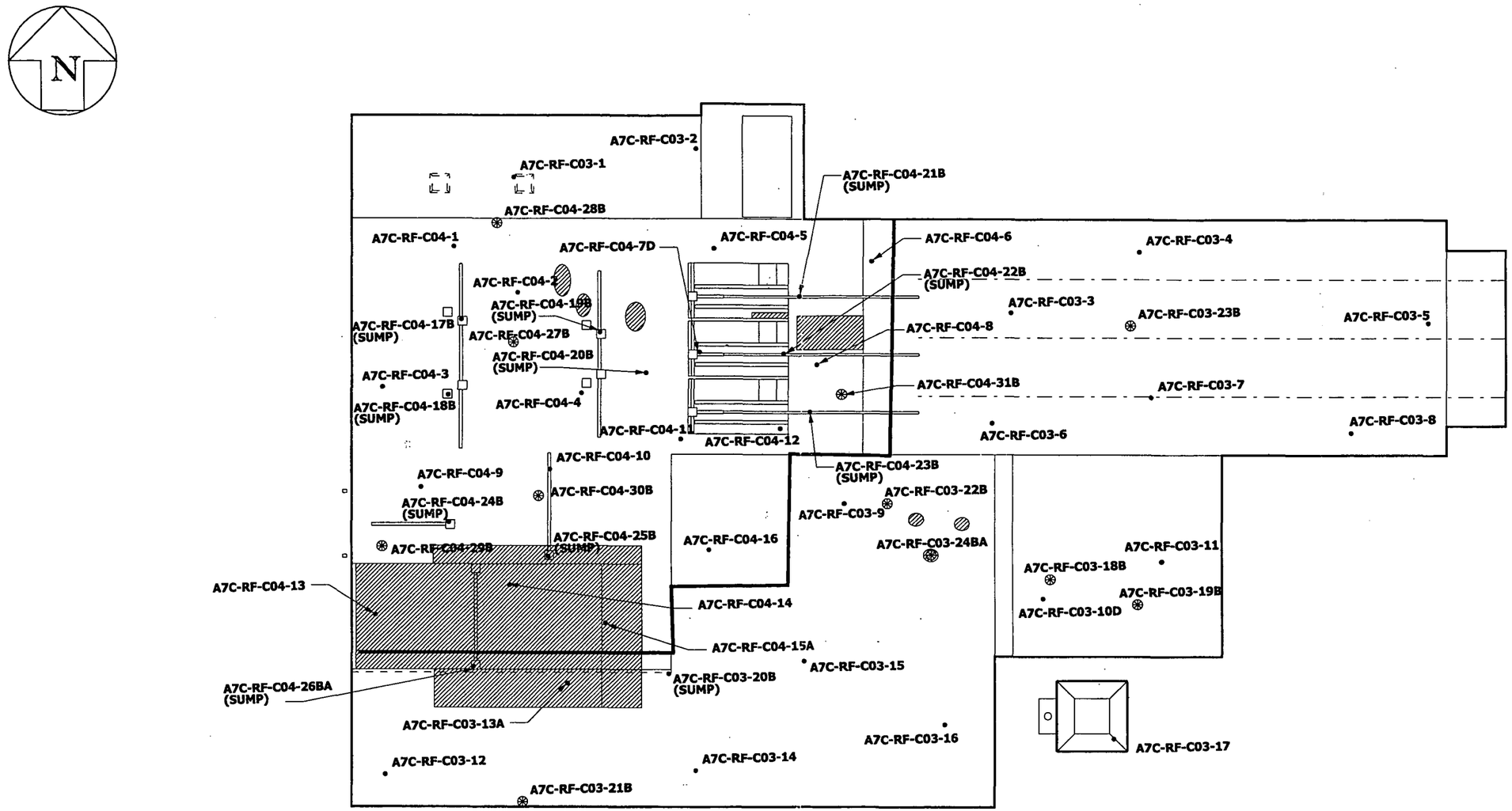


FIGURE 2-1. TRANSFER TANK BUILDING CERTIFICATION UNIT FINAL SAMPLE LOCATIONS



V:\2fm12\dgn\silos12_process fac.dgn STATE PLANAR COORDINATE SYSTEM 1983 27-OCT-2006

LEGEND:

• RANDOM SAMPLE OR BIASED SUMP SAMPLE

⊛ BIASED SAMPLE – LOCATIONS BASED ON ALPHA/BETA SCANS AND SURFACE CRACKS

CONCRETE SCABBLED OR HAMMERED, REMOVED AND RESAMPLED

SCALE

40 20 0 40 FEET

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FIGURE 2-2. SILOS 1 & 2 REMEDIATION FACILITY PAD CERTIFICATION UNIT FINAL SAMPLE LOCATIONS

3.0 OVERVIEW OF PRECERTIFICATION AND FIELD ACTIVITIES

In accordance with the SEP, prior to conducting precertification and certification activities, the historical use of the two concrete slabs in the scope of this certification report was evaluated to verify that the concrete could be feasibly decontaminated if necessary and ultimately meet the soil FRLs. The slabs were constructed from 2002 to 2004 to support waste treatment operations from 2005 to 2006.

3.1 AREA PREPARATION AND PRECERTIFICATION

The first step in preparing the concrete for certification involved the removal of demolition debris from the slab following by 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 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) (NUREG-1575/EPA 402-R-97-016 2000), and details are presented in the two referenced CDL/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.

Several areas on the Transfer Tank slab and Remediation Facility slab were remediated by removing the top surface of concrete based on the radiological scan results using the SCM system as indicated on Figures 2-1 and 2-2. The methods used to remove the surface concrete involved the use of scabbling

equipment on the Transfer Tank slab and a hydraulic hammer (hoe ram mounted on a trackhoe) on the Remediation Facility slab. The depth of concrete removal typically ranged from a fraction of an inch (scabbling) up to a depth of 3 to 6 inches (hydraulic hammer) to accomplish removal of the surface contamination. Sample data collected early in the field sampling effort from the Transfer Tank Area slab was used as a guide for identifying localized areas of contamination, based on radiological scan results, requiring surface removal of the concrete in various areas of the three CUs representing the two slabs. The removal of these particular sections of concrete was done to ensure that the CU would be likely to meet the certification criteria based on results from the random and high-biased sample locations. After removal of the localized areas of surface contamination, the new surfaces were rescanned with the SCM system as surface conditions permitted (e.g., when the surface was amenable for scanning using the relatively delicate gas-proportional detectors). Alternatively, portable beta-gamma instruments were used to verify to the extent possible that the remediated areas were ready for certification sample collection.

Laboratory results were reviewed to ensure that each CU passed the certification criteria prior to beginning placement of a soil cap over the slabs.

3.2 CHANGES TO SCOPE OF WORK

The scope of work under the CDL/PSP for the Transfer Tank slab and the Remediation Facility slab required five changes, which were documented with five V/FCNs (see Appendix D) and discussed in the following paragraphs.

Variance 20500-PSP-0012-01 documented the analysis of preliminary test samples from a contaminated portion of the Remediation Facility floor prior to any demolition activity to evaluate the correlation between field instrument readings and laboratory results. These samples were not collected for certification purposes.

Variance 20500-PSP-0012-02 documents the collection and analysis of samples from a debris stockpile generated from the silos project area to evaluate alternate off-site disposal options at permitted disposal facilities.

Variance 20500-PSP-0012-03 documents the deletion of CUs from the scope of the CDL/PSP. These CUs represented the Transfer Tank Building walls and second floor deck, the Remediation Facility loadout area walls, and the Remediation Facility west wall.

Variance 20500-PSP-0012-04 documents the change in the laboratory turn-around time for selected samples from the Transfer Tank Building slab.

Variance 20500-PSP-0012-05 corrects the coordinates for two certification sample locations on the Transfer Tank Building slab.

Variance 20500-PSP-0012-06 corrects four sample identifiers included in Figure 4-2 of the CDL/PSP. The variance also covers the deletion of two certification samples from the plan since the concrete represented by these samples were removed and disposed. The sections of concrete consisted of footers for the stairway and a pipe rack outside of the Transfer Tank Building.

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 B and a summary of the analytical methods are as 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.

Polychlorinated Biphenyl (PCBs)

Samples submitted for PCB analyses were analyzed by gas chromatography.

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 E), 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.

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. The preliminary failing certification statistics, limited to exceedances of the hotspot criteria, are presented in Appendix A and final certification data are presented in Appendix B.

5.1 CERTIFICATION RESULTS AND EVALUATION

Below is a summary of the findings from the initial certification sample results and the follow-up re-sample results following remediation of the concrete surfaces where necessary.

A7C-TT-C02

This CU failed one of the certification requirements (individual sample results >two times FRL) for radium-226. Two of the biased sample locations, identified and sampled as part of the three locations of the Transfer Tank slab having the maximum dpm/100 cm^2 based on the radiological scan, had a radium-226 result that exceeded this criteria. Sample A7C-TT-C02-22B and -23B had a radium-226 result of 26.6 pCi/g and 19.5 pCi/g, respectively. These two locations were located within a few feet of each other on the northern edge of the southwest tank pedestal (raised base of concrete that supported a tank). The radiological scan results and maps were utilized to define the areas in need of surface remediation (removal of the concrete surface) around the vicinity of these sample locations. The area encompassing the sample locations and general area (based on radiological scan maps) was remediated using scabbling equipment followed by a repeat scan over the area. Resampling followed at the revised top three locations having the maximum radiological scan results. The new biased sample locations (identified as A7C-TT-C02-36B, -37B, and -38B) passed the certification criteria for radium-226 as well as other COCs. Additionally, another area on the northwest pedestal was scabbled based on radiological scan results that were approximately the same range of surface contamination levels as the area discussed above having >two times FRL radium-226 laboratory results.

One of the random sample locations, A7C-TT-C02-30B, also failed the two times FRL criteria for radium-226. This sample was located on a former pipe rack footer (2 feet by 6 feet) that extended out from the Transfer Tank slab on the north side (refer to Figure 2-1). The surface concrete of this area was removed and followed by a radiological survey; a hand-held beta-gamma instrument was utilized due to the rough surface. The location was re-sampled and the result passed the certification hotspot criteria with a result of 2.0 pCi/g. The new sample is identified as A7C-TT-C02-30BA and results are presented in Appendix B.

The failing preliminary certification results and statistics are presented in Appendix A. Following remediation of the concrete surface and re-sampling, all of the certification criteria passed for this CU. Final sample results are presented in Appendix B. Final sample locations are shown in Figure 2-1.

A7C-RF-C03

This CU failed one of the certification requirements (individual sample results >two times FRL) for radium-226. One of the biased sample locations, consisting of one of the top three locations of the CU A7C-RF-C03 having the maximum dpm/100 cm^2 based on the radiological scan, had a radium-226 result that exceeded this criteria. Sample A7C-RF-C03-24B had a radium-226 result of 8.2 pCi/g. This area was remediated by removing the concrete surface using the radiological scan results as a guide and then the area was resurveyed using portable beta-gamma instruments (due to the rough surface). A sample was collected from the new surface, which passed the certification criteria; the radium-226 result was 3.0 pCi/g (identified as sample A7C-RF-C03-24BA in Appendix B and on Figure 2-2).

One of the random sample locations failed for the hotspot criteria at location A7C-RF-C03-13 with a radium-226 result of 9.4 pCi/g. This sample was located within a relatively large area that was later identified as having elevated readings based on radiological scan results and maps. As shown on Figure 2-2, this area of the slab was remediated using a hydraulic hammer to remove the concrete surface for disposal. This location was resampled and the radium-226 result was 0.6 pCi/g.

The failing preliminary certification results and statistics are presented in Appendix A. Following remediation of the concrete surface and resampling, all of the certification criteria passed for this CU. Final sample results are presented in Appendix B. Final sample locations are shown in Figure 2-2.

A7C-RF-C04

One of the random sample locations failed for the hotspot criteria at location A7C-RF-C04-15 with a radium-226 result of 13.7 pCi/g. This sample was located within a relatively large area that was later identified as having elevated readings based on radiological scan results and maps (same area as discussed above for CU RF-C03). As shown on Figure 2-2, this area of the slab was remediated using a hydraulic hammer to remove the concrete surface for disposal and re-surveyed using portable beta-gamma instruments (due to the rough surface). This random location was re-sampled and the radium-226 result was 0.7 pCi/g (identified as A7C-RF-C04-15A and included in Figure 2-2).

In the same vicinity of the slab as discussed above, sample A7C-RF-C04-26B failed the hotspot criteria for radium-226 at 8.8 pCi/g. This sample was location in the bottom of a sump. The sump was hammered to remove the top few inches of the surface and the area was re-surveyed using a portable beta-gamma instrument. The area was determined to be remediated based on the radiological survey and a new sample was collected. The new sample result was 1.1 pCi/g for radium-226 and is identified as A7C-RF-C04-26BA.

The failing preliminary certification results and statistics are presented in Appendix A. Following remediation of the concrete surface and resampling summarized above, all of the certification criteria passed for the CU. Final sample results are presented in Appendix B. Final sample locations are shown in Figure 2-2.

5.2 SILOS 1 AND 2 PROJECT AREA 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 referenced CDL/PSP have been achieved for the subject concrete described in this report. No further remedial actions are required for this concrete. The concrete slabs were covered with a soil and gravel cap 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.

REFERENCES

U.S. Department of Energy, 1995, "Record of Decision for Remediation Actions for Operable Unit 2," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1996a, "Record of Decision for Final Remedial Action for Operable Unit 3," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1996b, "Remedial Design Work Plan for Remedial Actions at Operable Unit 5," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, OH.

U.S. Department of Energy, 1996c, "Record of Decision for Remedial Actions for Operable Unit 5," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1998a, "Sitewide Excavation Plan," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 1998b, "Surface Contamination Monitor and Survey Information Management System," Deactivation and Decommissioning Focus Area, Office of Science and Technology, DOE, Washington, D.C.

U.S. Department of Energy, 1999, "Position-Sensitive Radiation Monitoring (Surface Contamination Monitor)," Deactivation and Decommissioning Focus Area, Office of Science and Technology, DOE, Washington, D.C.

U.S. Department of Energy, 2001, "Addendum to the Sitewide Excavation Plan," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 2003, "Sitewide CERCLA Quality Assurance Project Plan (SCQ)," Revision 3, Fernald Closure Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 2006a, "Certification Design Letter and Certification Project Specific Plan for Selected Concrete in the Silos 1 and 2 Project Area," Revision 0, Fernald Closure Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 2006b, "Fact Sheet - The Fernald Closure Project Identifies Clean Buildings, Critical Structures, and Construction Materials for Beneficial Reuse Under Legacy Management," Final, Fernald Closure Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Environmental Protection Agency, 1994, "National Functional Guidelines for Data Review," U.S. EPA, Office of Solid Waste and Emergency Response, Washington, DC.

U.S. Nuclear Regulatory Commission: Shonka, J. J. et al., 1996, "Characterization of Contamination Through the Use of Position Sensitive Detectors and Digital Image Processing," NUREG/CR-6450, June 1996, NRC, Washington, D.C.

U.S. Nuclear Regulatory Commission, 2000, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," NUREG-1575, Revision 1, NRC, DOE, EPA, and U.S. Department of Defense, Washington, D.C.

APPENDIX A

FAILING PRELIMINARY CERTIFICATION STATISTICS

APPENDIX A
FAILING PRELIMINARY CERTIFICATION STATISTCS

A7C-TT-C02	Radium-226
A7C-TT-C02-1	0.560 -
A7C-TT-C02-2	0.545 -
A7C-TT-C02-3	0.574 -
A7C-TT-C02-4	0.667 -
A7C-TT-C02-5	0.644 -
A7C-TT-C02-6	0.619 -
A7C-TT-C02-7	0.572 -
A7C-TT-C02-8	0.507 -
A7C-TT-C02-9	0.517
A7C-TT-C02-10	0.904 -
A7C-TT-C02-11	0.675 -
A7C-TT-C02-12	0.526 -
A7C-TT-C02-13	0.577 -
A7C-TT-C02-13-D	0.618 -
A7C-TT-C02-14	0.520 -
A7C-TT-C02-15	0.491 -
A7C-TT-C02-16	0.738 -
A7C-TT-C02-17	0.738 -
A7C-TT-C02-18	0.574 -
A7C-TT-C02-19	0.579 -
A7C-TT-C02-20	0.607 -
A7C-TT-C02-21	1.069 -
A7C-TT-C02-22B	19.5 -
A7C-TT-C02-23B	26.6 -
A7C-TT-C02-24	0.521 -
A7C-TT-C02-25B	2.49 -
A7C-TT-C02-26	0.661 -
A7C-TT-C02-27B	2.48 -
A7C-TT-C02-29B	1.469 -
A7C-TT-C02-30	3.43 -
A7C-TT-C02-31	0.532 -
A7C-TT-C02-32B	0.628 -
A7C-TT-C02-33B	0.615 -
A7C-TT-C02-34B	0.628 -
A7C-TT-C02-35B	0.681 -
Limit	1.7
Units	pCi/g
Conf. Level	95%
Max. Result	26.6
Max. >= Limit	Yes
W-statistic Prob. #	< 0.01% (LN)
Test Procedure	Median (Sign)
Sample Size	34
Nondetects	0
% Nondetects	0%
Est. Mean*	0.624
UCL	0.675
Prob. > Limit	- -
Pass / Fail	Pass

a posteriori Sample Size calculation	11 Pass

A7C-RF-C03	Radium-226
A7C-RF-C03-1	0.652 -
A7C-RF-C03-2	0.811 -
A7C-RF-C03-3	0.535 -
A7C-RF-C03-4	0.526 -
A7C-RF-C03-5	0.467 -
A7C-RF-C03-6	0.625 -
A7C-RF-C03-7	0.456 -
A7C-RF-C03-8	0.399 -
A7C-RF-C03-9	0.661 -
A7C-RF-C03-10	0.555 -
A7C-RF-C03-10-D	0.574 -
A7C-RF-C03-11	0.525 -
A7C-RF-C03-12	1.13 -
A7C-RF-C03-13	9.36 -
A7C-RF-C03-14	1.57 -
A7C-RF-C03-15	1.45 -
A7C-RF-C03-16	0.74 -
A7C-RF-C03-17	0.541 -
A7C-RF-C03-18B	0.48 -
A7C-RF-C03-19B	0.564 -
A7C-RF-C03-20B	0.903 -
A7C-RF-C03-21B	2.83 -
A7C-RF-C03-22B	2.31 -
A7C-RF-C03-23B	0.661 NV
A7C-RF-C03-24B	8.22 NV
Limit	1.7
Units	pCi/g
Conf. Level	0.95
Max. Result	9.36
Max. > Limit	Yes
W-statistic Prob. #	< 0.01% (LN)
Test Procedure	Median (Sign)
Sample Size	24
Nondetects	0
% Nondetects	0%
Est. Mean*	0.657
UCL	0.903
Prob. > Limit	- -
Pass / Fail	Pass

a posteriori Sample Size calculation	12 Pass

A7C-RF-C04	Radium-226
A7C-RF-C04-1	0.628 -
A7C-RF-C04-2	0.617 -
A7C-RF-C04-3	0.651 -
A7C-RF-C04-4	1.08 -
A7C-RF-C04-5	0.935 -
A7C-RF-C04-6	0.648 -
A7C-RF-C04-7	2.03 -
A7C-RF-C04-7-D	2.3 -
A7C-RF-C04-8	1.74 -
A7C-RF-C04-9	0.637 -
A7C-RF-C04-10	1.62 -
A7C-RF-C04-11	0.966 -
A7C-RF-C04-12	0.817 -
A7C-RF-C04-13	0.68 -
A7C-RF-C04-14	1.15 -
A7C-RF-C04-15	13.7 -
A7C-RF-C04-16	1.26 -
A7C-RF-C04-17B	0.581 -
A7C-RF-C04-18B	0.527 -
A7C-RF-C04-19B	0.485 -
A7C-RF-C04-20B	0.615 -
A7C-RF-C04-21B	1.42 -
A7C-RF-C04-22B	2.9 -
A7C-RF-C04-23B	0.707 -
A7C-RF-C04-24B	0.836 -
A7C-RF-C04-25B	0.601 -
A7C-RF-C04-26B	8.78
A7C-RF-C04-27B	0.645 -
A7C-RF-C04-28B	0.725 -
A7C-RF-C04-29B	1.05 -
A7C-RF-C04-30B	2.21 -
A7C-RF-C04-31B	2.29 -
Limit	1.7
Units	pCi/g
Conf. Level	0.95
Max. Result	13.7
Max. > Limit	Yes
W-statistic Prob. #	< 0.01% (LN)
Test Procedure	Median (Sign)
Sample Size	31
Nondetects	0
% Nondetects	0%
Est. Mean*	0.836
UCL	1.150
Prob. > Limit	- -
Pass / Fail	Pass

a posteriori Sample Size calculation	19 Pass

APPENDIX B

CERTIFICATION SAMPLES, ANALYTICAL RESULTS AND FINAL STATISTICAL TABLES

APPENDIX B
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.

APPENDIX B
A7C-TT-C02

SAMPLEID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Arsenic	Beryllium	Cobalt	Lead	Molybdenum	Aroclor-1254
A7C-TT-C02-1	0.560 -	0.322 -	0.339 -	0.322 -	2.15 J	0.875 J	9.3 -	0.9 -	5.5 J	6.5 J	1.9 J	3.6 U
A7C-TT-C02-2	0.545 -	0.381 -	0.38 -	0.381 -	2.36 J	0.658 J	6.9 -	1 -	6.5 J	6.7 J	2.6 J	3.6 U
A7C-TT-C02-3	0.574 -	0.392 -	0.38 -	0.392 -	3.3 J	0 U	9.3 -	0.94 -	5.9 J	7.5 J	1.9 J	3.6 U
A7C-TT-C02-4	0.667 -	0.38 -	0.383 -	0.38 -	2.55 -	0.833 J	10.6 -	0.87 -	6.2 J	6.9 J	1.6 J	3.6 U
A7C-TT-C02-5	0.644 -	0.349 -	0.354 -	0.349 -	1.42 J	0.709 J	6.6 -	0.96 -	8.6 J	6.3 J	2.2 J	3.6 U
A7C-TT-C02-6	0.619 -	0.339 -	0.337 -	0.339 -	1.05 U	1.01 J	5.9 -	0.56 -	4.8 J	5.9 J	1.3 J	3.6 U
A7C-TT-C02-7	0.572 -	0.352 -	0.364 -	0.352 -	1.42 J	0 U	5.3 -	0.54 -	5.4 J	5.9 J	1.3 J	3.5 U
A7C-TT-C02-8	0.507 -	0.315 -	0.32 -	0.315 -	1.98 J	0.368 J	5.6 -	0.5 -	5.3 J	5.6 J	1.2 J	3.6 U
A7C-TT-C02-9	0.517	0.346 -	0.358 -	0.346 -	2.16 J	0.857 J	6.4 -	0.9 -	6.6 J	6.6 J	1.6 J	3.6 U
A7C-TT-C02-10	0.904 -	0.497 -	0.477 -	0.497 -	2.84 -	1.08 J	7.7 -	0.89 -	6.7 J	7.3 J	1.7 J	3.6 U
A7C-TT-C02-11	0.675 -	0.412 -	0.422 -	0.412 -	1.91 -	0 U	6.3 -	0.68 -	4.6 J	6.3 J	1.4 J	3.6 U
A7C-TT-C02-12	0.526 -	0.397 -	0.391 -	0.397 -	2.29 J	0.542 J	8.2 -	0.75 -	6.1 J	7.3 J	1.7 J	3.6 U
A7C-TT-C02-13	0.577 -	0.369 -	0.361 -	0.369 -	1.43 J	0.903 J	5.9 -	0.68 -	4.8 J	5.9 J	1.3 J	3.6 U
A7C-TT-C02-13-D	0.618 -	0.329 -	0.322 -	0.329 -	2.85 J	0.688 J	5.7 -	0.63 -	4.2 J	5.6 J	1.1 J	3.55 UJ
A7C-TT-C02-14	0.520 -	0.365 -	0.359 -	0.365 -	1.58 J	0.46 U	7.5 -	0.87 -	5.4 J	7.3 J	1.6 J	3.6 U
A7C-TT-C02-15	0.491 -	0.397 -	0.397 -	0.397 -	1.54 J	0.772 J	7.6 -	0.75 -	6.2 J	8.5 J	1.9 J	3.5 U
A7C-TT-C02-16	0.738 -	0.438 -	0.434 -	0.428 -	1.45 J	0.71 J	7.3 -	1.1 -	5.6 J	7 J	3 J	3.6 U
A7C-TT-C02-17	0.738 -	0.397 -	0.391 -	0.397 -	2.5 -	0.846 J	7.3 -	1.1 -	6.7 J	6.7 J	2.5 J	3.6 U
A7C-TT-C02-18	0.574 -	0.324 -	0.33 -	0.324 -	4.24 -	0.297 U	7.5 -	1.1 -	5.7 J	7 J	2.5 J	3.6 U
A7C-TT-C02-19	0.579 -	0.405 -	0.396 -	0.405 -	2.48 -	0.643 J	6.6 -	0.97 -	4.8 J	7.5 J	2 J	3.6 U
A7C-TT-C02-20	0.607 -	0.402 -	0.425 -	0.402 -	1.46 J	0.461 J	8.2 J	1.3 -	10.1 J	7.3 J	2.7 J	3.6 U
A7C-TT-C02-21	1.069 -	0.343 -	0.351 -	0.343 -	1.38 J	2.53 -	5.9 J	0.79 -	5.1 J	10.9 J	1.8 J	3.6 U
A7C-TT-C02-24	0.521 -	0.427 -	0.428 -	0.427 -	2.15 -	1.1 J	3.6 J	0.52 J	5.2 J	5.9 J	1.8 J	3.6 U
A7C-TT-C02-26A	0.64 -	0.182 UJ	0.182 UJ	0.37 UJ	3.1 U	0.37 U	4.1 J	0.91 -	4.1 J	4.2 J	2.1 J	13 U
A7C-TT-C02-30AB	1.964 -	0.366 -	0.364 -	0.366 -	1.92 J	0.771 J	4.3 -	0.58 -	3.8 J	7.5 J	1.9 J	3.5 U
A7C-TT-C02-31	0.532 -	0.312 -	0.324 -	0.312 -	0.986 J	0.36 J	2.3 J	0.58 -	6.2 J	4.9 J	1.5 J	3.6 U
A7C-TT-C02-32B	0.628 -	0.358 -	0.355 -	0.358 -	1.61 J	0.828 J	9.2 J	0.77 -	6.1 J	8.8 J	1.7 J	3.5 U
A7C-TT-C02-33B	0.615 -	0.344 -	0.351 -	0.344 -	2.34 -	0.437 J	6.4 J	0.6 -	5.6 J	7 J	1.3 J	3.6 U
A7C-TT-C02-34B	0.628 -	0.338 -	0.341 -	0.338 -	0.798 U	0.715 J	5.1 J	0.61 -	5.1 J	6.3 J	1.5 J	3.6 U
A7C-TT-C02-35B	0.681 -	0.332 -	0.329 -	0.332 -	1.71 -	1.29 J	4.7 J	0.51 -	5 J	5.8 J	1.3 J	3.5 U
A7C-TT-C02-36B	2.501 -	0.388 -	0.41 -	0.388 -	1.98 J	0 U	10.4 -	0.84 J	17.8 J	12.9 J	2.3 J	3.5 U
A7C-TT-C02-37B	0.697 -	0.447 -	0.451 -	0.447 -	2.94 J	0 U	9.9 -	0.8 J	7.8 J	8.7 J	2 J	3.5 U
A7C-TT-C02-38B	1.648 -	0.513 -	0.532 -	0.513 -	0 U	0 U	7.2 -	0.89 J	8.9 J	8.9 J	2.3 J	3.6 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%	90%	90%	90%	90%	90%	90%	90%
Max. Result	2.501	0.513	0.532	0.513	4.24	2.53	10.6	1.3	17.8	12.9	3	13U
Max. >= Limit	Yes	No	No	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	< 0.01% (LN)	--	--	--	--	--	--	--	--	--		--
Test Procedure	Median (Sign)	--	--	--	--	--	--	--	--	--		--
Sample Size	34	34	34	34	34	34	34	34	34	34	34	34
Nondetects	0	1	1	1	5	10	0	0	0	0	0	20
% Nondetects	0%	3%	3%	3%	15%	29%	0%	0%	0%	0%	0%	59%
Est. Mean*	0.619	--	--	--	--	--	--	--	--	--	--	--
UCL	0.667	--	--	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--	--	--	--
Pass / Fail	Pass	--	--	--	--	--	--	--	--	--	--	--
a posteriori Sample Size calculation	6 Pass	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --

APPENDIX B
A7C-RF-C03

SAMPLEID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Arsenic	Beryllium	Cobalt	Lead	Molybdenum	Aroclor-1254
A7C-RF-C03-1	0.652 -	0.286 -	0.292 -	0.286 -	2.24 -	1.14 -	4.6 -	0.53 -	4.2 J	12.8 J	1.9 J	3.5 U
A7C-RF-C03-2	0.811 -	0.277 -	0.282 -	0.277 -	1.7 J	5.17 U	4.2 -	0.42 -	3.5 J	3.7 J	1.7 J	3.5 U
A7C-RF-C03-3	0.535 -	0.237 -	0.236 -	0.237 -	1.85 J	3.37 U	2.3 J	0.16 J	2.3 J	2.5 J	0.67 U	3.5 U
A7C-RF-C03-4	0.526 -	0.227 -	0.203 -	0.227 -	0.974 J	0.954 J	3.6 J	0.24 J	3.1 J	3.6 J	0.74 U	3.5 U
A7C-RF-C03-5	0.467 -	0.234 -	0.241 -	0.234 -	0.943 U	0.383 U	3.5 J	0.24 J	7.3 J	3.2 J	0.72 U	3.5 U
A7C-RF-C03-6	0.625 -	0.234 -	0.256 -	0.234 -	1.34 J	0.861 J	3.1 J	0.23 J	2.9 J	3 J	0.77 U	3.5 U
A7C-RF-C03-7	0.456 -	0.236 -	0.232 -	0.236 -	1.01 -	0.341 J	3 J	0.25 J	2.6 J	3.7 J	0.68 U	3.5 U
A7C-RF-C03-8	0.399 -	0.324 -	0.336 -	0.324 -	2 -	0.368 U	7.7 J	0.57 J	8.9 J	7 J	1.7 U	3.5 U
A7C-RF-C03-9	0.661 -	0.306 -	0.48 -	0.306 -	2.25 J	2.85 U	5.7 -	0.49 -	4.1 J	5.1 J	2.2 J	3.5 U
A7C-RF-C03-10	0.555 -	0.394 -	0.392 -	0.394 -	2.78 U	2.69 -	5.7 -	0.72 -	5.3 J	6.8 J	1.7 J	3.5 U
A7C-RF-C03-10-D	0.574 -	0.33 -	0.34 -	0.33 -	1.7 J	2.96 U	4.7 -	0.68 -	5.4 J	6.3 J	1.6 J	3.5 U
A7C-RF-C03-11	0.525 -	0.315 -	0.316 -	0.315 -	2.1 -	0.398 J	3.6 -	0.74 -	5 J	6.2 J	1.5 U	3.5 U
A7C-RF-C03-12	1.13 -	0.349 -	0.372 -	0.349 -	1.61 J	0.865 J	4.6 -	0.74 -	7 J	5.7 J	1.8 J	3.49 U
A7C-RF-C03-13A	0.57 -	0.247 -	0.255 -	0.247 -	1.46 J	0.665 J	3.5 J	0.73 -	4.9 J	5.6 J	1.6 J	3.5 U
A7C-RF-C03-14	1.57 -	0.384 -	0.406 -	0.384 -	1.9 J	3.96 U	7 -	0.58 -	5.2 J	6.6 J	2 J	3.5 U
A7C-RF-C03-15	1.45 -	0.242 -	0.238 -	0.242 -	1.07 J	1.08 -	7.3 -	0.76 -	5.1 J	10.1 J	2.8 J	3.5 U
A7C-RF-C03-16	0.74 -	0.279 -	0.271 -	0.279 -	2.12 J	0.514 U	5.7 -	0.4 -	4.5 J	4.8 J	2 J	3.5 U
A7C-RF-C03-17	0.541 -	0.354 -	0.38 -	0.354 -	3.28 -	3.7 U	7.8 -	0.85 -	5.9 J	7 J	2.6 J	3.5 U
A7C-RF-C03-18B	0.48 -	0.343 -	0.349 -	0.343 -	1.81 -	2.14 U	4.7 -	0.7 -	10.7 J	6.4 J	1.6 U	3.5 U
A7C-RF-C03-19B	0.564 -	0.332 -	0.335 -	0.332 -	2.01 J	5.15 U	4 -	0.71 -	7.5 J	6.8 J	1.5 U	3.5 U
A7C-RF-C03-20B	0.903 -	0.288 -	0.289 -	0.288 -	2.16 -	1.35 U	5.4 J	0.55 -	6 J	4.5 J	1.5 J	3.5 U
A7C-RF-C03-21B	2.83 -	0.311 -	0.323 -	0.311 -	1.26 U	4.66 U	8.2 J	0.56 -	8.7 J	12 J	1.4 J	3.6 U
A7C-RF-C03-22B	2.31 -	0.27 -	0.274 -	0.27 -	0.968 U	2.95 J	5.8 J	0.74 -	6 J	10.1 J	3.2 J	3.5 U
A7C-RF-C03-23B	0.661 -	0.287 -	0.294 -	0.287 -	1.45 J	4.38 U	3.9 -	0.3 J	3.9 J	5.4 J	1.4 J	3.6 U
A7C-RF-C03-24BA	3.04 -	0.241 -	0.232 -	0.241 -	1.25 J	4.89 -	3.5 -	0.27 -	3 .0 J	7.8 J	3.6 J	3.5 U
Limit	1.70	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%	90%	90%	90%	90%	90%	90%	90%
Max. Result	3.04	0 .394	0 .48	0 .394	3.28	4.89	8.2	0 .85	10.7	12.8	3.6	3.6 U
Max. >= Limit	Yes	No	No	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	< 0.01% (LN)	--	--	--	--	--	--	--	--	--		--
Test Procedure	Median (Sign)	--	--	--	--	--	--	--	--	--		--
Sample Size	24	24	24	24	24	24	24	24	24	24	24	24
Nondetects	0	0	0	0	3	13	0	0	0	0	9	24
% Nondetects	0.0%	0%	0%	0%	13%	54%	0%	0%	0%	0%	38%	100%
Est. Mean*	0.639	--	--	--	--	--	--	--	--	--	--	--
UCL	0.811	--	--	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--	--	--	--
Pass / Fail	Pass	--	--	--	--	--	--	--	--	--	--	--
a posteriori Sample Size calculation	9 Pass	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --

APPENDIX B
A7C-RF-C04

SAMPLEID	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total	Lead-210	Arsenic	Beryllium	Cobalt	Lead	Molybdenum	Aroclor-1254
A7C-RF-C04-1	0.628 -	0.363 -	0.377 -	0.363 -	0.866 U	0 U	5.2 -	1.1 -	6.9 J	6.6 J	2 J	17.5 U
A7C-RF-C04-2	0.617 -	0.371 -	0.36 -	0.371 -	1.48 J	0 U	4.1 -	0.79 -	5.6 J	5.4 J	1.5 J	3.5 U
A7C-RF-C04-3	0.651 -	0.462 -	0.461 -	0.462 -	0.862 U	0 U	6.2 -	0.95 -	5.5 J	7 J	2.4 J	3.5 U
A7C-RF-C04-4	1.080 -	0.361 -	0.362 -	0.361 -	1.63 J	0 U	5.6 -	1 -	6 J	6.8 J	2.7 J	3.5 U
A7C-RF-C04-5	0.935 -	0.43 -	0.431 -	0.43 -	2.87 -	0 U	5.2 -	0.88 -	5.6 J	6.4 J	1.9 J	3.5 U
A7C-RF-C04-6	0.648 -	0.229 -	0.243 -	0.229 -	0.52 U	1.15 U	4.2 -	0.42 -	4.5 J	4.4 J	1.6 J	3.5 U
A7C-RF-C04-7	2.027 -	0.389 -	0.384 -	0.389 -	2.21 -	0.856 U	4.8 -	0.77 -	6.4 J	6.9 J	2.3 J	3.5 U
A7C-RF-C04-7-D	2.301 -	0.465 -	0.474 -	0.465 -	1.35 U	2.36 -	4.7 -	0.84 -	5.1 J	7.5 J	3.1 J	3.5 U
A7C-RF-C04-8	1.743 -	0.473 -	0.483 -	0.473 -	2.59 -	0 U	6.4 -	0.92 -	6 J	7.8 J	4.5 J	3.6 U
A7C-RF-C04-9	0.637 -	0.402 -	0.416 -	0.402 -	3.28 -	0 U	5.2 -	1.1 -	6.5 J	5.6 J	2 J	3.5 U
A7C-RF-C04-10	1.617 -	0.419 -	0.435 -	0.419 -	2.73 J	0 U	5.7 -	1.1 -	6.8 J	7.9 J	2.5 J	3.5 U
A7C-RF-C04-11	0.966 -	0.39 -	0.416 -	0.39 -	2.4 J	6.34 J	4.8 -	0.81 -	5.9 J	6.2 J	1.6 J	3.5 U
A7C-RF-C04-12	0.817 -	0.377 -	0.389 -	0.377 -	2.25 -	0 U	5.9 -	0.8 -	5.4 J	7.2 J	7.5 J	3.5 U
A7C-RF-C04-13	0.680 -	0.203 -	0.213 -	0.203 -	2.03 J	0 U	4.9 -	0.56 -	4.6 J	3.8 J	1.9 J	3.5 U
A7C-RF-C04-14	1.153 -	0.262 -	0.263 -	0.262 -	0.11 U	2.88 J	4.9 -	0.53 -	3.9 J	4.8 J	5.5 J	3.5 U
A7C-RF-C04-15A	0.687 -	0.393 -	0.397 -	0.393 -	2.4 -	0.708 J	4.6 J	0.77 -	4.8 J	6.3 J	1.8 J	3.5 U
A7C-RF-C04-16	1.259 -	0.335	0.351 -	0.335 -	0.806 U	0 U	6.9 -	0.67 -	5.2 J	6.2 J	2.4 J	3.5 U
A7C-RF-C04-17B	0.581 -	0.535 -	0.517 -	0.535 -	2.07 -	0.43 J	5.6 -	1.3 -	8.8 J	9.5 J	1.9 J	3.7 U
A7C-RF-C04-18B	0.527 -	0.404 -	0.406 -	0.404 -	0 U	0 U	5.4 -	0.86 -	5.5 J	7.7 J	2 J	3.6 U
A7C-RF-C04-19B	0.485 -	0.342 -	0.341 -	0.342 -	1.79 -	0.352 J	3.7 -	0.62 -	4.9 J	4.6 J	1.4 U	3.6 U
A7C-RF-C04-20B	0.615 -	0.471 -	0.476 -	0.471 -	2.35 J	2.14 U	5.7 -	0.95 -	7.8 J	7.9 J	1.8 J	3.5 U
A7C-RF-C04-21B	1.416 -	0.442	0.434	0.442	2.6 -	1.79 -0	4.1 -	1 -	14.3 J	16.8 J	2.1 J	3.6 U
A7C-RF-C04-22B	2.901 -	0.383 -	0.372 -	0.383 -	3.35 -	3.75 -	3.1 -	0.73 -	5 J	7.6 J	1.3 U	3.5 U
A7C-RF-C04-23B	0.707 -	0.348 -	0.352 -	0.348 -	2.9 -	0.434 U	5.3 -	0.92 -	5.7 J	6.8 J	1.6 J	3.5 U
A7C-RF-C04-24B	0.836 -	0.399 -	0.403 -	0.399 -	1.19 U	0.542 J	5.4 -	0.9 -	4.9 J	7.3 J	2 J	3.6 U
A7C-RF-C04-25B	0.601 -	0.427 -	0.43 -	0.427 -	2.73 -	0.806 J	3.9 -	0.7 -	3.6 J	5.7 J	1.5 J	3.6 U
A7C-RF-C04-26BA	1.12 -	0.386 -	0.378 -	0.386 -	2.42 -	1.17 -	6.1 -	0.8 -	6.1 J	9.7 J	2 J	3.6 U
A7C-RF-C04-27B	0.645 -	0.222 -	0.219 -	0.222 -	3.04 -	3.43 U	4.8 -	0.74 -	8.6 J	7.1 J	1.9 U	3.4 U
A7C-RF-C04-28B	0.725 -	0.357 -	0.364 -	0.357 -	2.38 -	0.449 U	3.8 -	0.82 -	12.2 J	6.9 J	1.5 U	3.5 U
A7C-RF-C04-29B	1.05 -	0.392 -	0.39 -	0.392 -	1.31 J	2.96 U	7 J	1.1 -	6.1 J	8.7 J	2.1 J	3.5 U
A7C-RF-C04-30B	2.21 -	0.354 -	0.341 -	0.354 -	1.46 J	4.88 U	6.3 J	0.95 -	6.1 J	14.6 J	2.8 J	3.5 U
A7C-RF-C04-31B	2.29 -	0.341 -	0.326 -	0.341 -	2.25 -	2.18 -	6 J	1.2 -	14.6 J	10.1 J	2.3 J	3.5 U
Limit	1.70	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%	90%	90%	90%	90%	90%	90%	90%
Max. Result	2.901	0.535	0.517	0.535	3.35	6.34	7	1.3	14.6	16.8	7.5	17.5
Max. >= Limit	Yes	No	No	No	No	No	No	No	No	No	No	No
W-statistic Prob. #	< 0.01% (LN)	--	--	--	--	--	--	--	--	--		--
Test Procedure	Median (Sign)	--	--	--	--	--	--	--	--	--		--
Sample Size	31	31	31	31	31	31	31	31	31	31	31	31
Nondetects	0	0	0	0	7	16	0	0	0	0	4	31
% Nondetects	0.0%	0%	0%	0%	23%	52%	0%	0%	0%	0%	13%	100%
Est. Mean*	0.817	--	--	--	--	--	--	--	--	--	--	--
UCL	1.080	--	--	--	--	--	--	--	--	--	--	--
Prob. > Limit	--	--	--	--	--	--	--	--	--	--	--	--
Pass / Fail	Pass	--	--	--	--	--	--	--	--	--	--	--
a posteriori Sample Size calculation	12 Pass	--	--	--	--	--	--	--	--	--	--	--

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-3 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 mode in the data quality review (Attachment C-1), and the detectors are identified as T-180 in the survey files. 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 100 cm^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 TTA Building Pad, the black areas on the map represents a lack of measurements from the survey due to structural obstacles and depressions, 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 white, yellow and reddish-orange areas on the TTA map are indicative of alpha/beta contamination on the surface of the concrete. Reddish brown to dark brown areas represent homogenous background for concrete.

The CFD plots show the activity (dpm) for each 100 m^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, sample points below the 90 percentile line lie along a straight line, indicating the data are normally

distributed (refer to the CFD plot for the TTA Building Pad surveys [TP00102A, TP00202A, TP00302A, TP00402A, TP00502A and TP00602A], presented after Figure C-1). However, data points above the 90 percentile line indicate contamination, as they fall along a different slope. As most of the data fall in the normal distribution below the 90 percentile line, 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 TTA Building pad survey, the 0.9 percentile line indicates that 90 percent of the samples have a value less than 6,000 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 two different configurations for the detectors (trap or corner), and the dynamic (trap) 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. Background values for the corner mode will be 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 TP00702A and TP00802A for the TTA Building Pad, 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 TP00102A, TP00202A, TP00302A, TP00402A, TP00502A and TP00602A for the TTA Building Pad, 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 TTA Building slab. Trap and corner modes were used to survey the structures. Significant contamination was found on survey TP00102A, and smaller areas of contamination were identified on surveys TP00202A and TP00302A. These areas were remediated using hand-held scarification tools until the surveys recorded less than 70,000 dpm/100 cm^2. Biased samples were then collected of the three highest activity areas on the pad. Sample results in Appendix B demonstrate that the remediation of the concrete surface was successful, and this pad passed the certification process for all radionuclides.

Figure C-2 cross references the alpha/beta concrete surveys that were performed for CU 03 on the Remediation Facility Building slab (noted as CU B in the summary survey report). Trap and corner modes were used to survey the structures. Significant contamination was found in survey unit RP00302A, RP00502B and RP01202A. Contaminated surfaces were removed using a hoe ram and radiological technicians performed beta-gamma scans with hand held detectors to verify that the contaminated surfaces were removed (Attachment C-2). Biased samples were then collected from the three highest activity areas in the CU. Sample results in Appendix B demonstrate that the remediation of the concrete surface was successful, and this CU passed the certification process for all radionuclides.

Figure C-3 cross references the alpha/beta concrete surveys that were performed for CU 04 on the Remediation Facility Building slab (noted as CU A in the summary survey report). Trap and corner modes were used to survey the structures. Significant contamination was found in survey units RP00102A, RP00402B, RP00602A, RP00902A, RP01002A and RP01102A. Contaminated surfaces were removed using a hoe ram and radiological technicians performed beta-gamma scans with hand held detectors on approximately one-half of the remediated area to verify that the contaminated surfaces were removed (Attachment C-2). The entire scabbled area could not be surveyed due to standing water on low areas of the pad. After performing the beta-gamma scans, biased samples were collected from the three highest activity areas in the CU. Sample results in Appendix B demonstrate that the remediation of the concrete surface was successful, and this CU passed the certification process for all radionuclides.

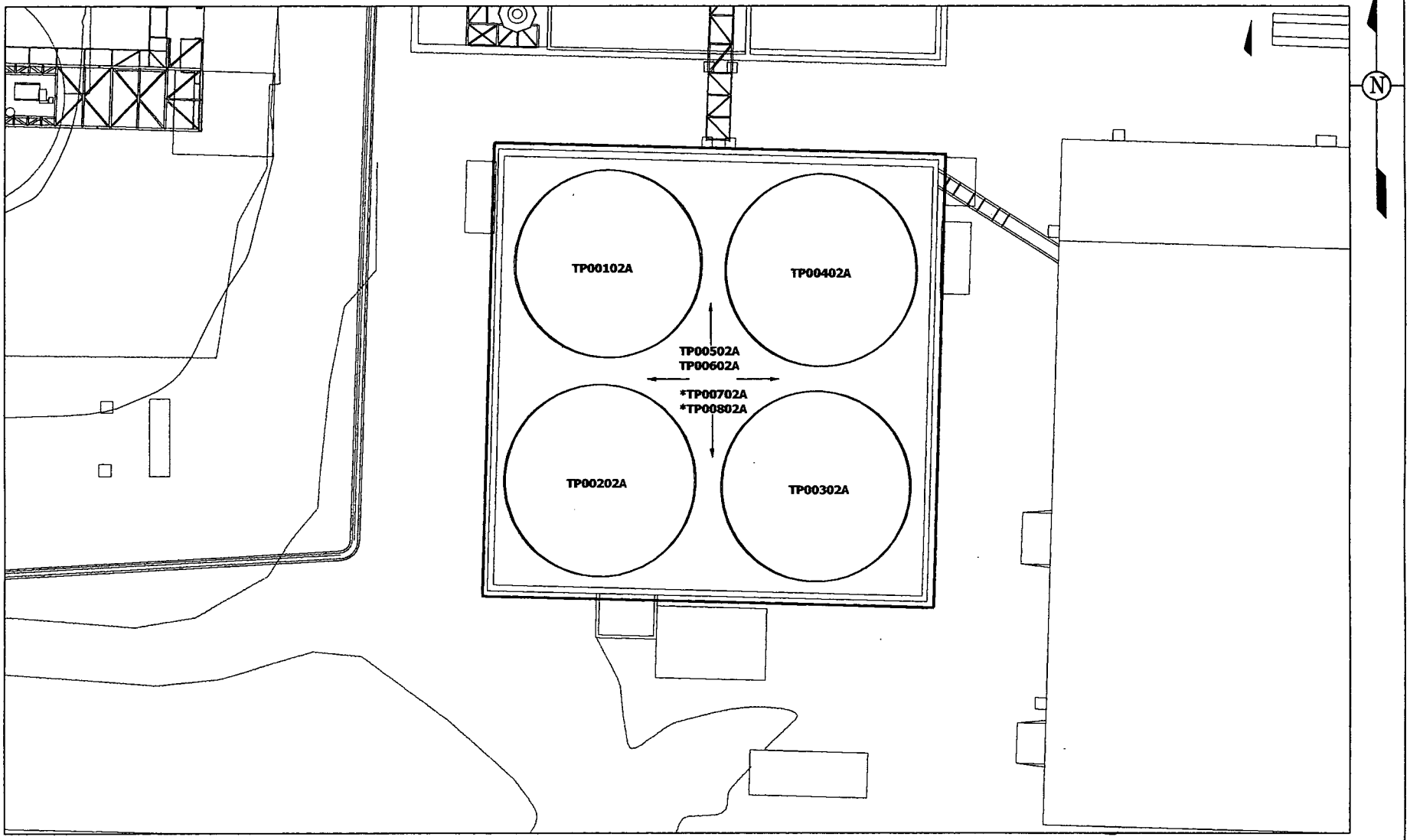


FIGURE C-1. TTA BUILDING. SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-TT-C02

Fernald Closure Project

Survey Report

TTA Pad

Surveys of the TTA 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 TP00102A, TP00202A, TP00302A, TP00402A, TP00502A and TP00602A 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 surveys TP00102A through TP00402A "quilted" into one image, with the (0,0) point representing the southwest corner of the survey area. Initial survey of TP00102A, TP00202A, and TP00402A identified areas of high contamination. Those areas were remediated, and the localized areas were resurveyed. Post decontamination survey strips were overlaid on the initial surveys to create the final post-decontamination report. Details are documented in the Survey Record Forms for those surveys. Surveys TP00502A and TP 00602A are not included in Figure 1. Neither survey was geometrically stitched due to the diverse areas involved, but neither survey identified localized contamination levels in the range identified in surveys TP00102A through TP00402A. Figure 2 provides a Cumulative Frequency Distribution Plot (CFD) of the data from surveys TP00102A through TP00402A. The CFD is indicative of many areas, approximately 1 to 2 % of the pad, that are indicative of radioactivity above the normal distribution of concrete background radioactivity.

Survey reports TP00702A and TP00802A 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. 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. Activity levels found in these surveys did not challenge those identified in the rolling surveys performed and documented in TP00102A through TP00402A. The locations of the three highest readings obtained on the TTA 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
TP00102A	67973	10	(1545,2005)	(60,1275)
TP00102A	64362	101	(1380,220)	(425,30)
TP00102A	54815	32	(1290,140)	(70,130)

TTA PAD QUILTED SURVEYS
Includes TP00102A, TP00202A, TP00302A
And TP00402A

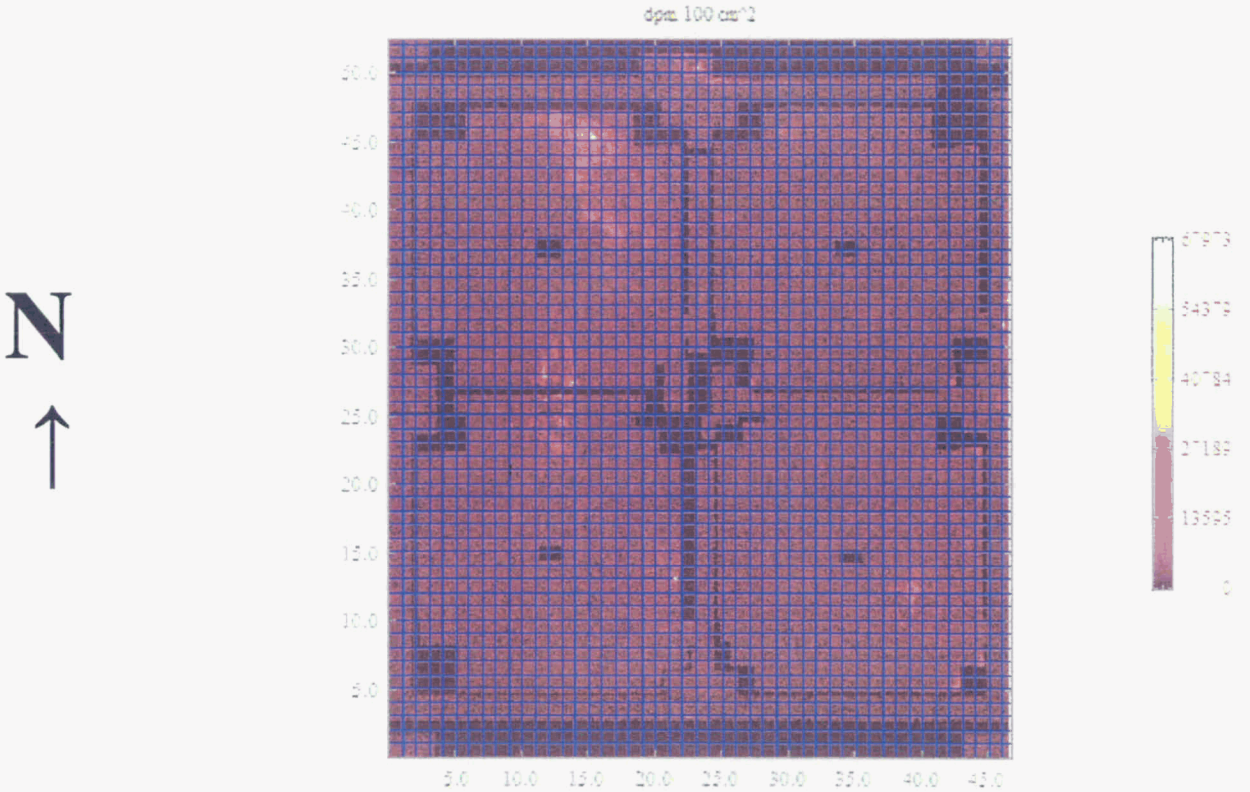


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

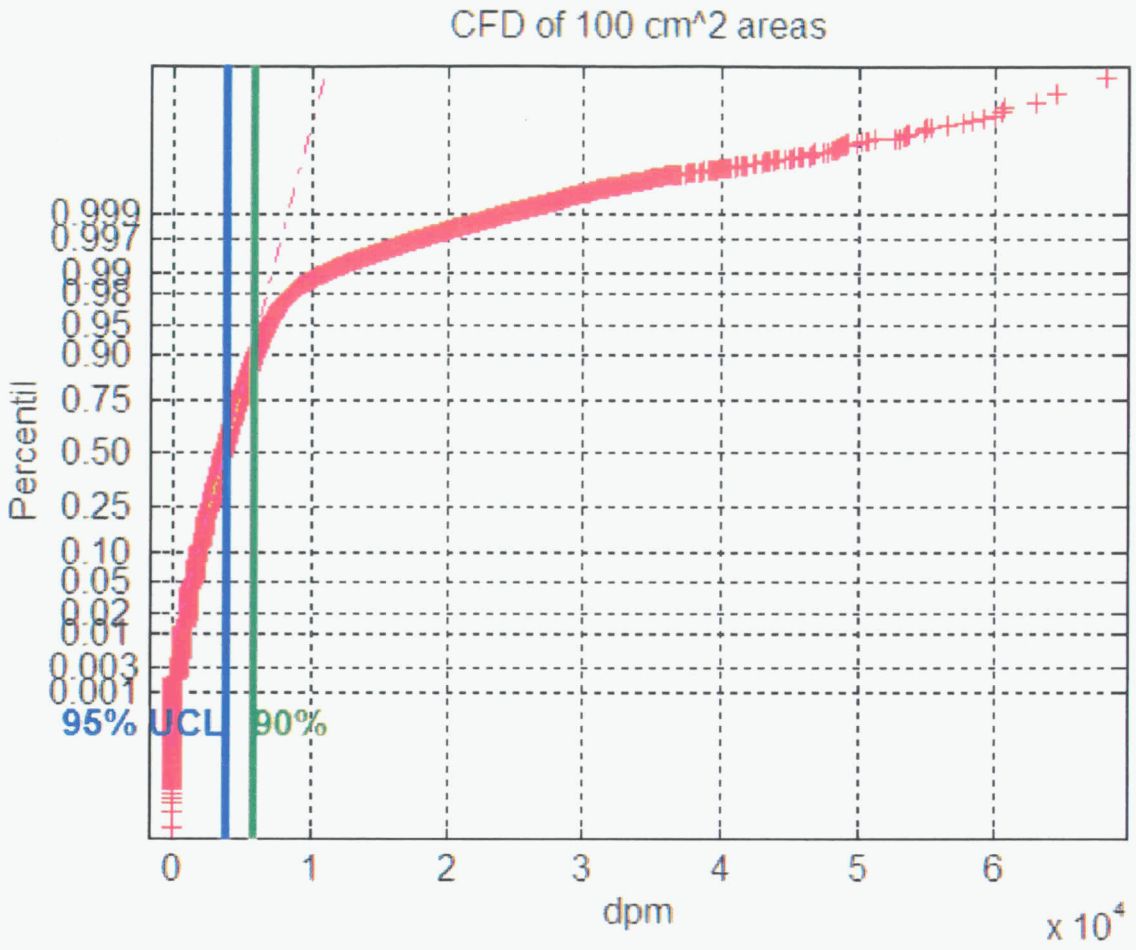


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x10^4 per 100cm^2.

Survey Report

Survey Location:	TTA PAD
Survey Unit Area Code:	N0099X
Survey File Name:	TP00102A
Survey Date:	August 31, 2006 & September 14, 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:	**67,973 dpm/100 cm^2**
Maximum m^2 Average:	**19,583 dpm/100 cm^2**
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630TP00102A

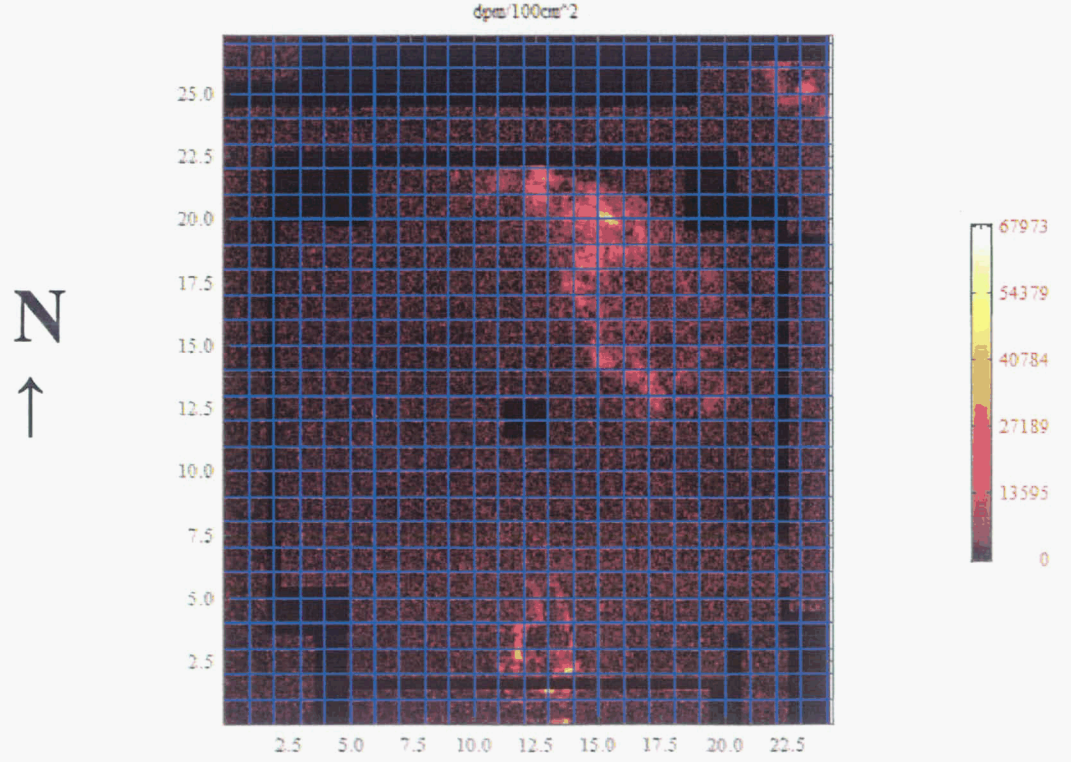


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

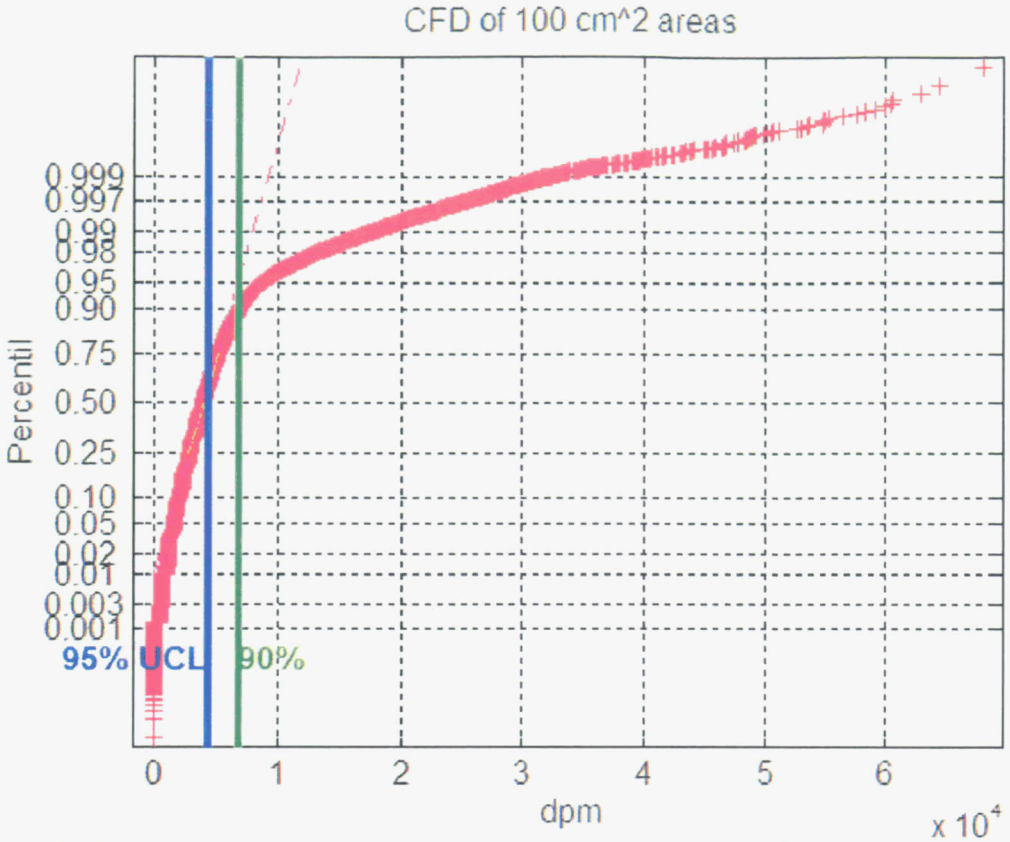


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x10^4 per 100cm^2.

Survey Report

Survey Location:	TTA PAD
Survey Unit Area Code:	N0099X
Survey File Name:	TP00202A
Survey Date:	August 31, 2006 & September 14, 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:	**53,315 dpm/100 cm^2**
Maximum m^2 Average:	8,720 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630TP00202A

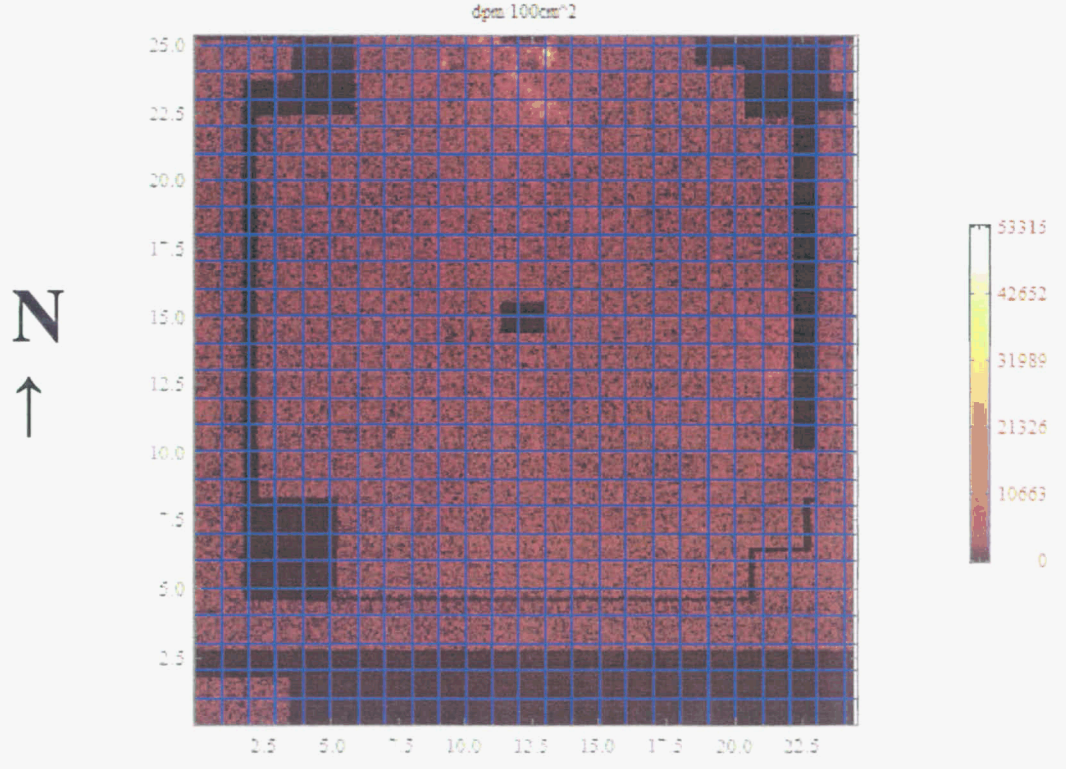


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

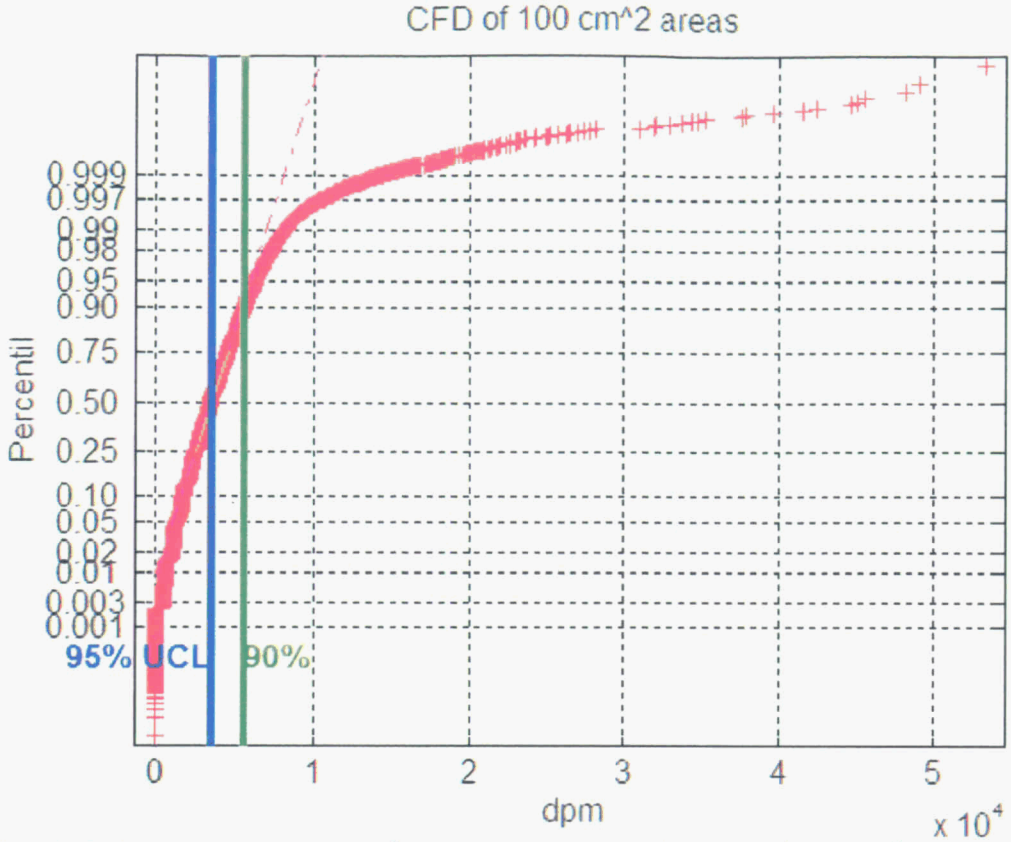


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x10^4 per 100cm^2.

Survey Report

Survey Location:	TTA PAD
Survey Unit Area Code:	N0099X
Survey File Name:	TP00302A
Survey Date:	August 30, 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:	**36,207 dpm/100 cm^2**
Maximum m^2 Average:	**14,631 dpm/100 cm^2**
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630TP00302A

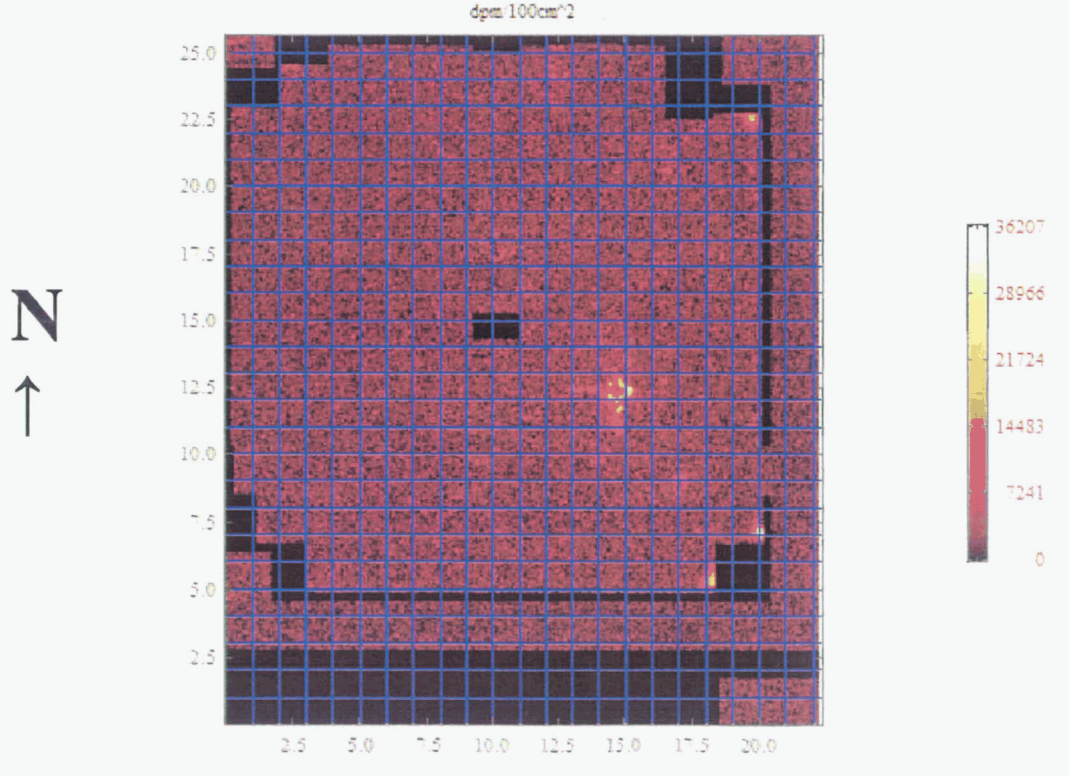


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

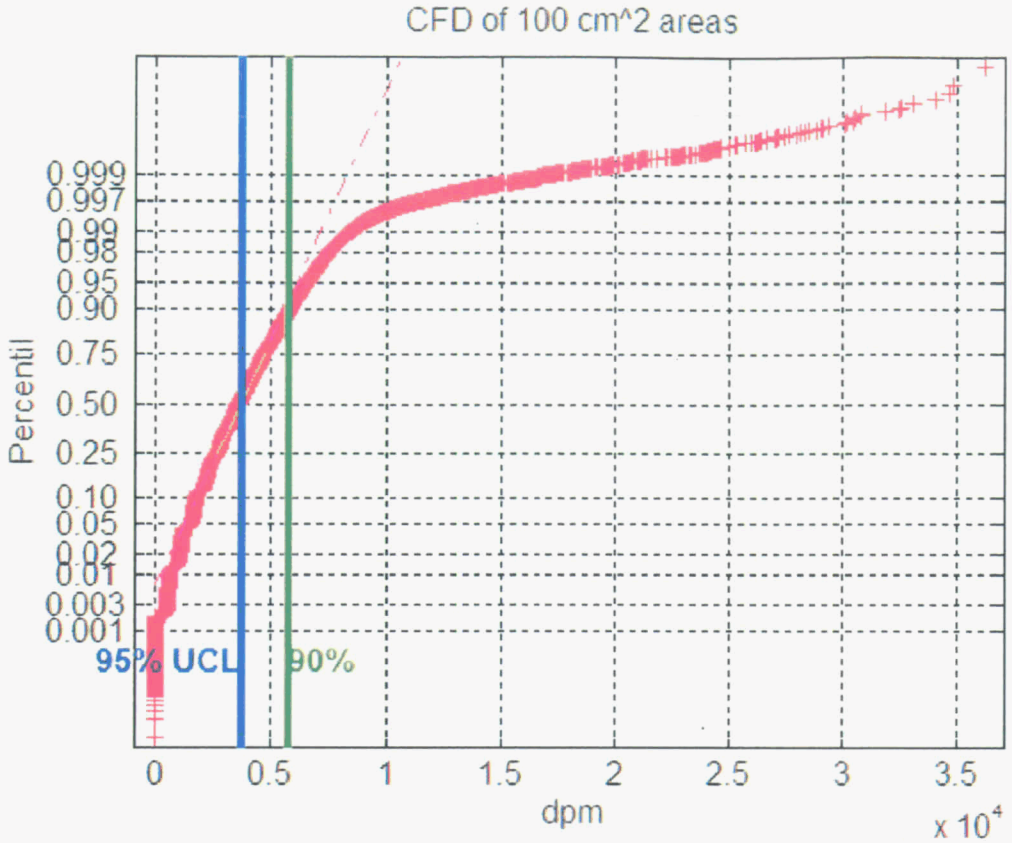


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.

Survey Report

Survey Location:	TTA PAD
Survey Unit Area Code:	N0099X
Survey File Name:	TP00402A
Survey Date:	August 31, 2006 & September 14, 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:	**41,769 dpm/100 cm^2**
Maximum m^2 Average:	**10,269 dpm/100 cm^2**
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630TP00402A

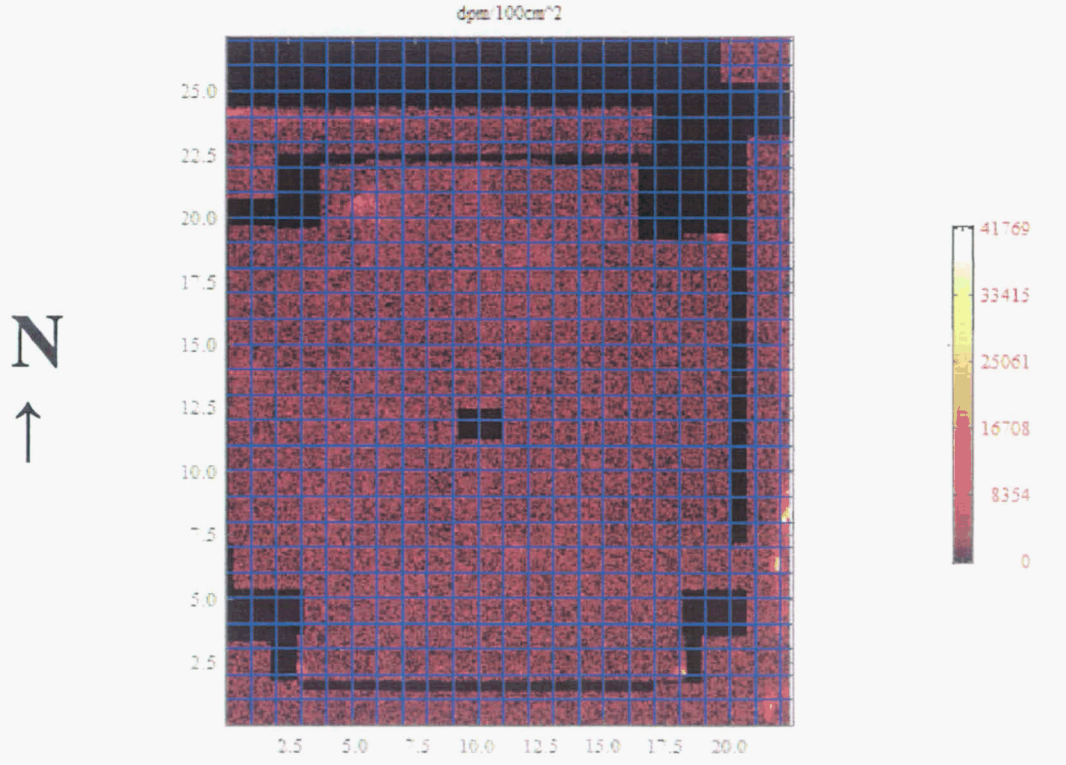


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

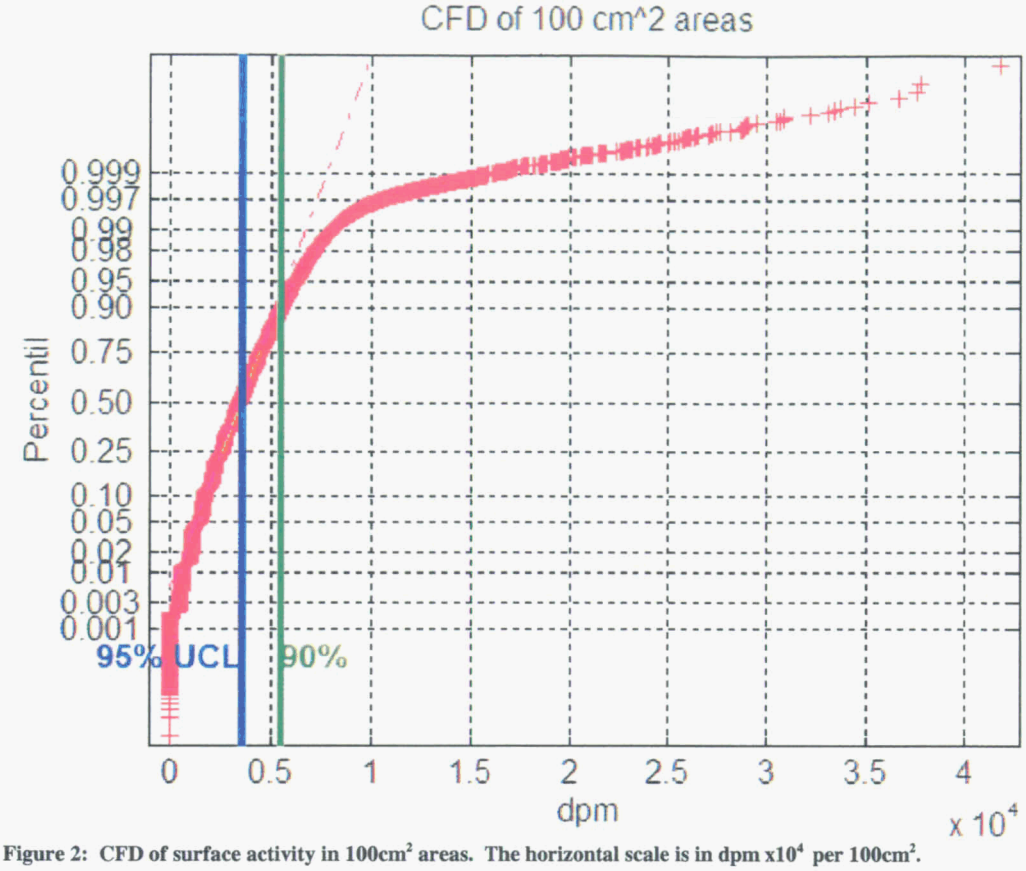


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x10^4 per 100cm^2.

Survey Report

Survey Location:	TTA PAD
Survey Unit Area Code:	N0099X
Survey File Name:	TP00502A
Survey Date:	August 30, 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:	**17,908 dpm/100 cm^2**
Maximum m^2 Average:	3,586 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630TP00502A

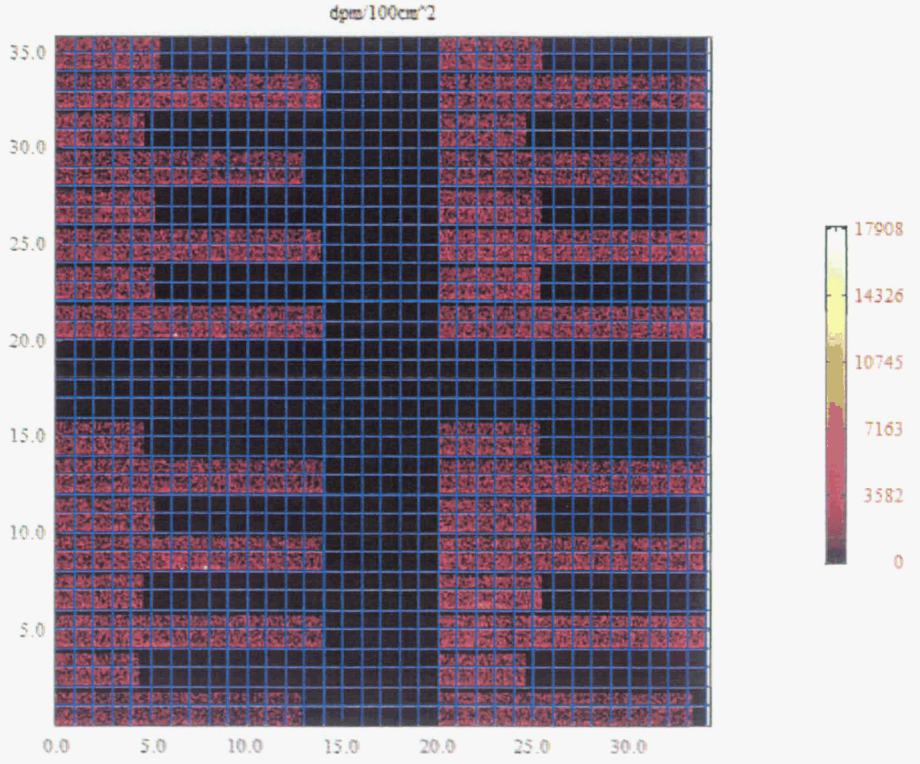


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

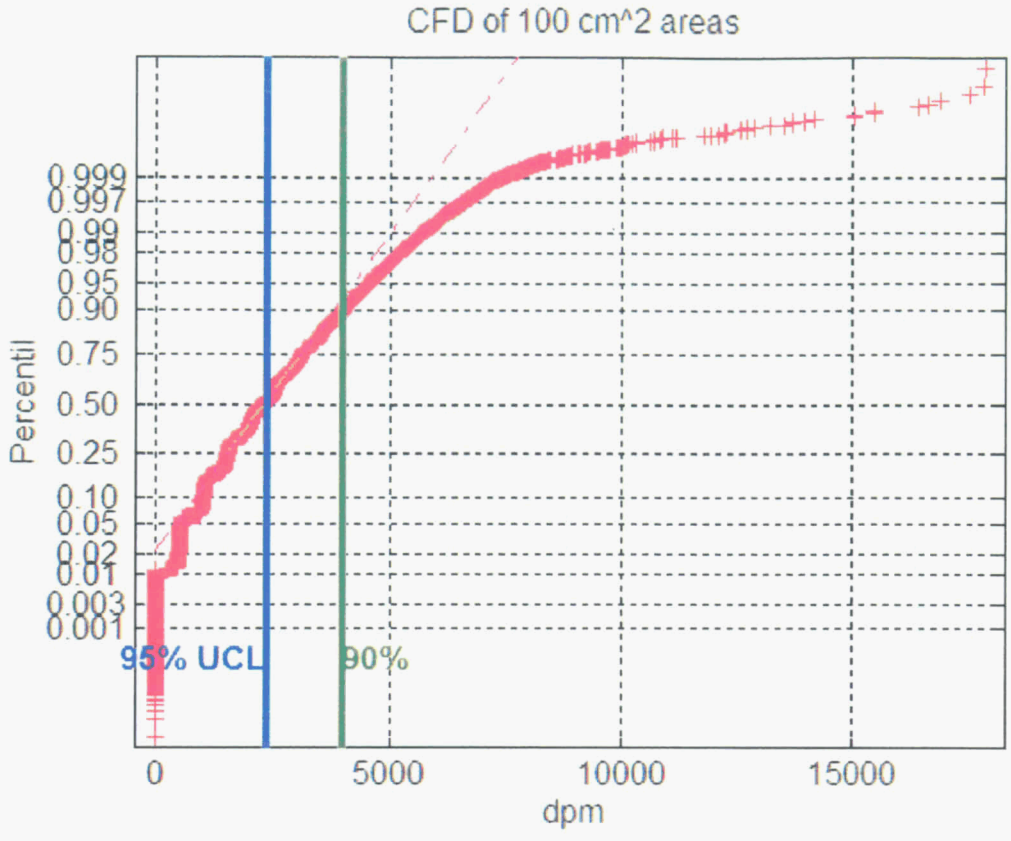


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Survey Report

Survey Location:	TTA PAD
Survey Unit Area Code:	N0099X
Survey File Name:	TP00602A
Survey Date:	August 31, 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:	**9,364 dpm/100 cm^2**
Maximum m^2 Average:	2,710 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630TP00602A

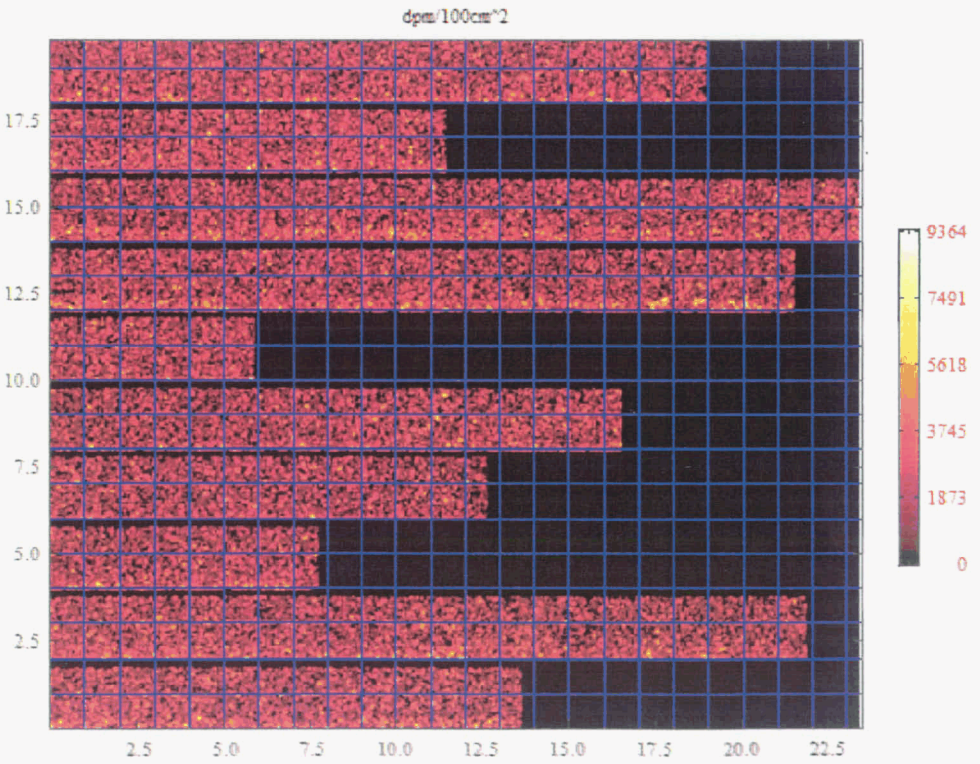


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

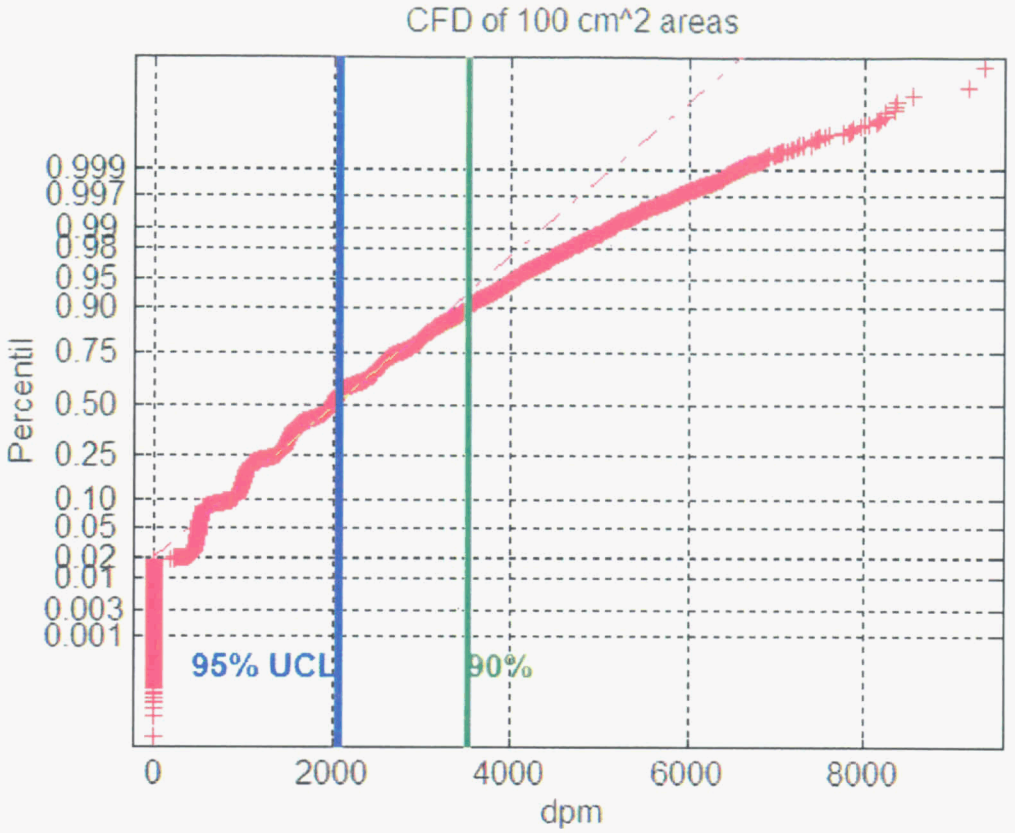


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Survey Report

Survey Location:	TTA PAD
Survey Unit Area Code:	N0099X
Survey File Name:	TP00702A
Survey Date:	August 31, 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%
SIMS Version:	V5.3l
SCM Version:	V3.4a
Survey Results	
Maximum 100 cm^2:	**6,019 dpm/100 cm^2**
Maximum m^2 Average:	3,263 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012651TP00702A

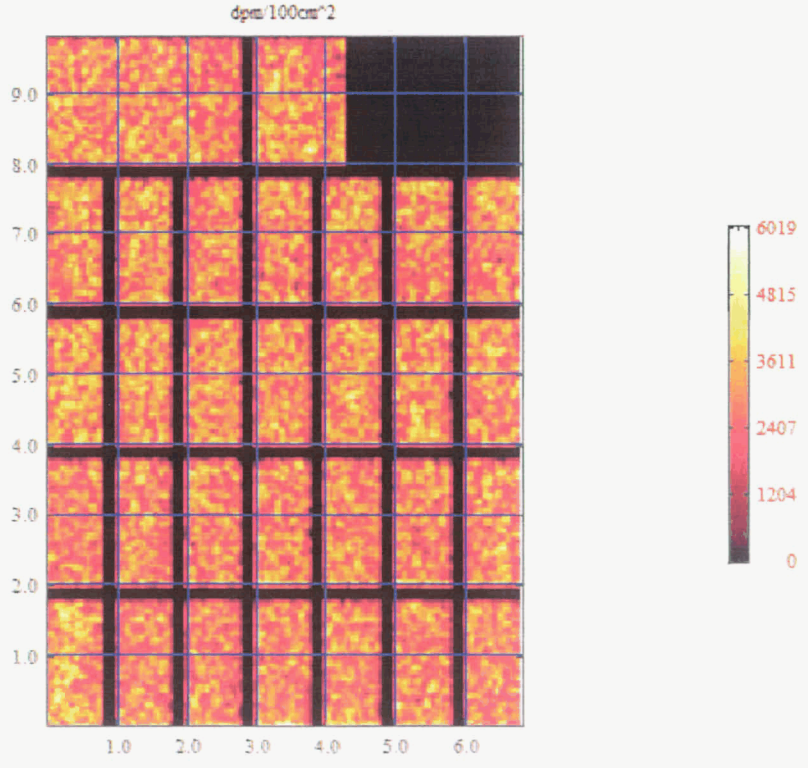


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

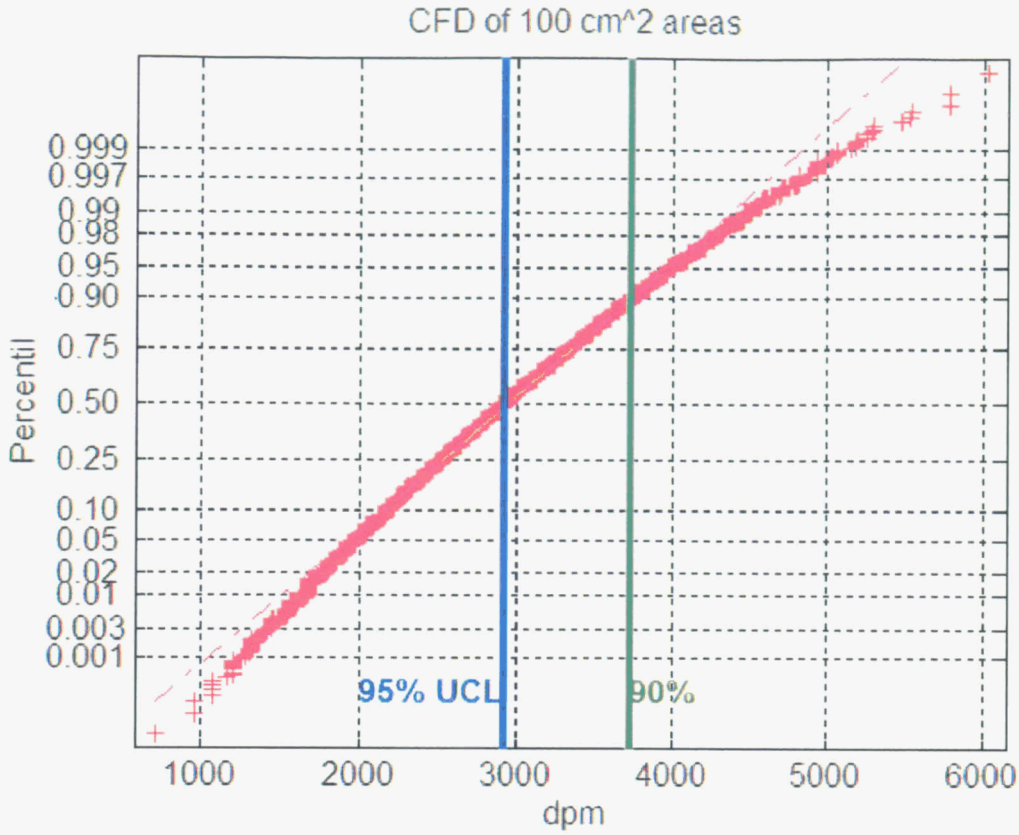


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Survey Report

Survey Location:	TTA PAD
Survey Unit Area Code:	N0099X
Survey File Name:	TP00802A
Survey Date:	September 8, 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%
SIMS Version:	V5.3l
SCM Version:	V3.4a
Survey Results	
Maximum 100 cm^2:	**12,639 dpm/100 cm^2**
Maximum m^2 Average:	4,313 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012651TP00802A

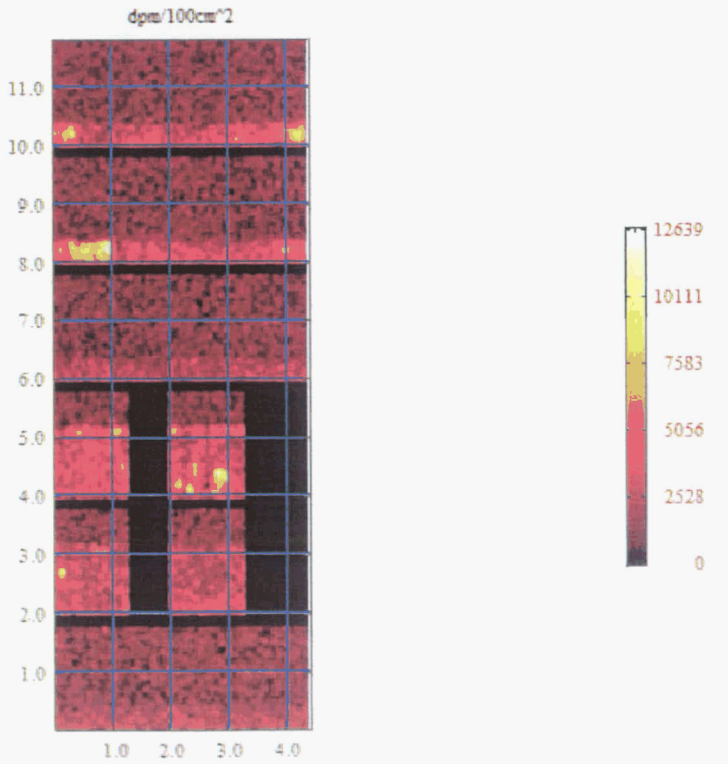


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

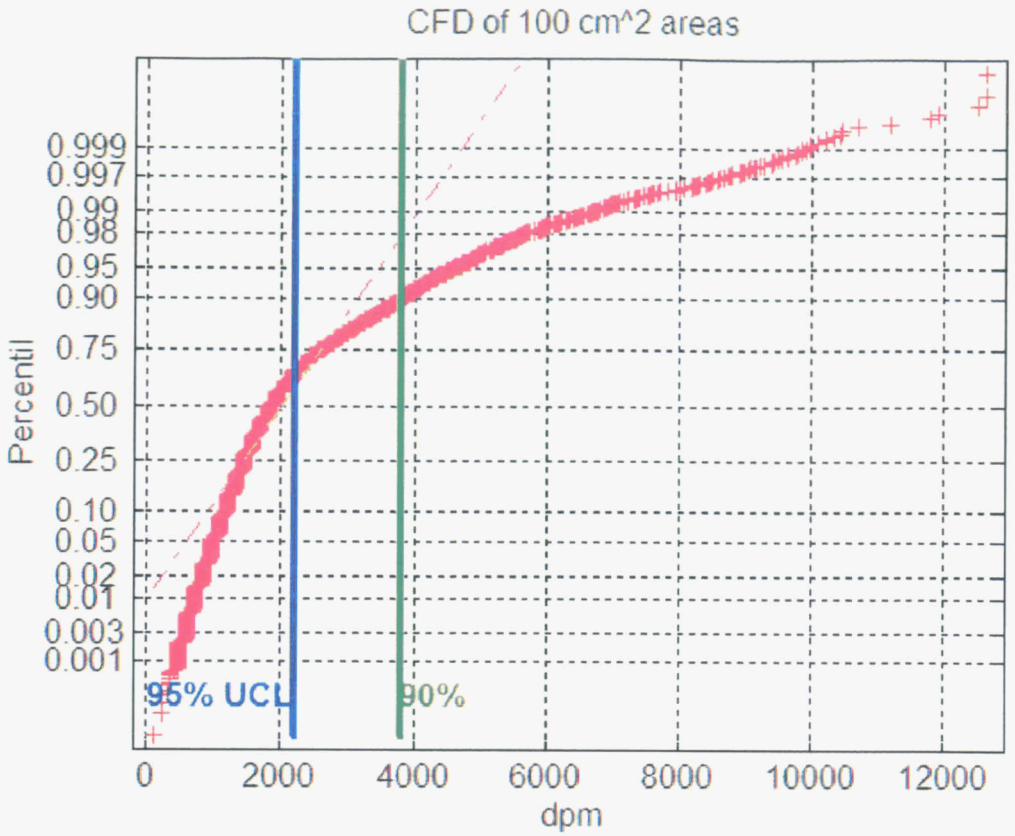


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.

Fernald Closure Project

Survey Report

TTA Generator Pad

A survey of the TTA Generator Pad was performed using the Surface Contamination Monitor (SCM). The objective of the survey was to identify the three highest locations of radioactivity on the pad for subsequent core sampling. The survey was conducted with the survey instrumentation operating in the alpha + beta mode. The attached survey report provides the results of that survey.

Survey report XP10102C 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. The pad was first surveyed on March 29, 2006 as XP10102A. However several grounding issues were identified. The metal items (ex. anchor bolts) were removed and the survey was repeated in it's entirety on March 30, 2006 as XP10102B. Subsequent to the second survey, equipment movement across the pad was necessary, requiring a resurvey due to the potential for recontamination. Survey XP10102C was performed on September 8, 2006, following completion of D&D activities near 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.

The locations of the three highest readings obtained on the South Tank 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
XP10102C	4936	1	(1380,50)	(0,45)
XP10102C	4815	171	(310,320)	(5,75)
XP10102C	4800	152	(120,350)	(5,105)

Survey Report

Survey Location:	TTA South Generator Pad
Survey Unit Area Code:	N0099X
Survey File Name:	XP10102C
Survey Date:	September 8, 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%
SIMS Version:	V5.3l
SCM Version:	V3.4a
Survey Results	
Maximum 100 cm^2:	**4,936 dpm/100 cm^2**
Maximum m^2 Average:	2,719 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012651XP10102C

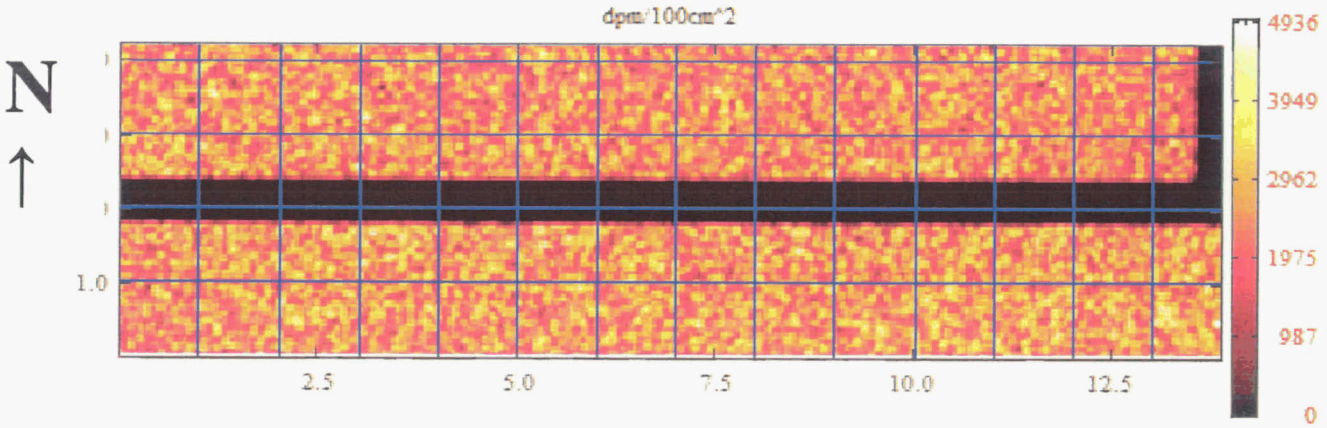


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the concrete pad.

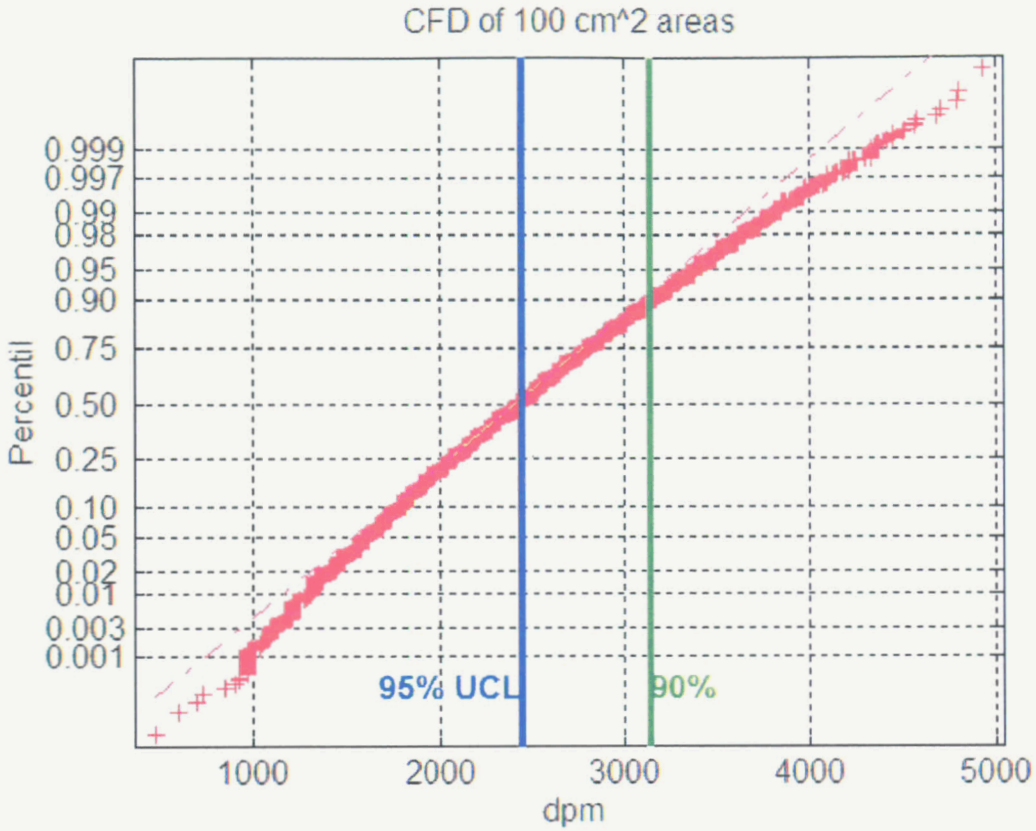
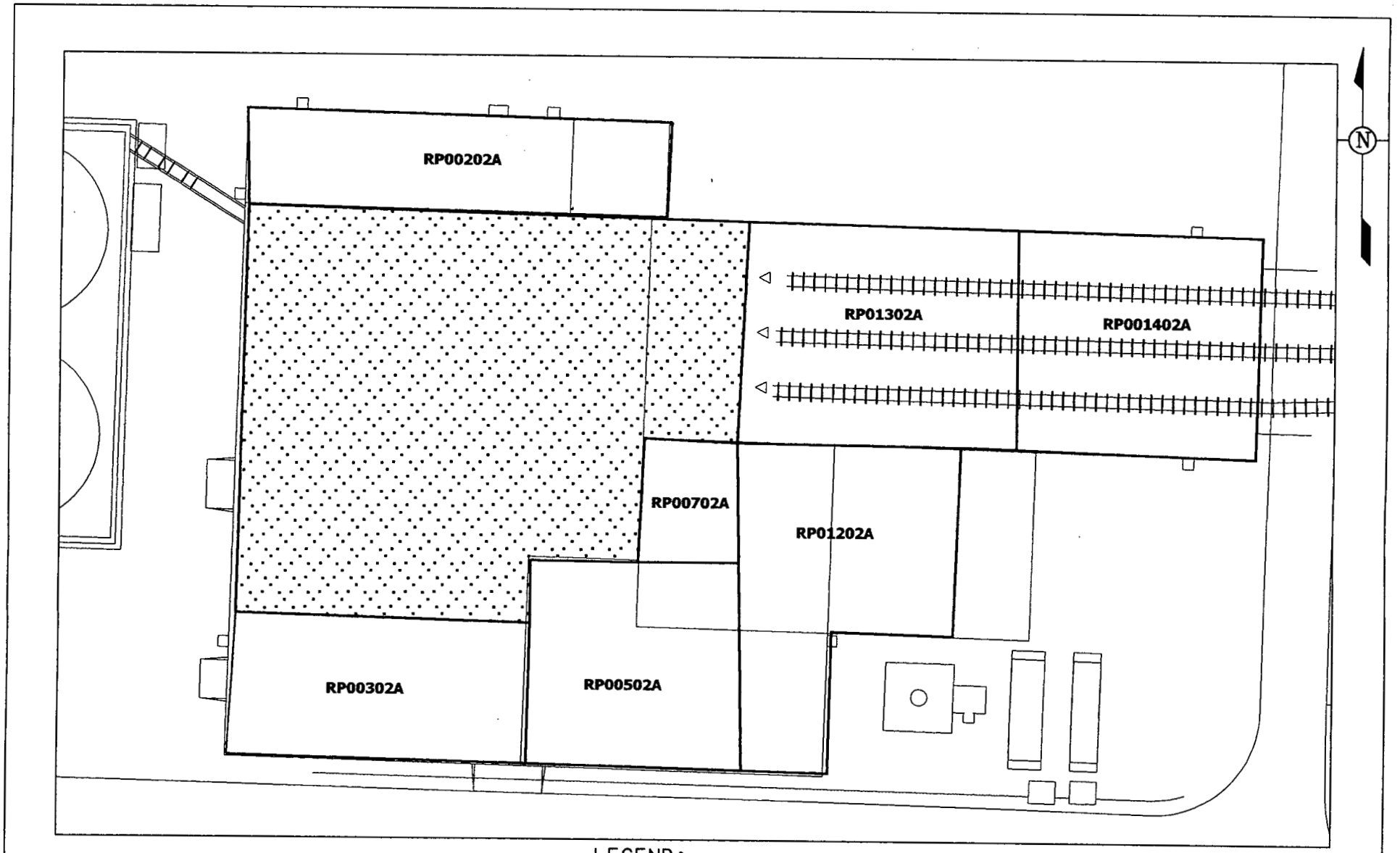


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm per 100cm^2.



v:\2fm12\dgn\a7_conc_cu1_a.dgn
STATE PLANAR COORDINATE SYSTEM 1983

FIGURE C-2. SILOS 1 & 2 REMEDIATION FACILITY. SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-RF-C03

23-OCT-2006

Fernald Closure Project

Survey Report

Remediation Facility Pad

Surveys of the Remediation Facility 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 RP00102A, RP00202A, RP00302A; RP00402A, RP00502B, RP00602A, RP00702A, RP00802A, RP00902A, RP01202A, RP01302A and RP01402A are the result of the SCM operating in the rolling mode. The survey was performed at a dynamic speed of 4 in./sec. The surveys identified numerous areas of surface contamination above levels that, based on experience, were highly likely to exceed the volumetric acceptance criteria. Areas above the limit (70,000 dpm/100 cm^2) were remediated and subsequently surveyed with hand held instrumentation due to the surface profile left following remediation.

The Remediation Facility Pad is broken down into 2 areas consistent with the certification area demarcation. Figure 1 provides spatially correlated results from five of the surveys (RP00102A, RP00402A, RP00602A, RP00802A and RP00902A) "quilted" into one image, with the (0,0) point representing the southwest corner of the survey area. The area is referred to as Certification Unit A for the SCM survey only. The actual certification unit is identified in Fluor Fernald documents. Figure 2 provides a Cumulative Frequency Distribution plot of the data from all five surveys. The plot represents a large number of measurements that are not with the normal distribution of clean concrete.

Figure 3 provides spatially correlated results from seven of the surveys (RP00202A, RP00302A, RP00502B, RP00702A, RP01202A, RP01302 and RP01402A) "quilted" into one image, with the (0,0) point representing the southwest corner of the survey area. The area is referred to as Certification Unit B for the SCM survey only. The actual certification unit is identified in Fluor Fernald documents. Survey RP00502B is a re-survey of the area. Detector problems were noted during the performance of RP00502A and the survey was repeated. Figure 4 provides a Cumulative Frequency Distribution plot of the data from all five surveys. The plot represents a large number of measurements that are not with the normal distribution of clean concrete.

Survey report RP01002A and RP01102A 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 surveys were performed with a static measurement time of 4 seconds. The results presented in Figure 5 and 7 are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey reports if necessary. Figures 6 and 8 provide Cumulative Frequency Distribution plots of the data from the two surveys. The plots represent

a large number of measurements that are not with the normal distribution of clean concrete. The surveys identified numerous areas of surface contamination above levels that, based on experience, were highly likely to exceed the volumetric acceptance criteria. Areas above the limit (70,000 dpm/100 cm^2) were remediated and subsequently surveyed with hand held instrumentation due to the surface profile left following remediation.

For each certification unit, locations with the three highest readings not within those area being remediated were identified for sampling. The areas were chosen to represent three different areas by omitting 100 cm^2 areas that were immediately adjacent to a spot already chosen.

The locations of the three highest readings obtained on the Remediation Facility Pad for each of the certification units are identified in the table below.

Certification Area A

Survey Filename	Value dpm/100 cm^2	Grid Location on Figure 1
RP00602A	69,121	(2,24)
RP00402A	65,487	(9,14)
RP00102A	64,613	(22,1)

Certification Area B

Survey Filename	Value dpm/100 cm^2	Grid Location on Figure 3
RP00502B	69,739	(1,15)
RP01302A	68,068	(25,13)
RP01202A	67,059	(4,26)

REMEDIATION FACILITY PAD – CERTIFICATION UNIT A

Surveys RP00102A, RP00402A, RP00602A, RP00802A and RP00902A

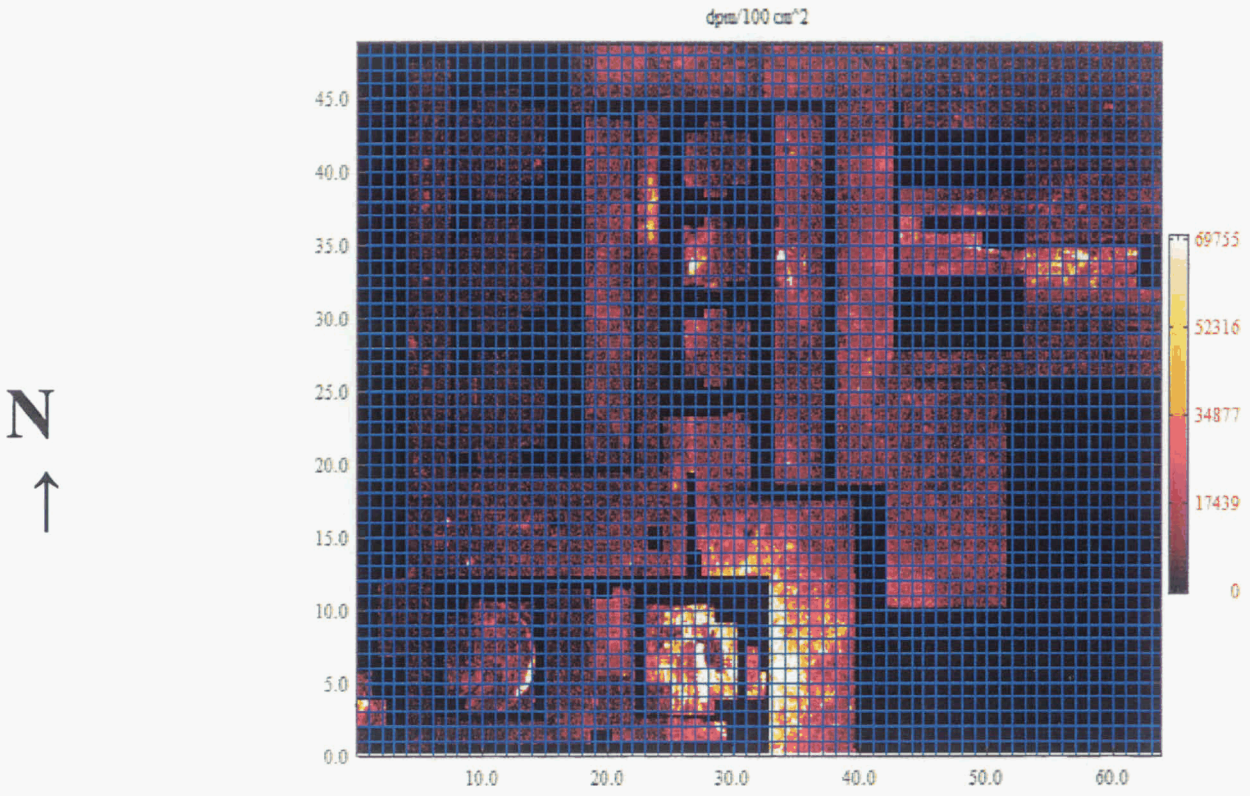


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the survey area.

REMEDIATION FACILITY PAD – CERTIFICATION UNIT A

Surveys RP00102A, RP00402A, RP00602A, RP00802A and RP00902A

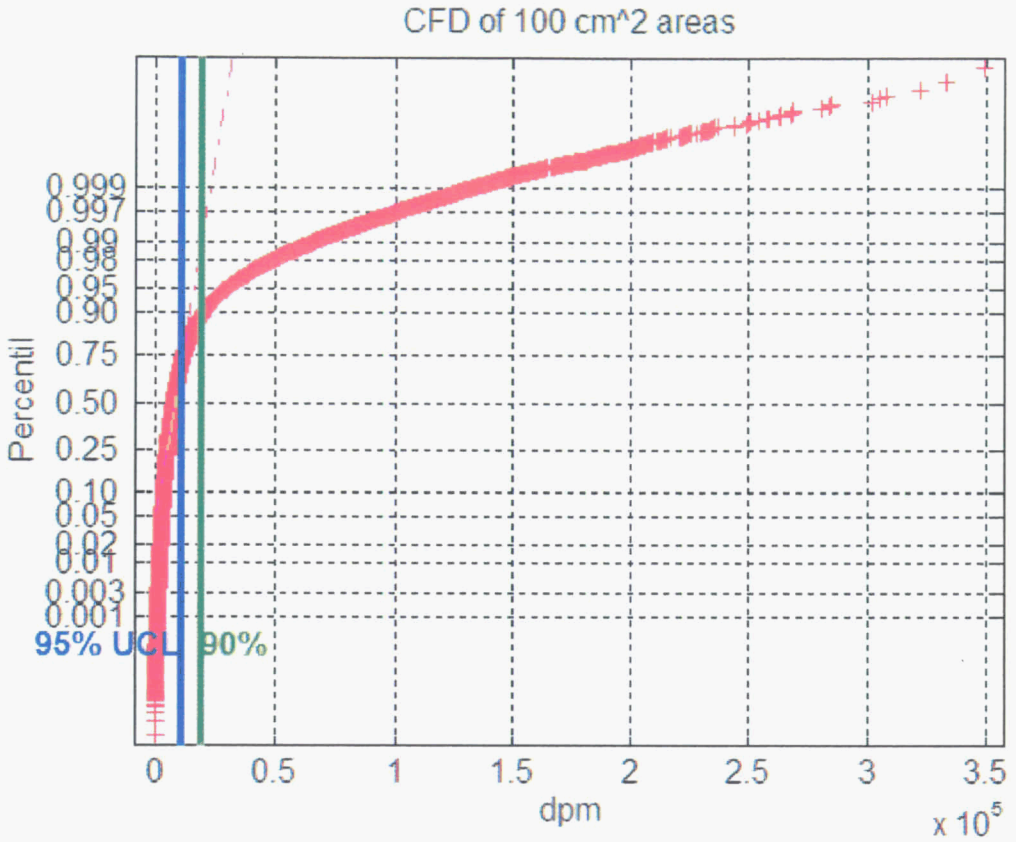


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^5 per 100cm^2.

REMEDIATION FACILITY PAD – CERTIFICATION UNIT B

Surveys RP00202A, RP00302A, RP005602B, RP00702A, RP01202A, RP01302A and RP01402A

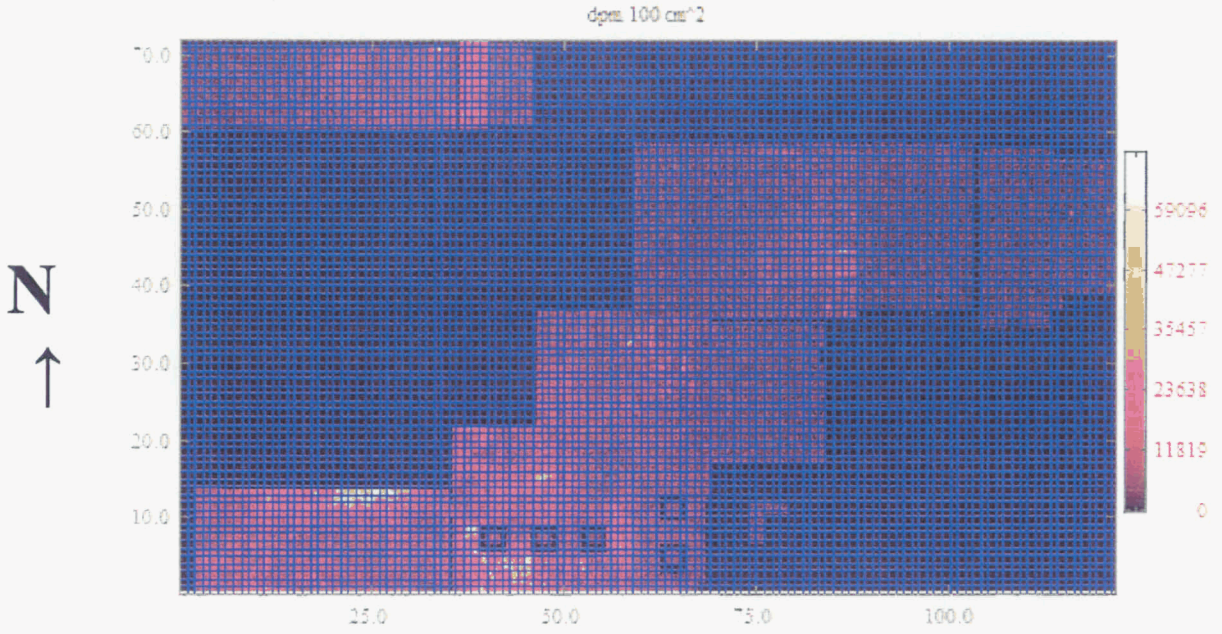


Figure 3: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the survey area.

REMEDIATION FACILITY PAD – CERTIFICATION UNIT B

Surveys RP00202A, RP00302A, RP005602B, RP00702A, RP01202A, RP01302A and RP01402A

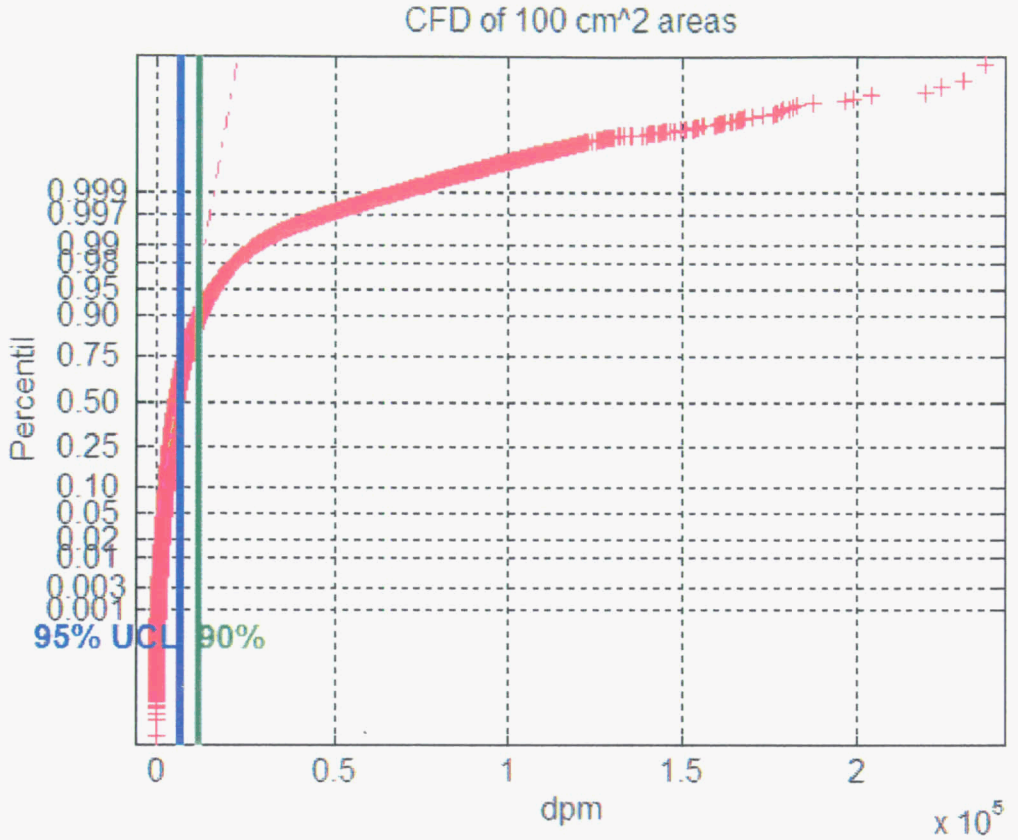


Figure 4: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^5 per 100cm^2.

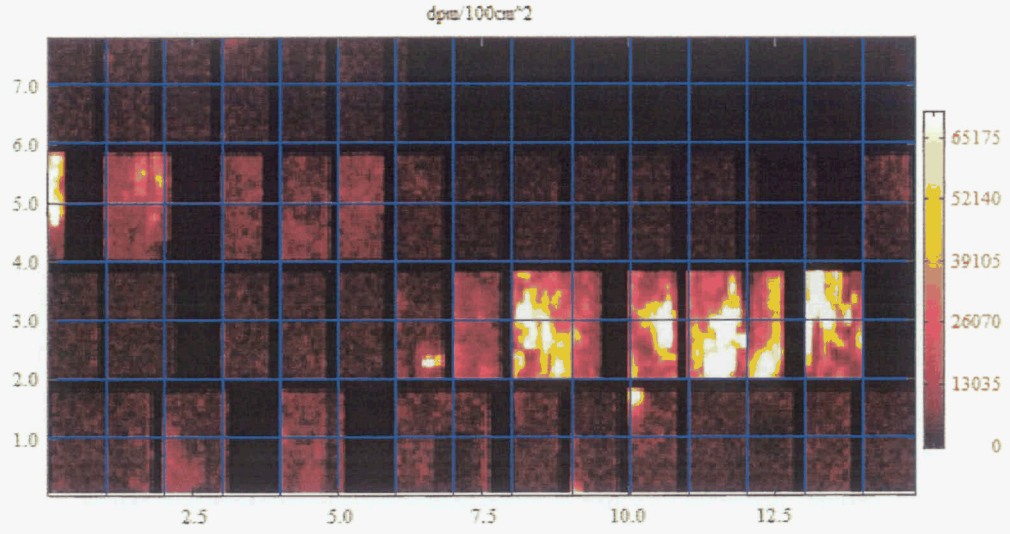


Figure 5: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2 and has been trimmed to 70,000 dpm/100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

Survey RP01002A

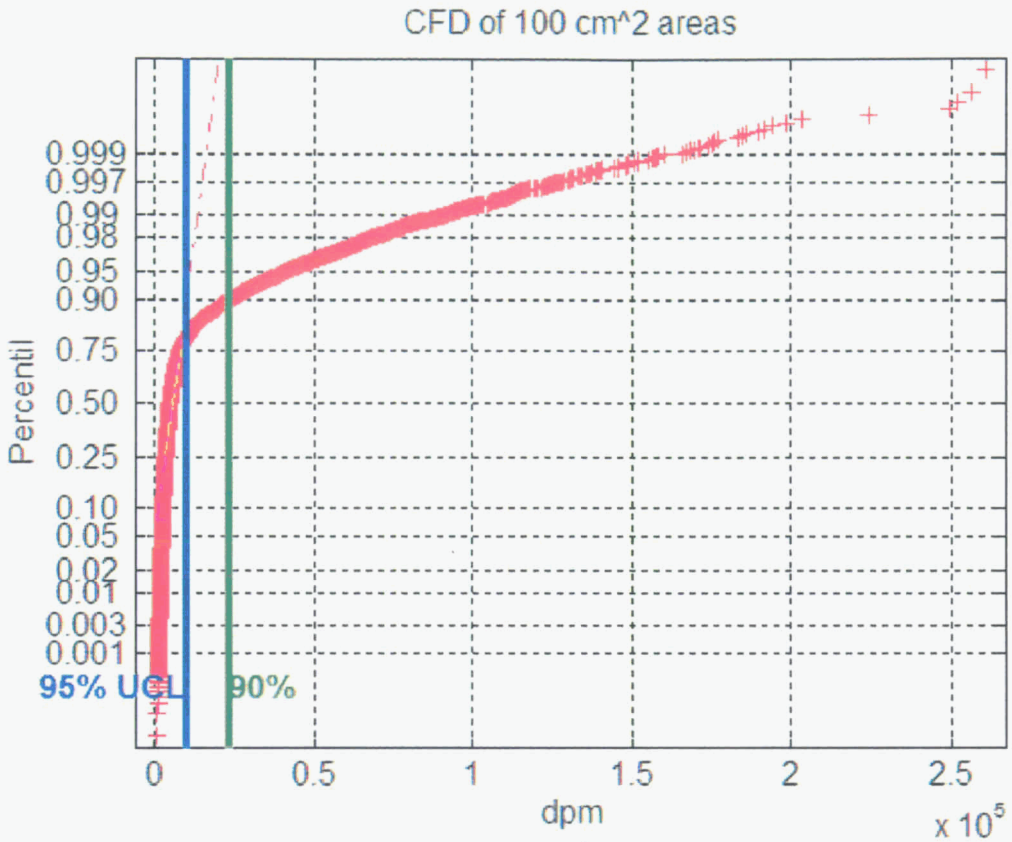


Figure 6: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^5 per 100cm^2.

Survey RP01102A

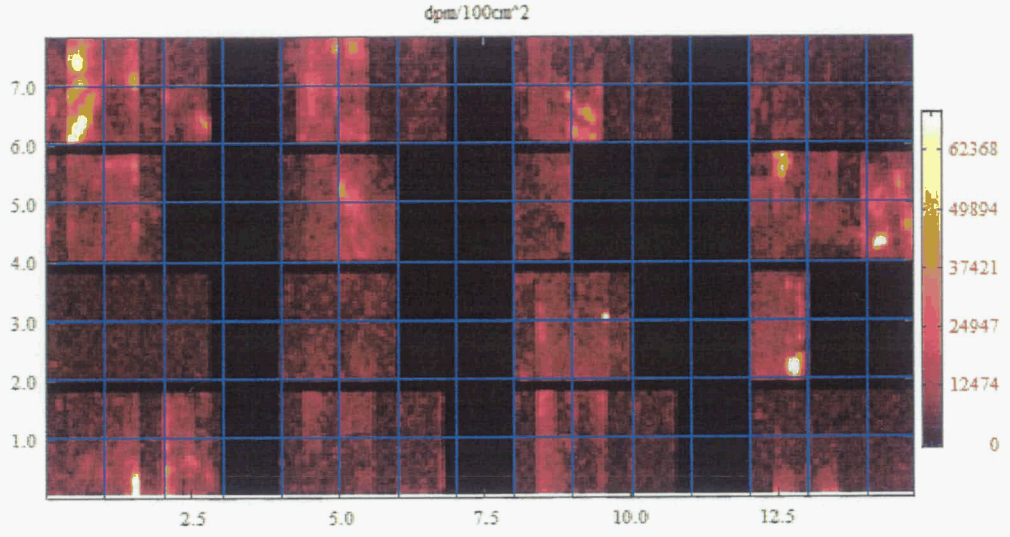


Figure 7: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2 and has been trimmed to 70,000 dpm/100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

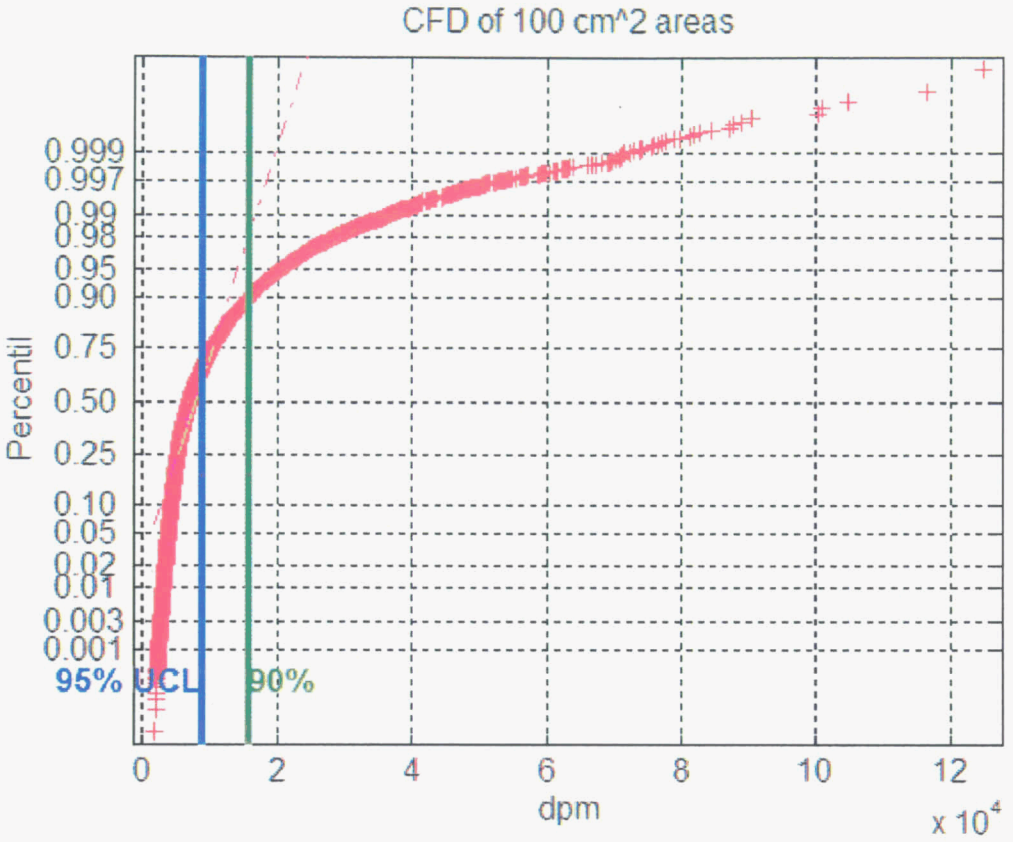


Figure 8: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.

Investigation Report

Survey Location:	Remediation Facilities Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP00202A
Survey Date:	September 19, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**97,134 dpm/100 cm^2**
Maximum m^2 Average:	28,124 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP00202A

NOTE: Bold Text Denotes Values Exceeding Criteria.

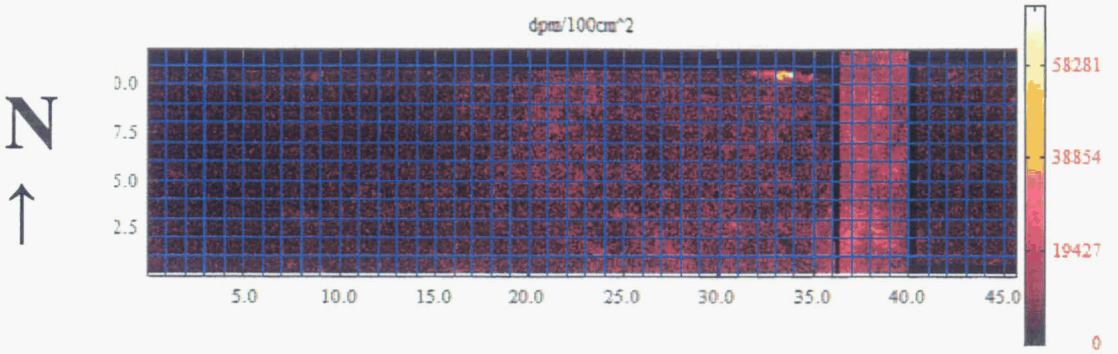


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

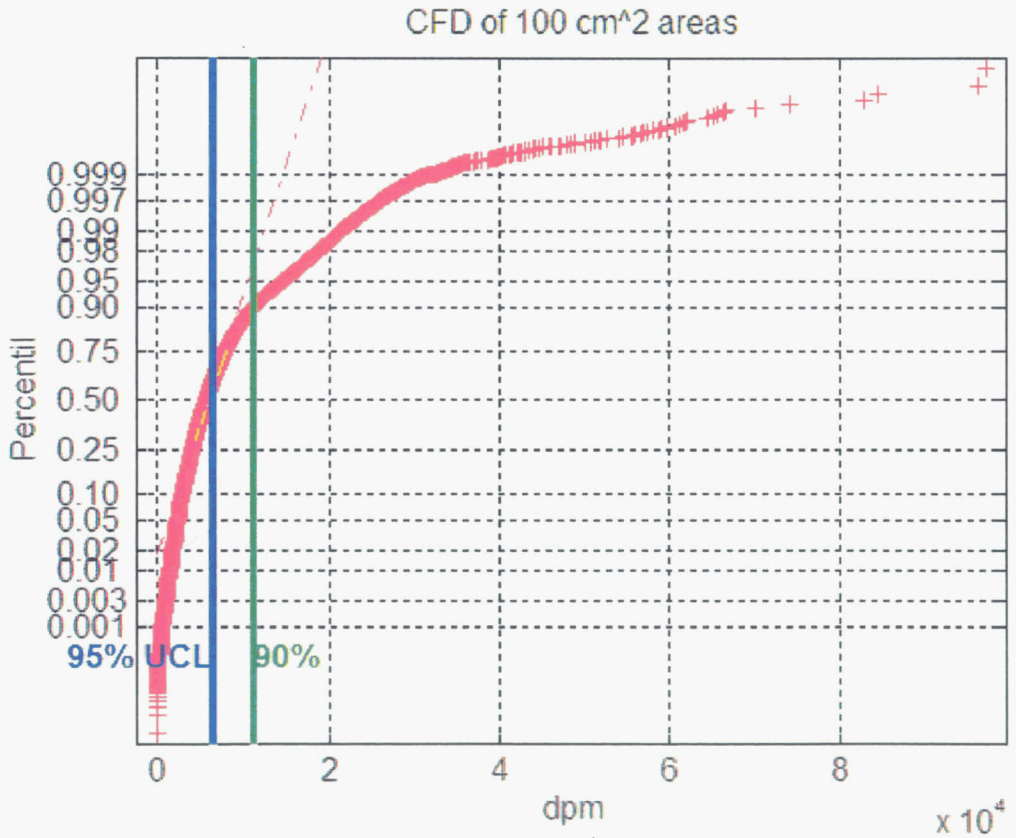


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².

Investigation Report

Survey Location:	Remediation Facilities Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP00302A
Survey Date:	September 19, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**236,383 dpm/100 cm^2**
Maximum m^2 Average:	**95,514 dpm/100 cm^2**
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP00302A

NOTE: Bold Text Denotes Values Exceeding Criteria.

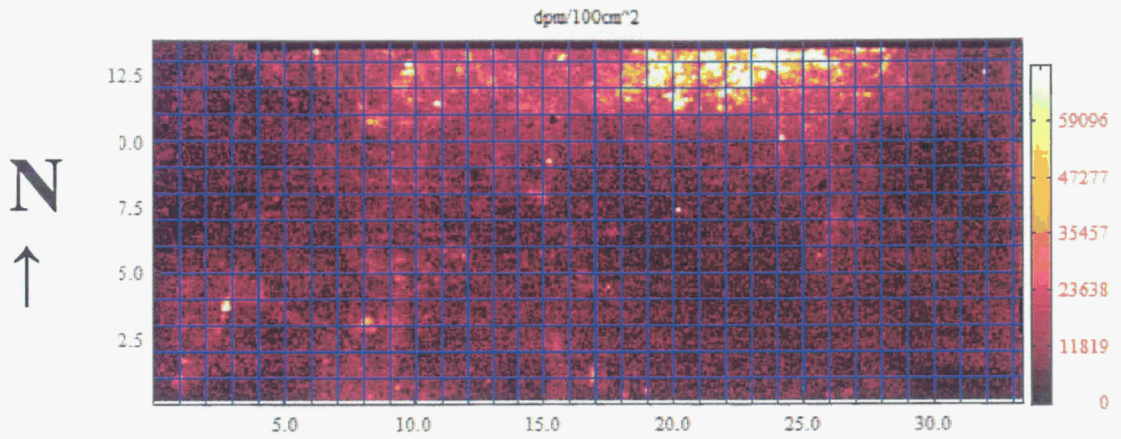


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

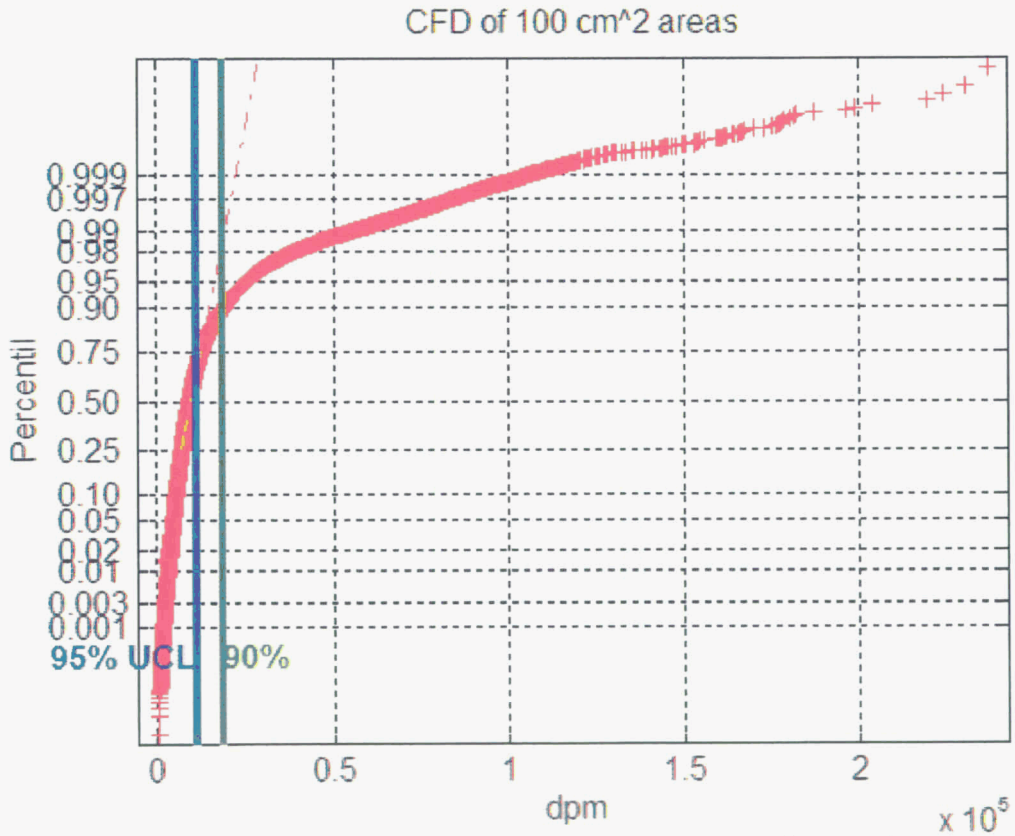


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10⁴ per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP00502B
Survey Date:	September 21, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP/KIMOKEO
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**155,943 dpm/100 cm^2**
Maximum m^2 Average:	49,796 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP00502B

NOTE: Bold Text Denotes Values Exceeding Criteria.

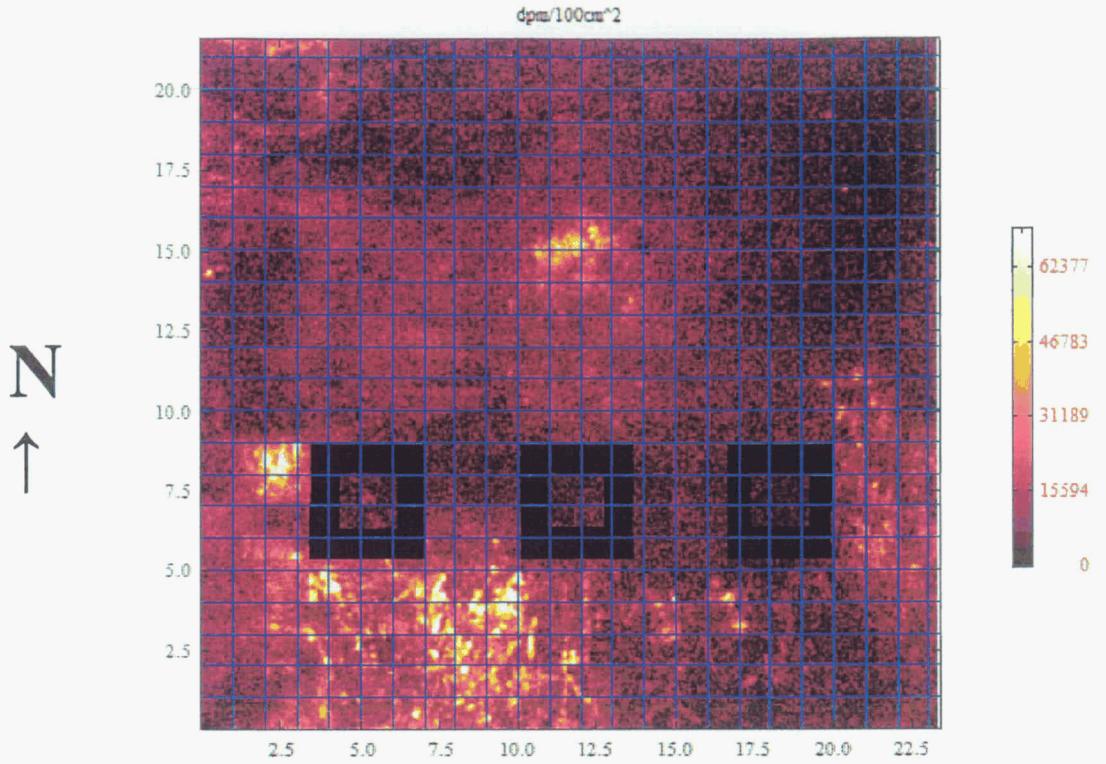


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

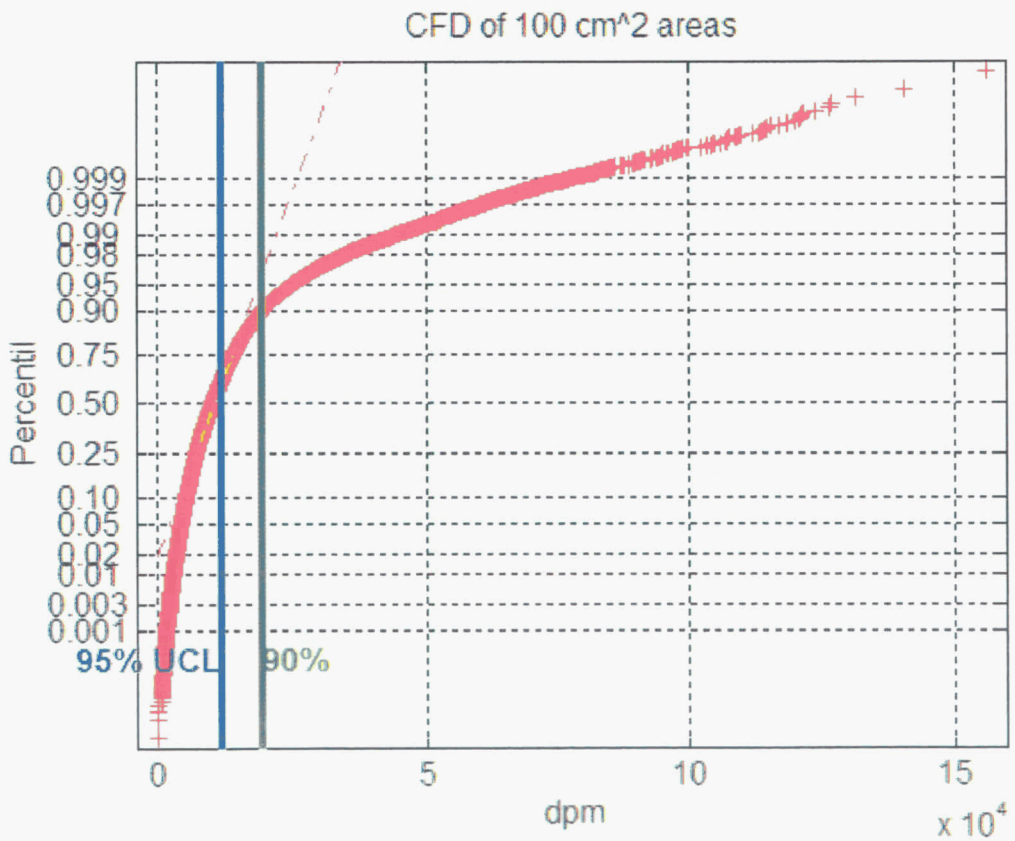


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP00702A
Survey Date:	September 21, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP/KIMOKEO
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**75,366 dpm/100 cm^2**
Maximum m^2 Average:	13,936 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB012630RP00702A

NOTE: Bold Text Denotes Values Exceeding Criteria.

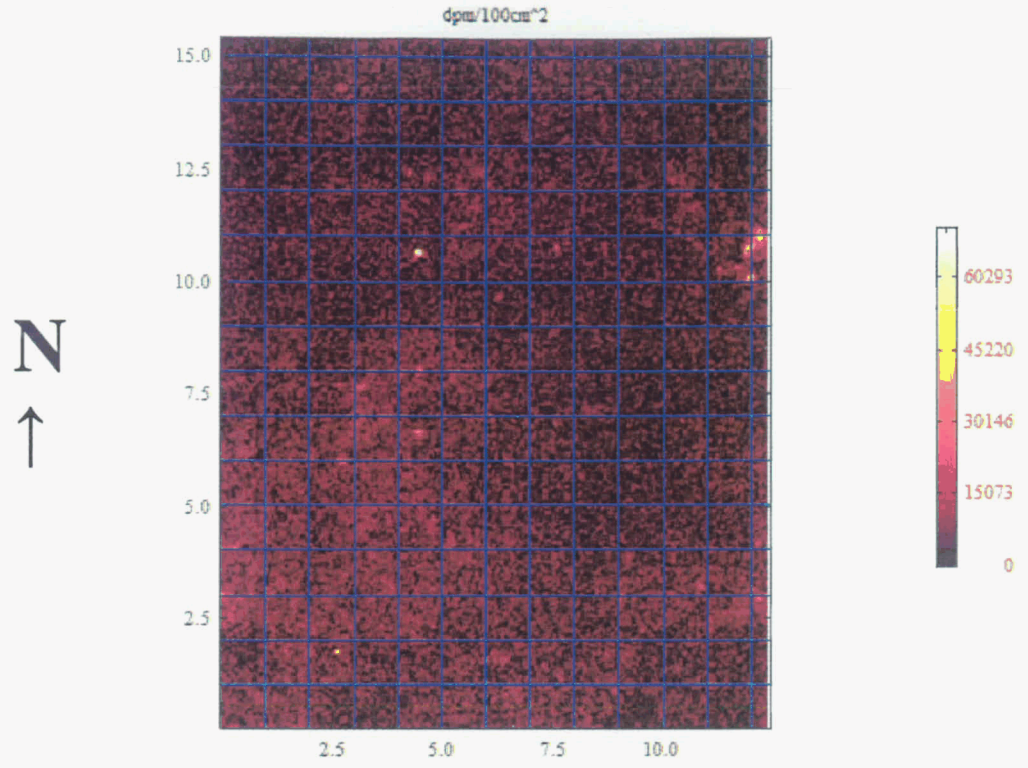


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

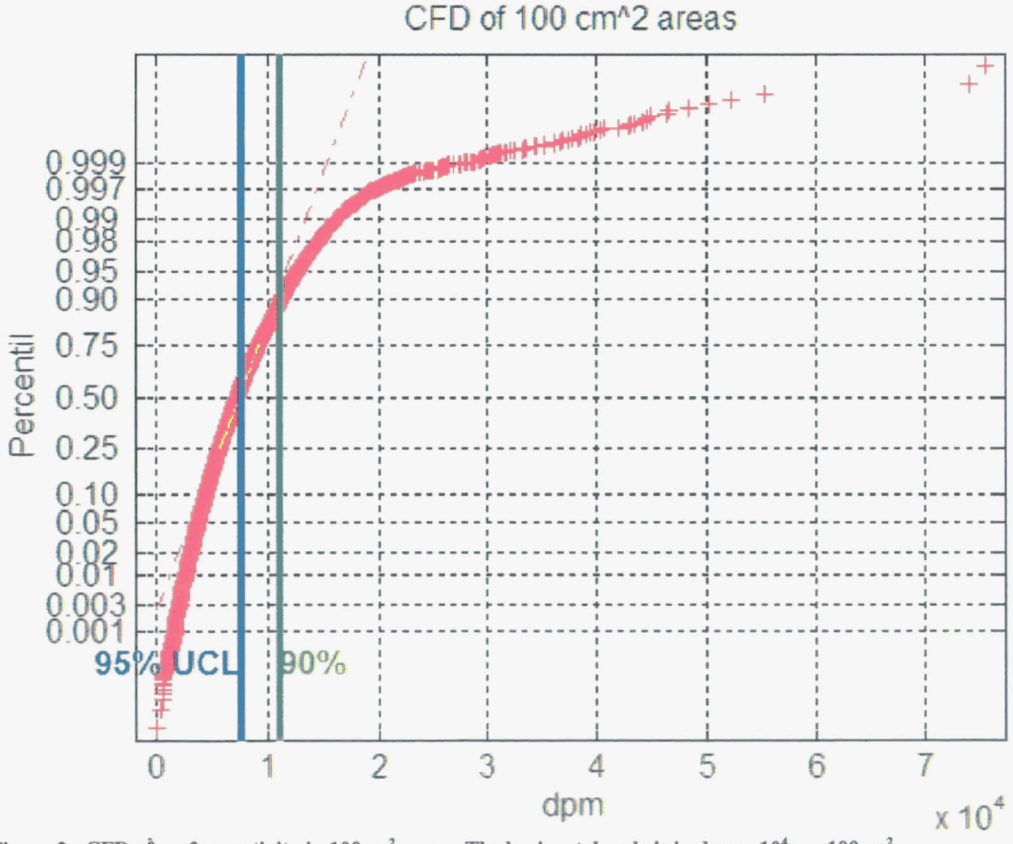


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP01202A
Survey Date:	October 4, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
Any 100 cm^2 Measurement:	45,000 net dpm/100 cm^2
Average Over Any 1 m^2:	45,000 net dpm/100 cm^2
Investigation Level 100cm^2:	45,000 net dpm/100 cm^2
Investigation Level m^2:	45,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**140,248 dpm/100 cm^2**
Maximum m^2 Average:	13,721 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB012630RP01202A

NOTE: Bold Text Denotes Values Exceeding Criteria.

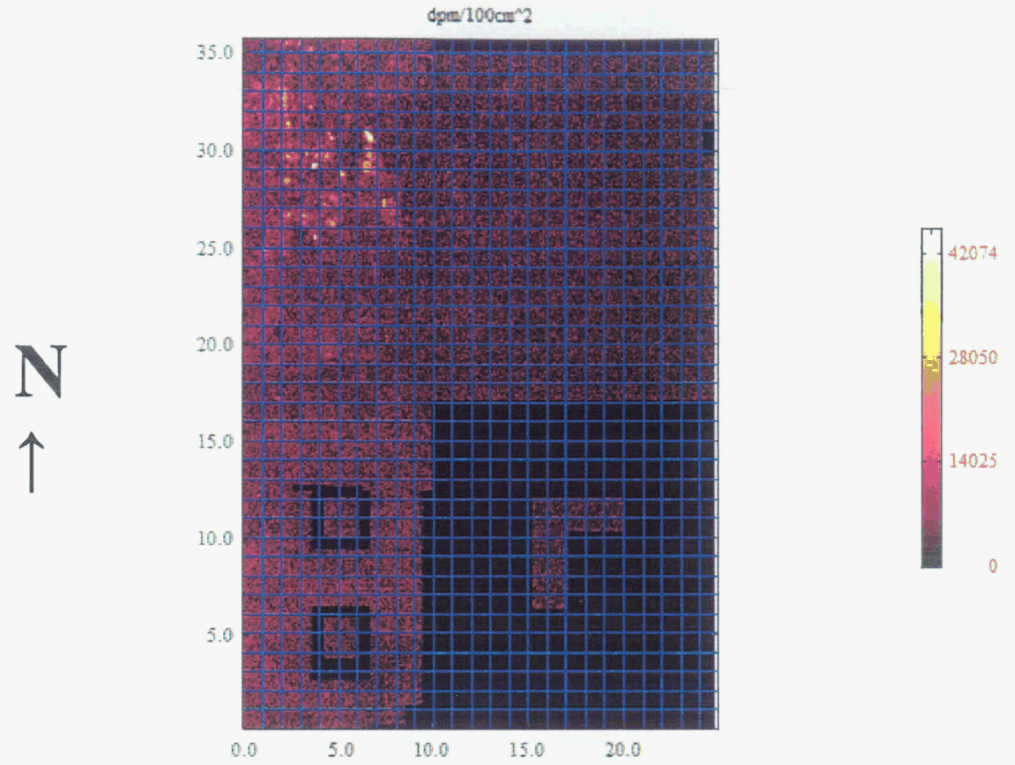


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 45,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

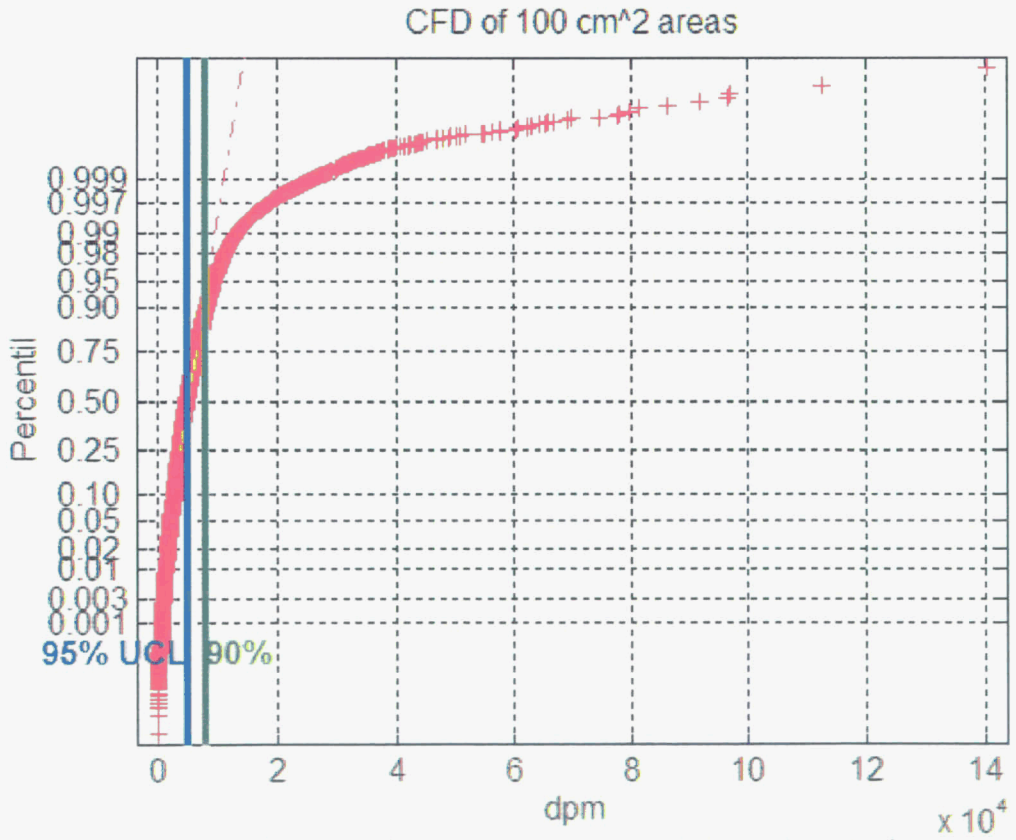


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP01302A
Survey Date:	October 4, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
Any 100 cm^2 Measurement:	45,000 net dpm/100 cm^2
Average Over Any 1 m^2:	45,000 net dpm/100 cm^2
Investigation Level 100cm^2:	45,000 net dpm/100 cm^2
Investigation Level m^2:	45,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**68,068 dpm/100 cm^2**
Maximum m^2 Average:	15,009 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP01302A

NOTE: Bold Text Denotes Values Exceeding Criteria.

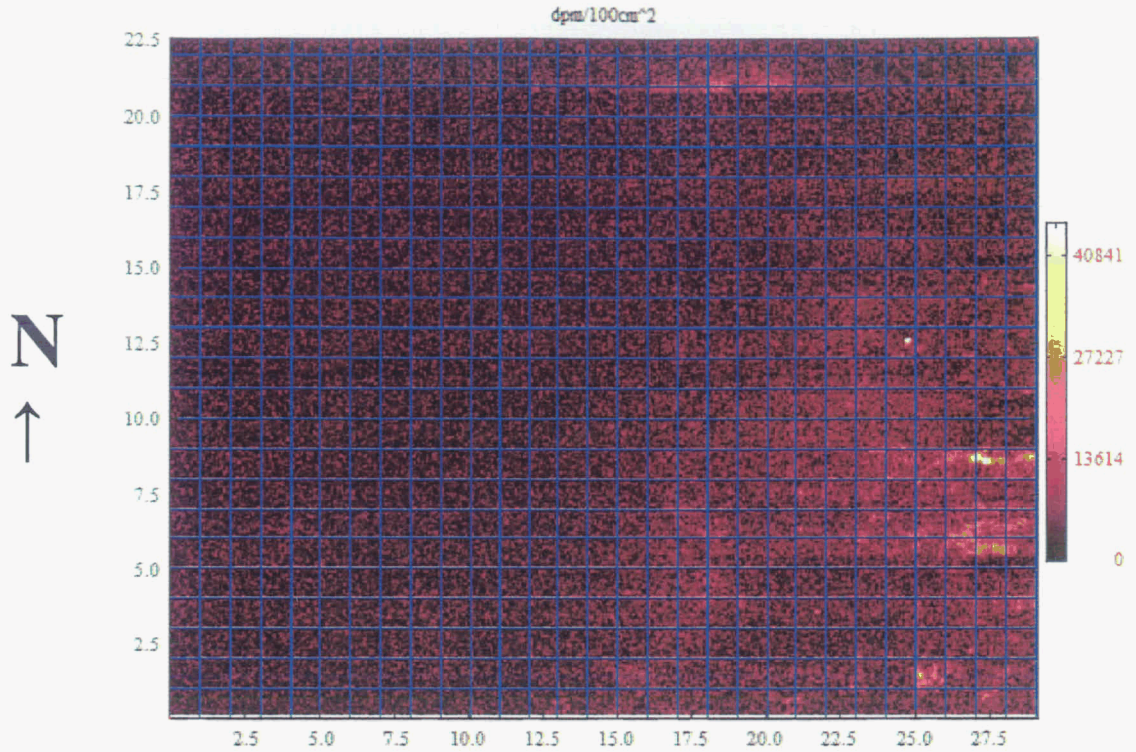


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 45,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

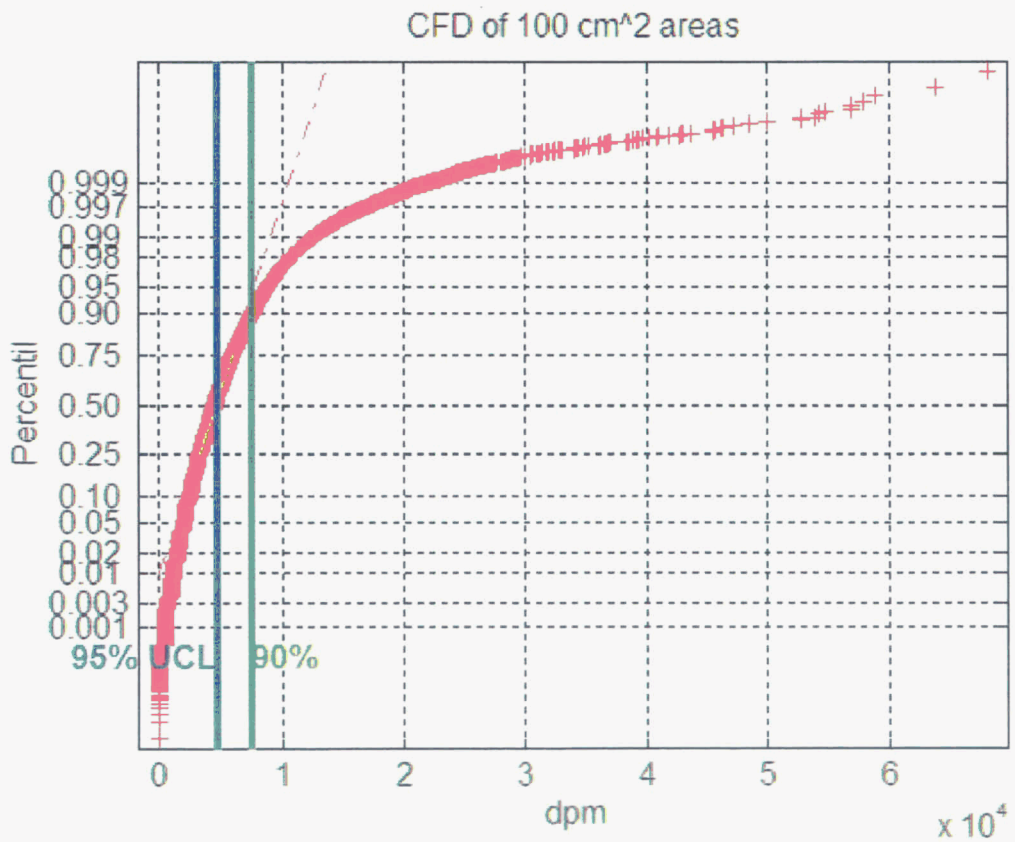


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10⁴ per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP01402A
Survey Date:	October 4, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	KIMOKEO/SAPP
Criteria	
Any 100 cm^2 Measurement:	45,000 net dpm/100 cm^2
Average Over Any 1 m^2:	45,000 net dpm/100 cm^2
Investigation Level 100cm^2:	45,000 net dpm/100 cm^2
Investigation Level m^2:	45,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	41,446 dpm/100 cm^2
Maximum m^2 Average:	4,282 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP01402A

NOTE: Bold Text Denotes Values Exceeding Criteria.

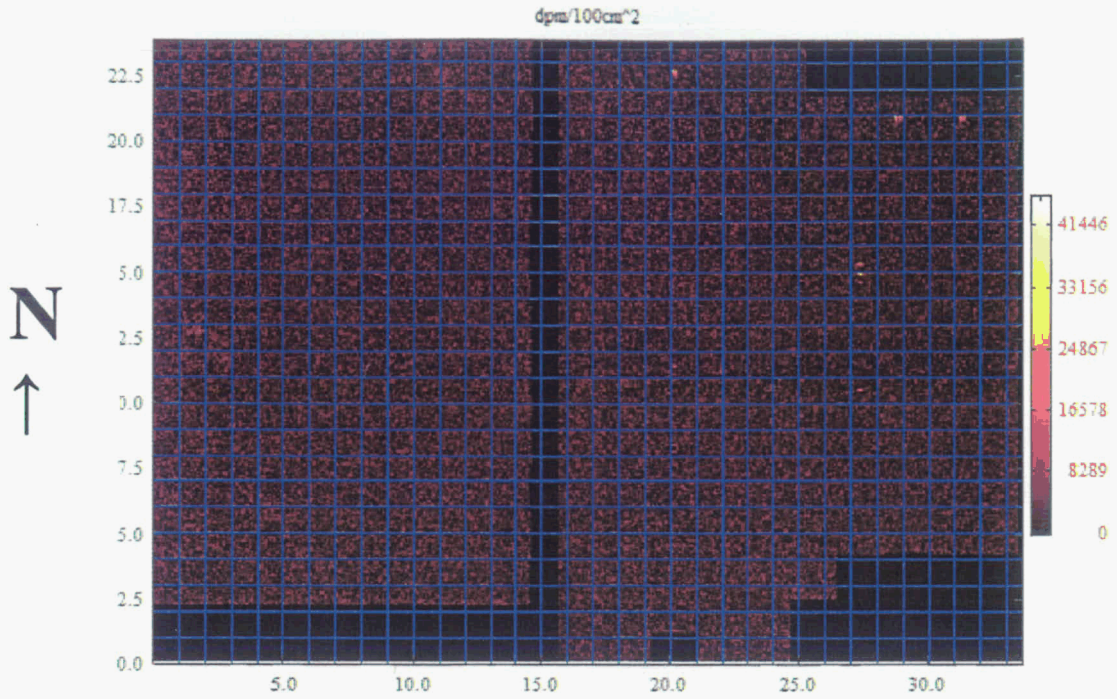


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². The (0,0) point is the Southwest corner of the concrete pad.

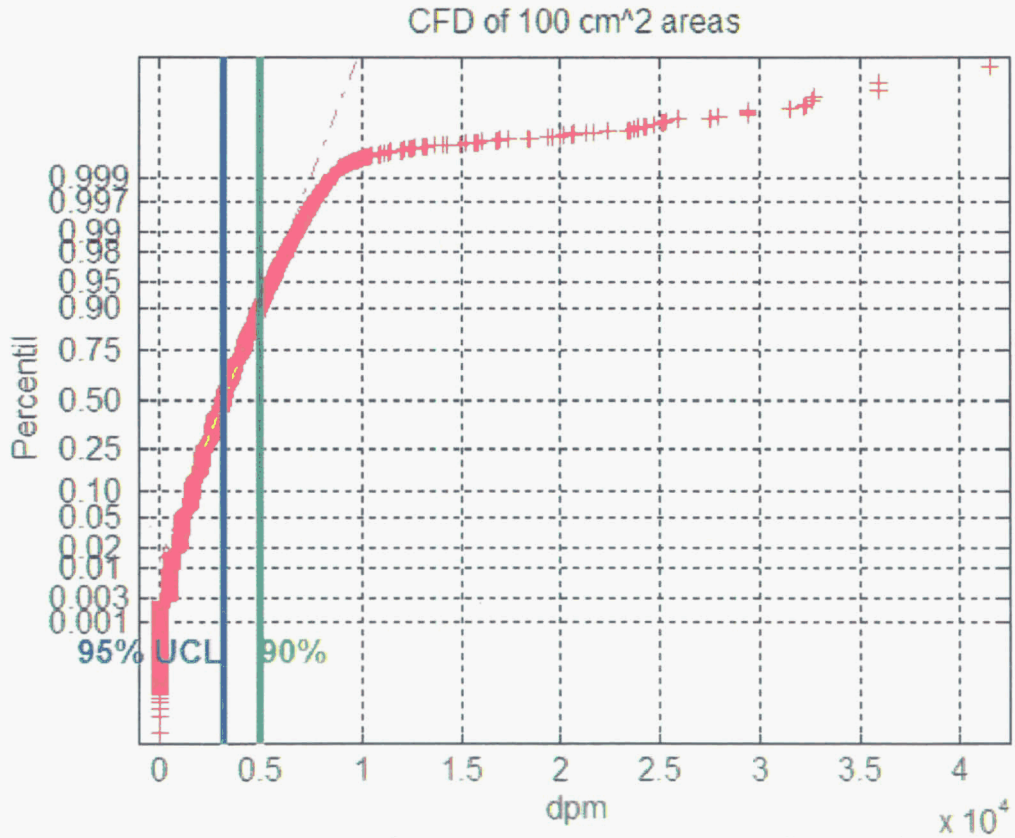
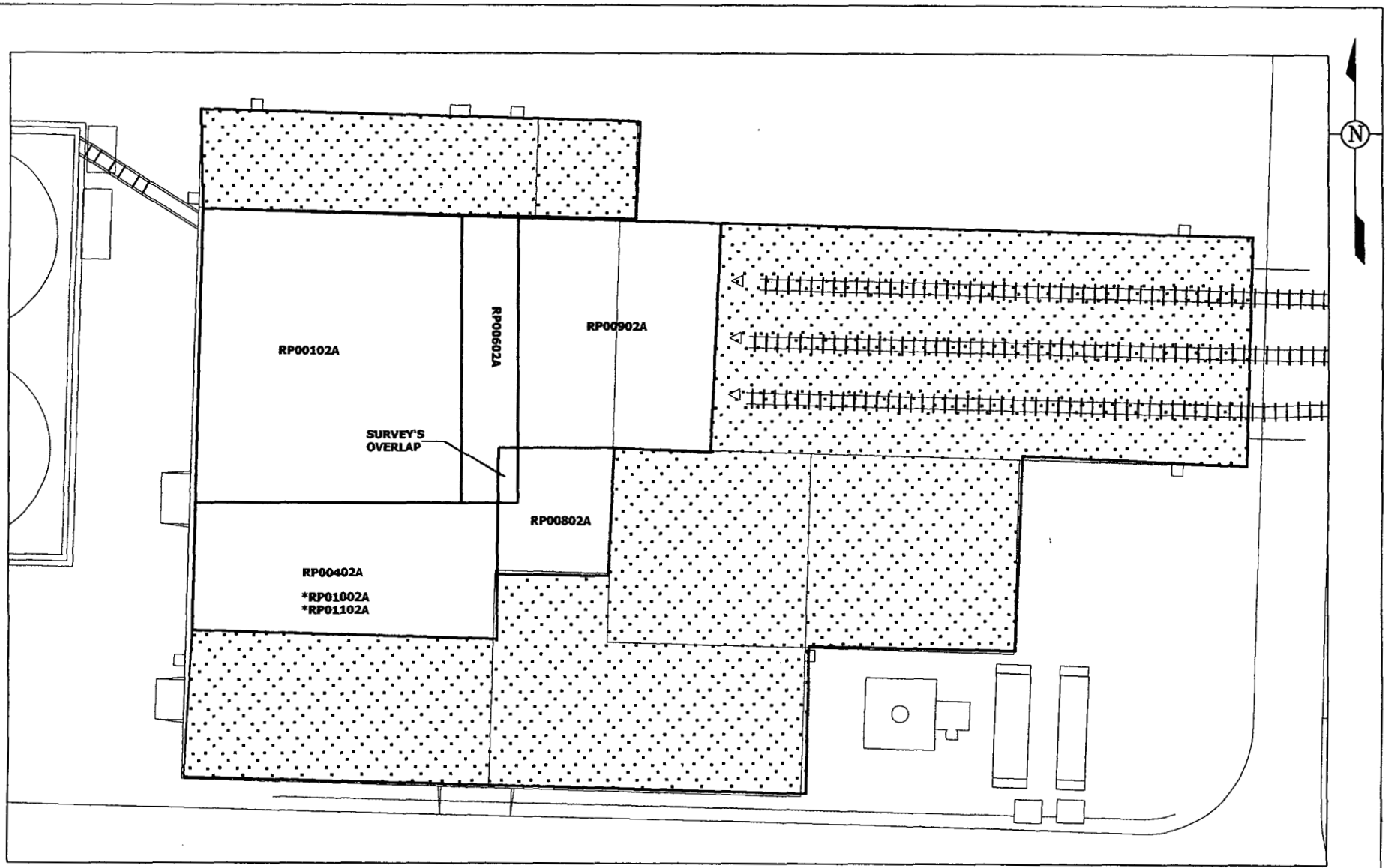


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².



LEGEND:

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

SCALE

50 25 0 50 FEET

v:\2-fm12\dgn\a7_conc_cu2_a.dgn
STATE PLANAR COORDINATE SYSTEM 1983

23-OCT-2006

FIGURE C-3. SILOS 1 & 2 REMEDIATION FACILITY. SURVEY IDENTIFICATION FOR CERTIFICATION UNIT A7C-RF-C04

Fernald Closure Project

Survey Report

Remediation Facility Pad

Surveys of the Remediation Facility 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 RP00102A, RP00202A, RP00302A; RP00402A, RP00502B, RP00602A, RP00702A, RP00802A, RP00902A, RP01202A, RP01302A and RP01402A are the result of the SCM operating in the rolling mode. The survey was performed at a dynamic speed of 4 in./sec. The surveys identified numerous areas of surface contamination above levels that, based on experience, were highly likely to exceed the volumetric acceptance criteria. Areas above the limit (70,000 dpm/100 cm^2) were remediated and subsequently surveyed with hand held instrumentation due to the surface profile left following remediation.

The Remediation Facility Pad is broken down into 2 areas consistent with the certification area demarcation. Figure 1 provides spatially correlated results from five of the surveys (RP00102A, RP00402A, RP00602A, RP00802A and RP00902A) "quilted" into one image, with the (0,0) point representing the southwest corner of the survey area. The area is referred to as Certification Unit A for the SCM survey only. The actual certification unit is identified in Fluor Fernald documents. Figure 2 provides a Cumulative Frequency Distribution plot of the data from all five surveys. The plot represents a large number of measurements that are not with the normal distribution of clean concrete.

Figure 3 provides spatially correlated results from seven of the surveys (RP00202A, RP00302A, RP00502B, RP00702A, RP01202A, RP01302 and RP01402A) "quilted" into one image, with the (0,0) point representing the southwest corner of the survey area. The area is referred to as Certification Unit B for the SCM survey only. The actual certification unit is identified in Fluor Fernald documents. Survey RP00502B is a re-survey of the area. Detector problems were noted during the performance of RP00502A and the survey was repeated. Figure 4 provides a Cumulative Frequency Distribution plot of the data from all five surveys. The plot represents a large number of measurements that are not with the normal distribution of clean concrete.

Survey report RP01002A and RP01102A 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 surveys were performed with a static measurement time of 4 seconds. The results presented in Figure 5 and 7 are not spatially correlated to field acquisitions, but each data point can be correlated via maps included in the field survey reports if necessary. Figures 6 and 8 provide Cumulative Frequency Distribution plots of the data from the two surveys. The plots represent

a large number of measurements that are not with the normal distribution of clean concrete. The surveys identified numerous areas of surface contamination above levels that, based on experience, were highly likely to exceed the volumetric acceptance criteria. Areas above the limit (70,000 dpm/100 cm^2) were remediated and subsequently surveyed with hand held instrumentation due to the surface profile left following remediation.

For each certification unit, locations with the three highest readings not within those area being remediated were identified for sampling. The areas were chosen to represent three different areas by omitting 100 cm^2 areas that were immediately adjacent to a spot already chosen.

The locations of the three highest readings obtained on the Remediation Facility Pad for each of the certification units are identified in the table below.

Certification Area A

Survey Filename	Value dpm/100 cm^2	Grid Location on Figure 1
RP00602A	69,121	(2,24)
RP00402A	65,487	(9,14)
RP00102A	64,613	(22,1)

Certification Area B

Survey Filename	Value dpm/100 cm^2	Grid Location on Figure 3
RP00502B	69,739	(1,15)
RP01302A	68,068	(25,13)
RP01202A	67,059	(4,26)

REMEDIATION FACILITY PAD – CERTIFICATION UNIT A

Surveys RP00102A, RP00402A, RP00602A, RP00802A and RP00902A

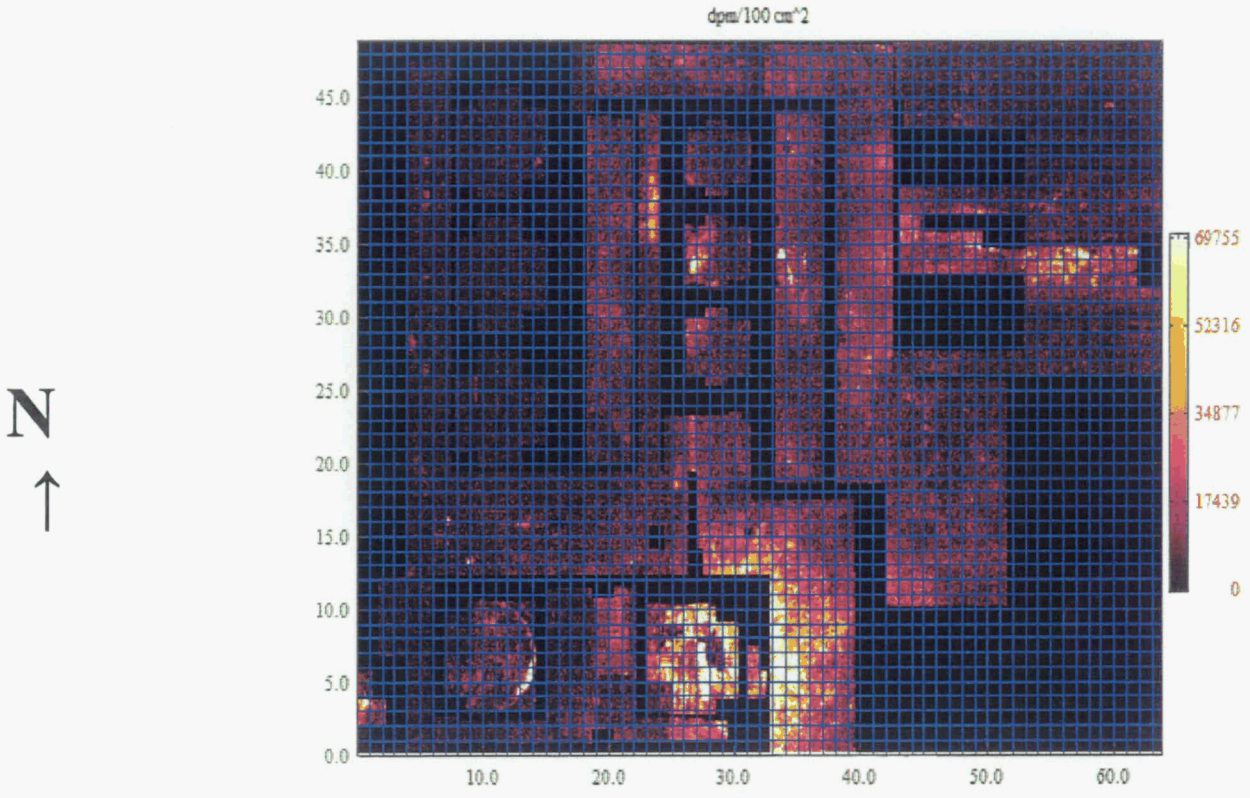


Figure 1: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the survey area.

REMEDIATION FACILITY PAD – CERTIFICATION UNIT A

Surveys RP00102A, RP00402A, RP00602A, RP00802A and RP00902A

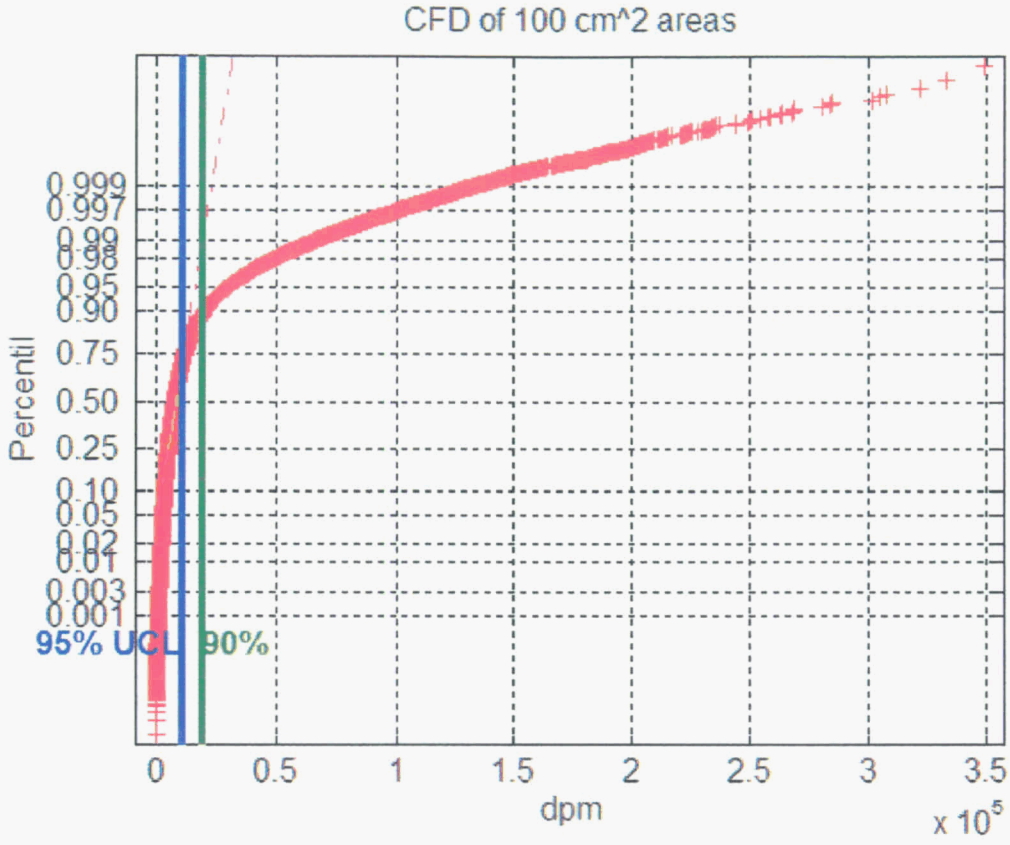


Figure 2: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^5 per 100cm^2.

REMEDIATION FACILITY PAD – CERTIFICATION UNIT B

Surveys RP00202A, RP00302A, RP005602B, RP00702A, RP01202A, RP01302A and RP01402A

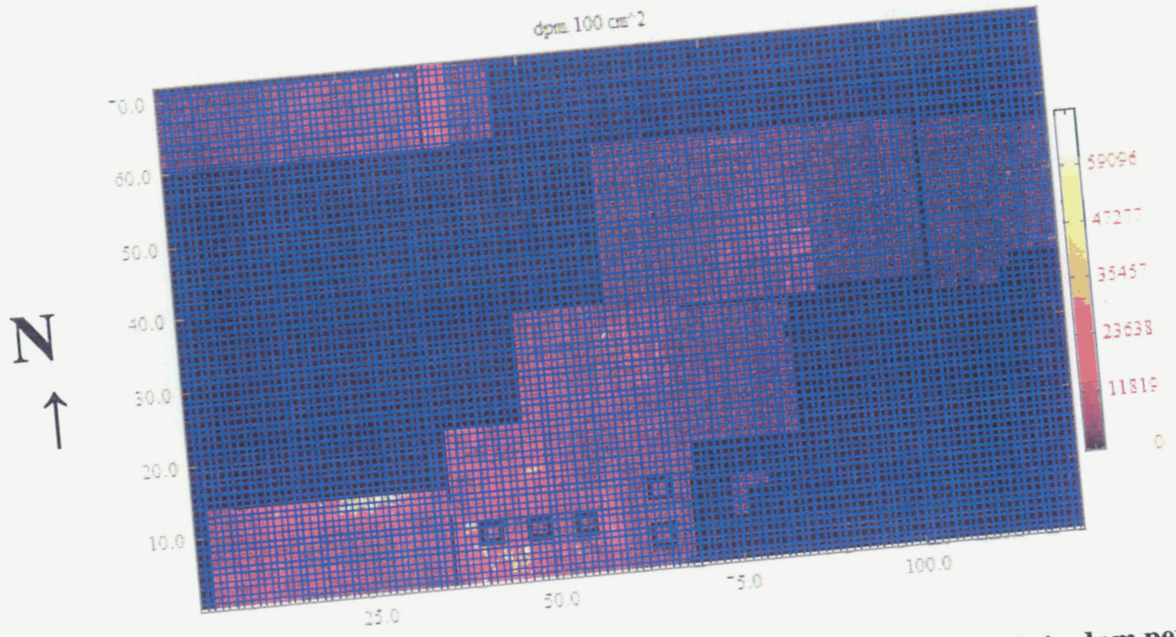


Figure 3: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2. The (0,0) point is the Southwest corner of the survey area.

REMEDIATION FACILITY PAD – CERTIFICATION UNIT B

Surveys RP00202A, RP00302A, RP005602B, RP00702A, RP01202A, RP01302A and RP01402A

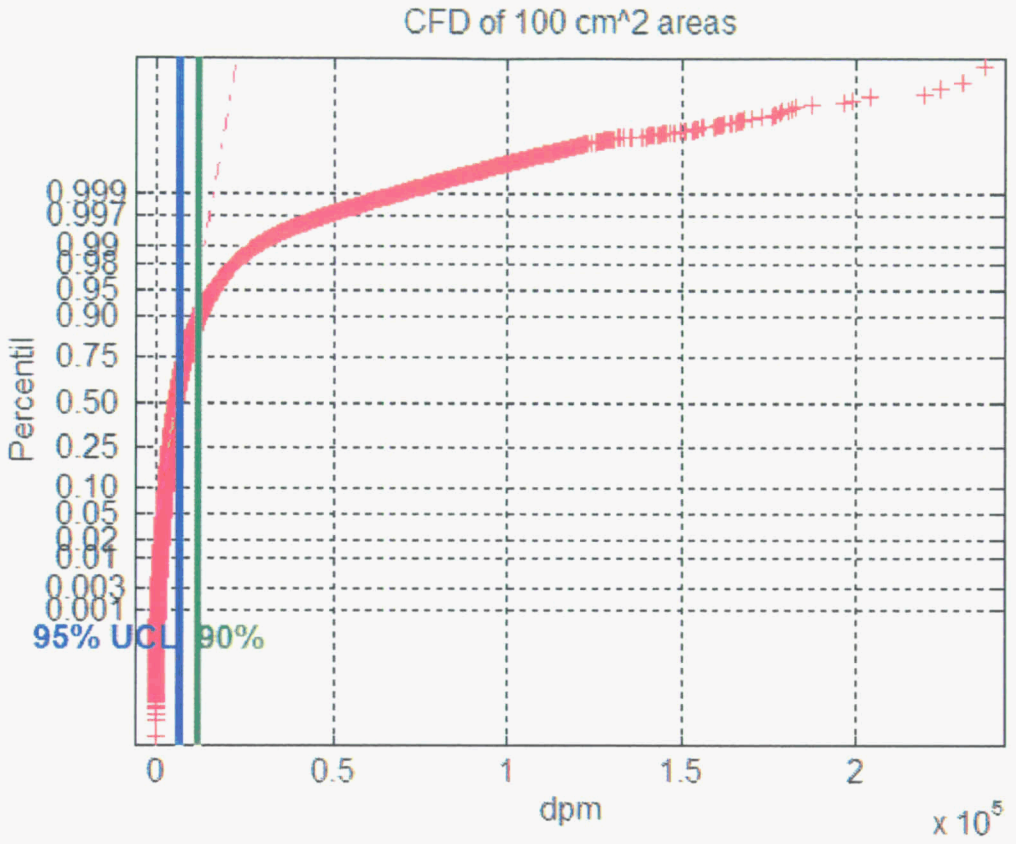


Figure 4: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^5 per 100cm^2.

Survey RP01002A

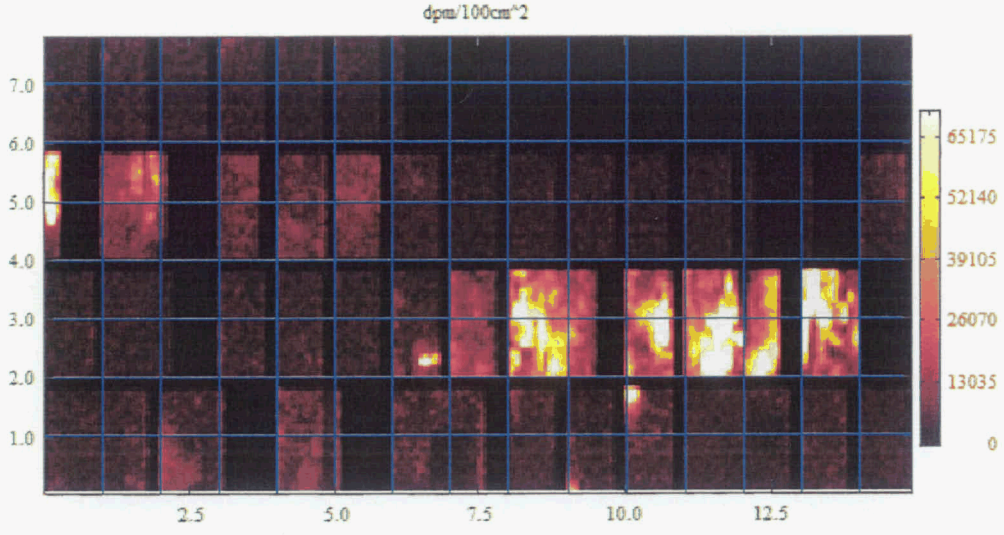


Figure 5: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2 and has been trimmed to 70,000 dpm/100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

Survey RP01002A

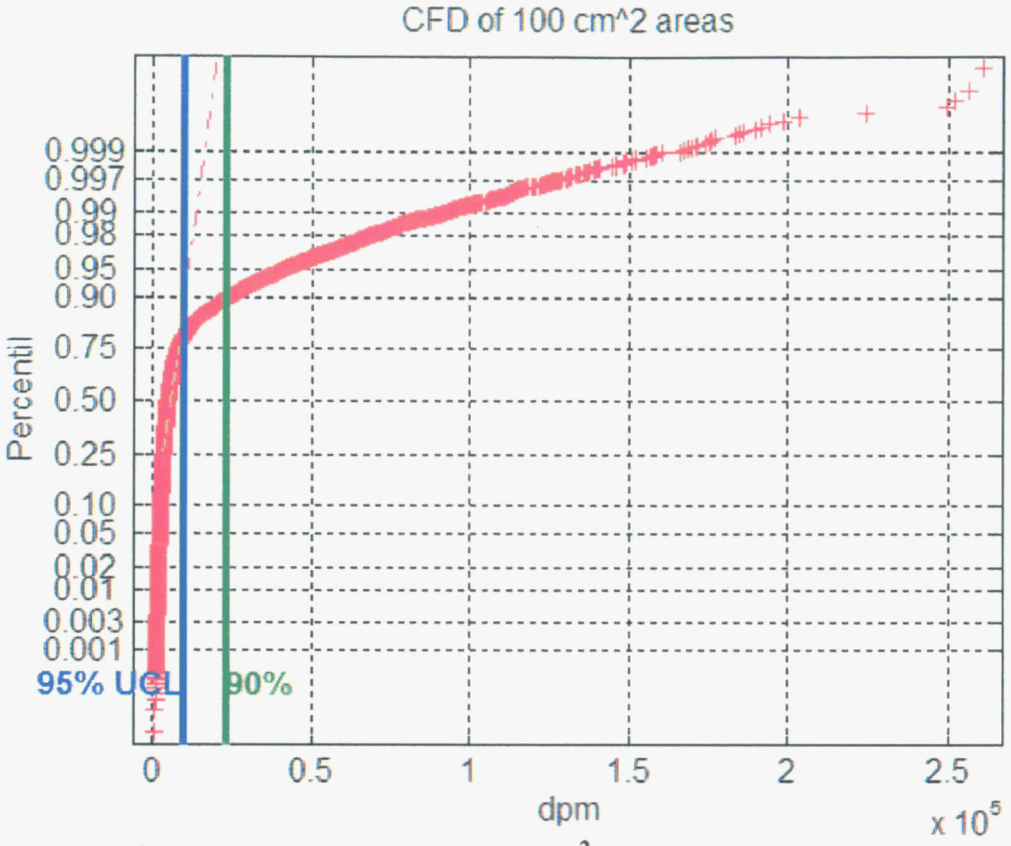


Figure 6: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^5 per 100cm^2.

Survey RP01102A

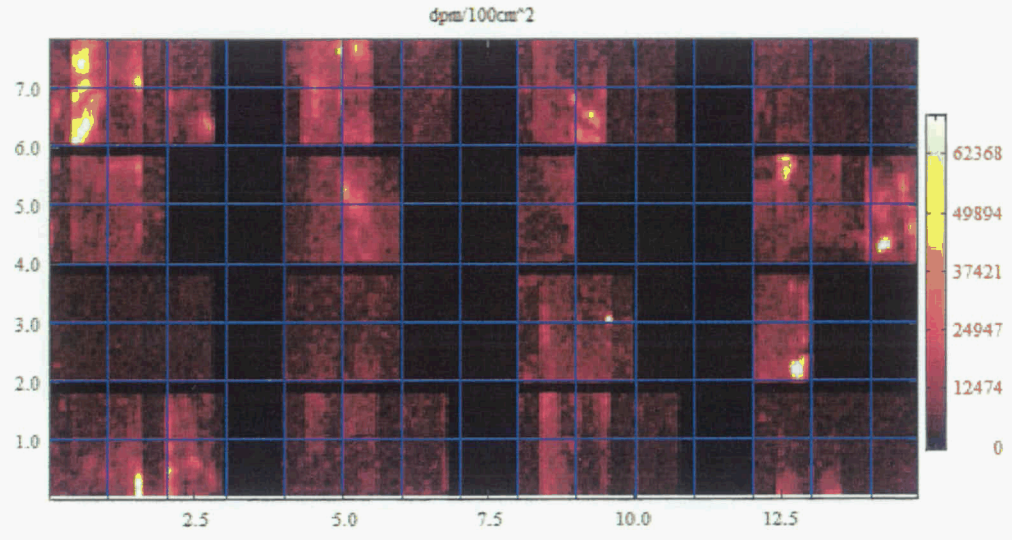


Figure 7: Meter Grid overlaid onto image plot of 100cm^2 areas. The color scale is in dpm per 100cm^2 and has been trimmed to 70,000 dpm/100cm^2. Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

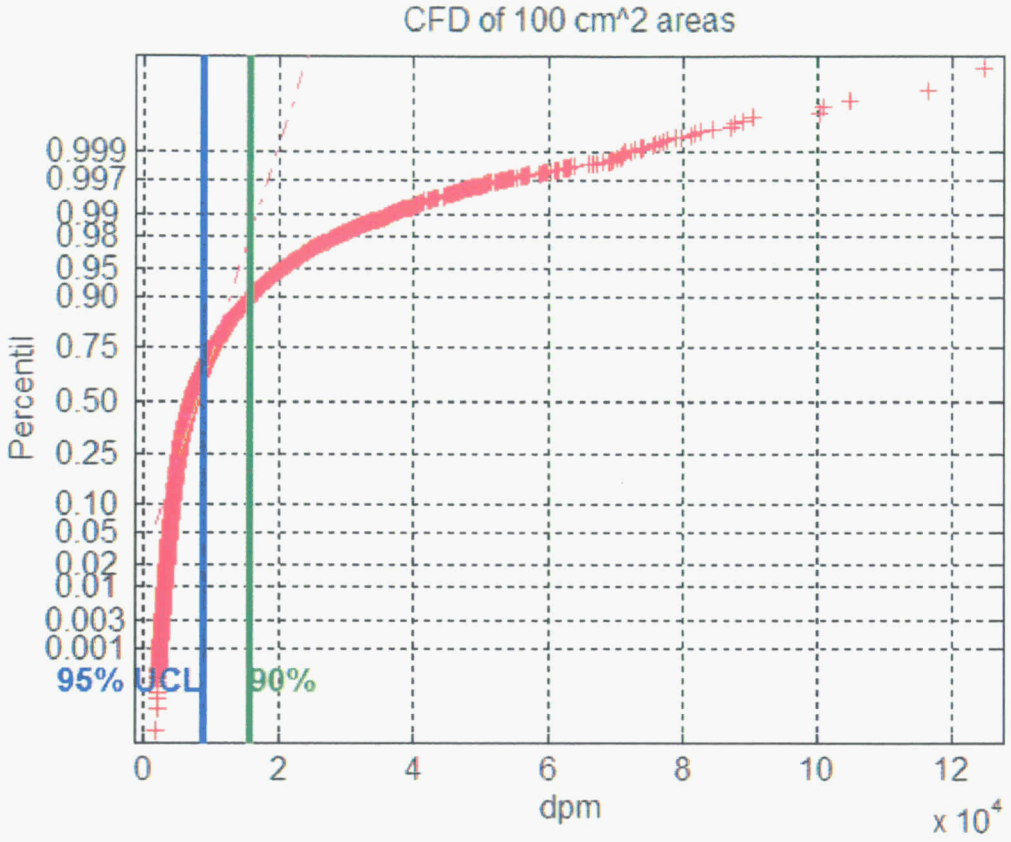


Figure 8: CFD of surface activity in 100cm^2 areas. The horizontal scale is in dpm x 10^4 per 100cm^2.

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP00102A
Survey Date:	September 20, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP/KIMOKEO
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**142,468 dpm/100 cm^2**
Maximum m^2 Average:	36,490 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP00102A

NOTE: Bold Text Denotes Values Exceeding Criteria.

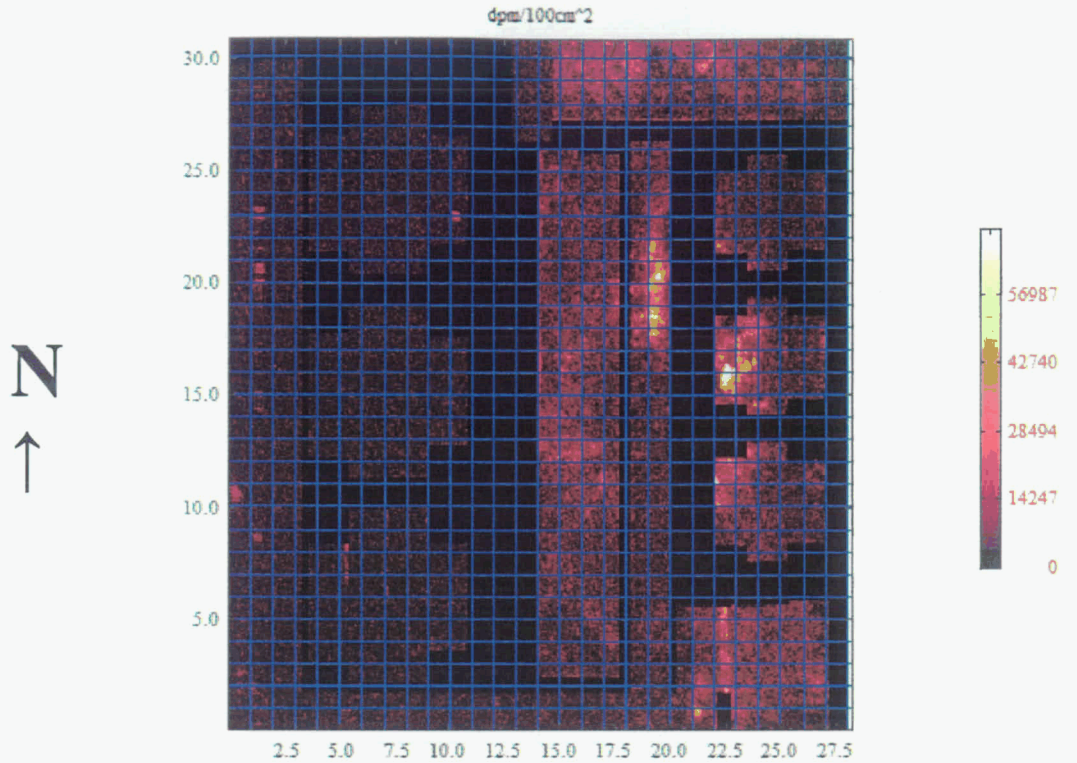


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

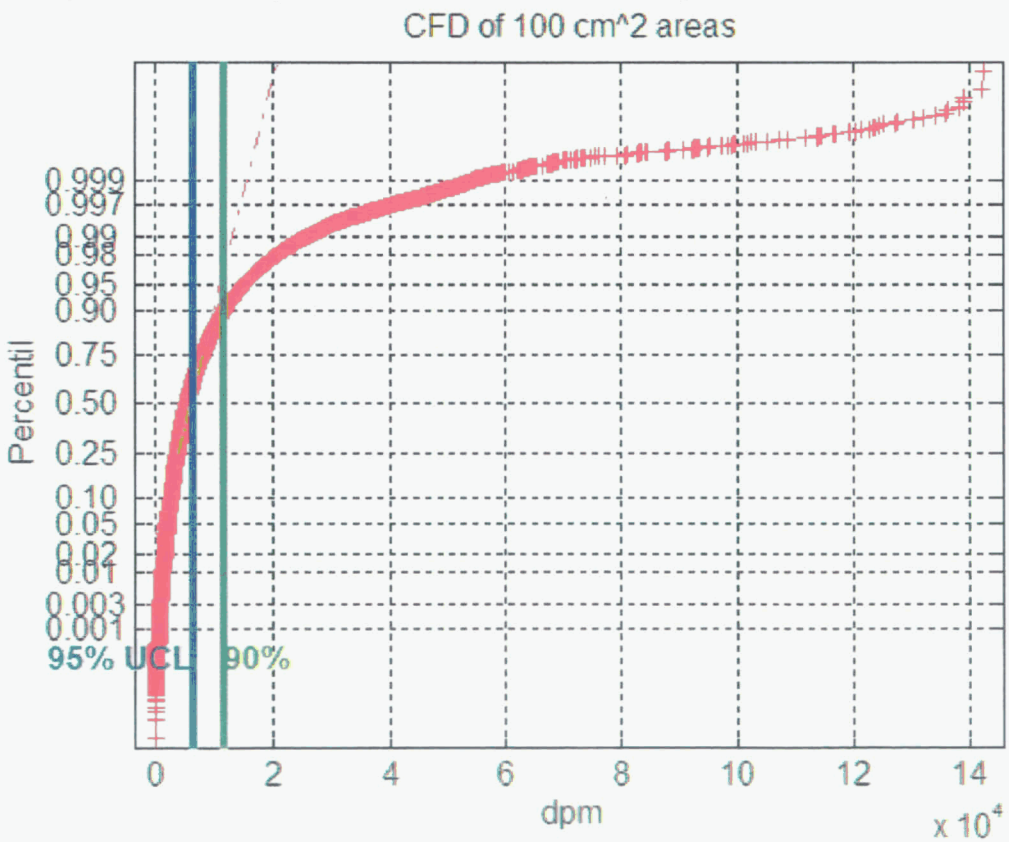


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP00402A
Survey Date:	September 20, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP/KIMOKEO
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**348,773 dpm/100 cm^2**
Maximum m^2 Average:	**144,858 dpm/100 cm^2**
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP00402A

NOTE: Bold Text Denotes Values Exceeding Criteria.

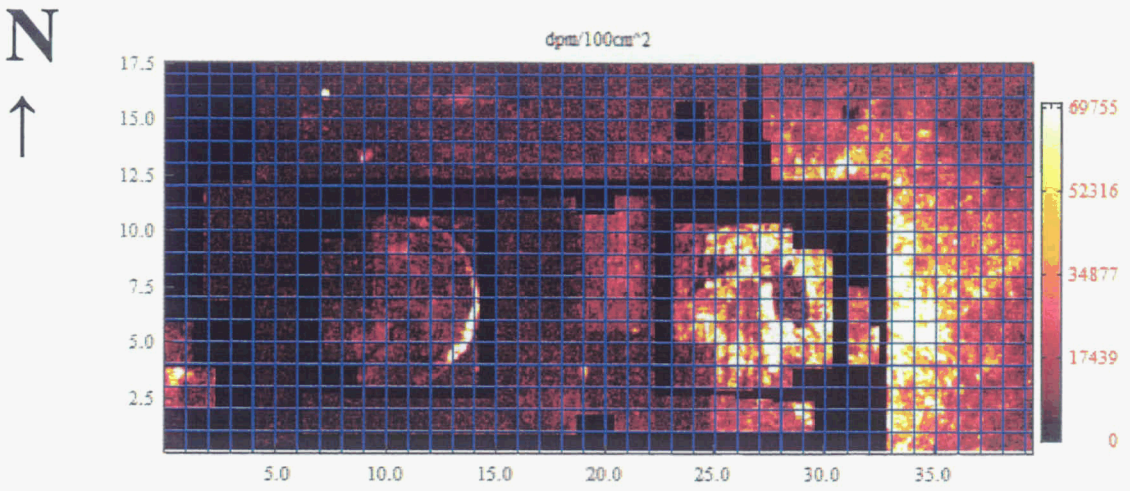


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

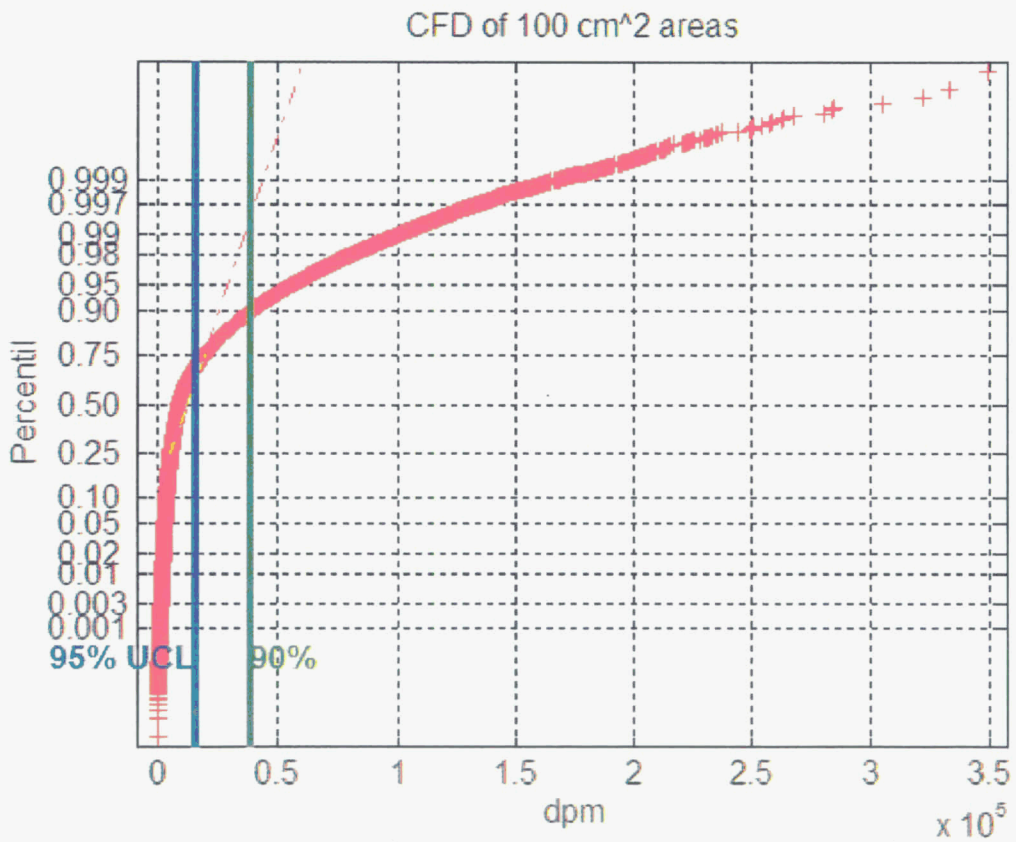


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10⁴ per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP00602A
Survey Date:	September 21, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP/KIMOKEO
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**307,623 dpm/100 cm^2**
Maximum m^2 Average:	32,654 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP00602A

NOTE: Bold Text Denotes Values Exceeding Criteria.

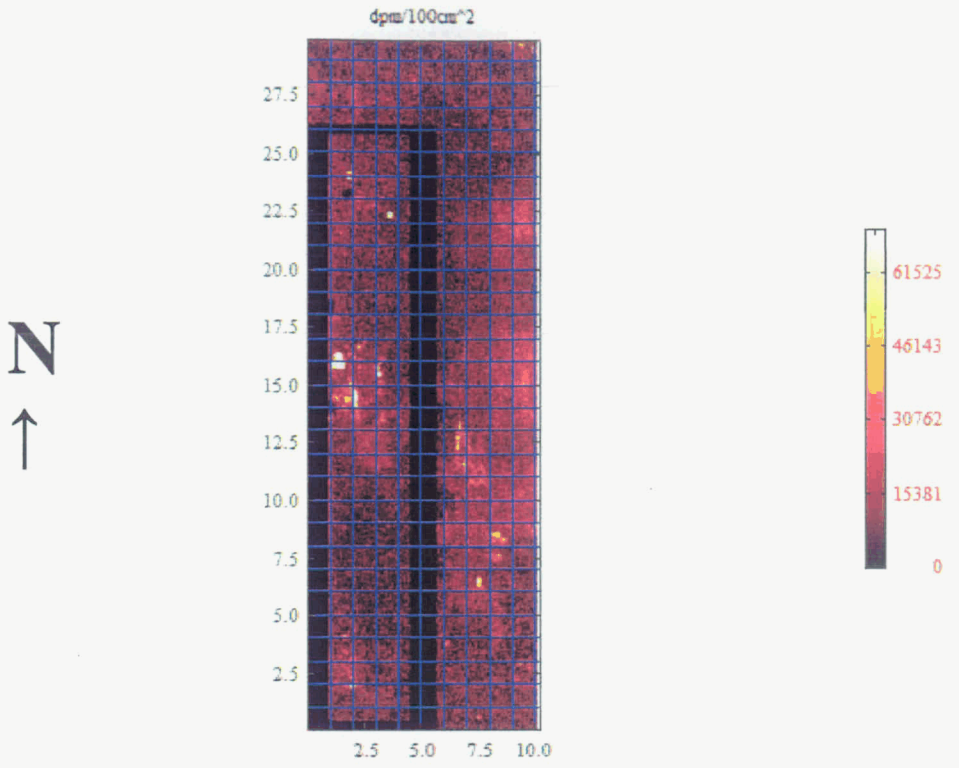


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

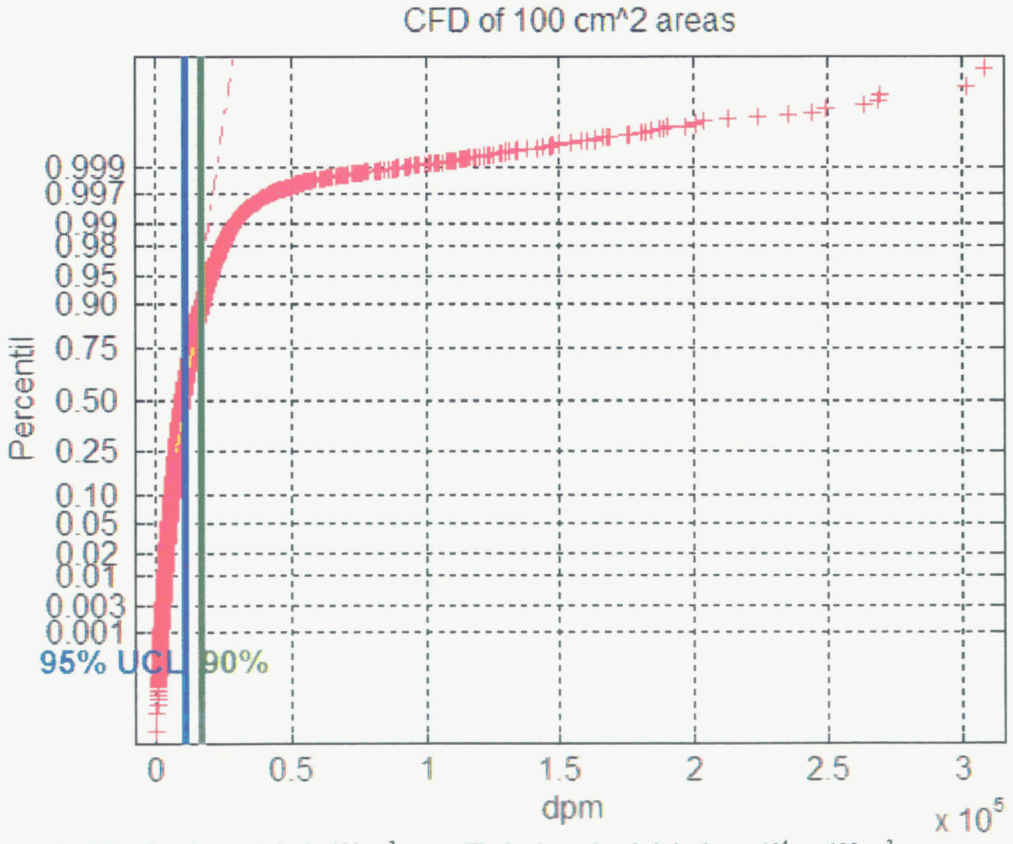


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10⁴ per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP00802A
Survey Date:	September 21, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP/KIMOKEO
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	60,923 dpm/100 cm^2
Maximum m^2 Average:	23,542 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP00802A

NOTE: Bold Text Denotes Values Exceeding Criteria.

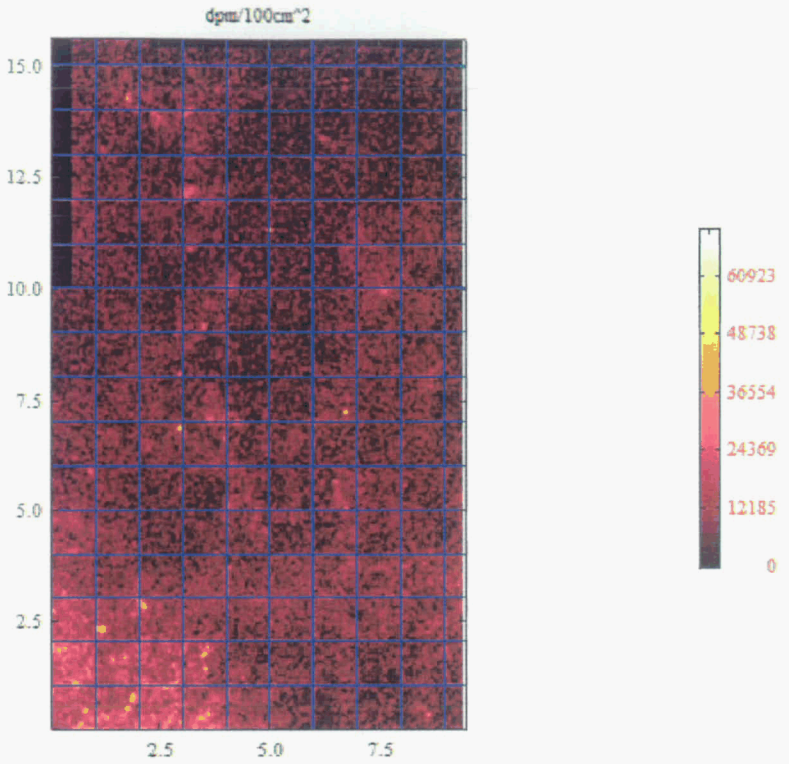


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm². The (0,0) point is the Southwest corner of the concrete pad.

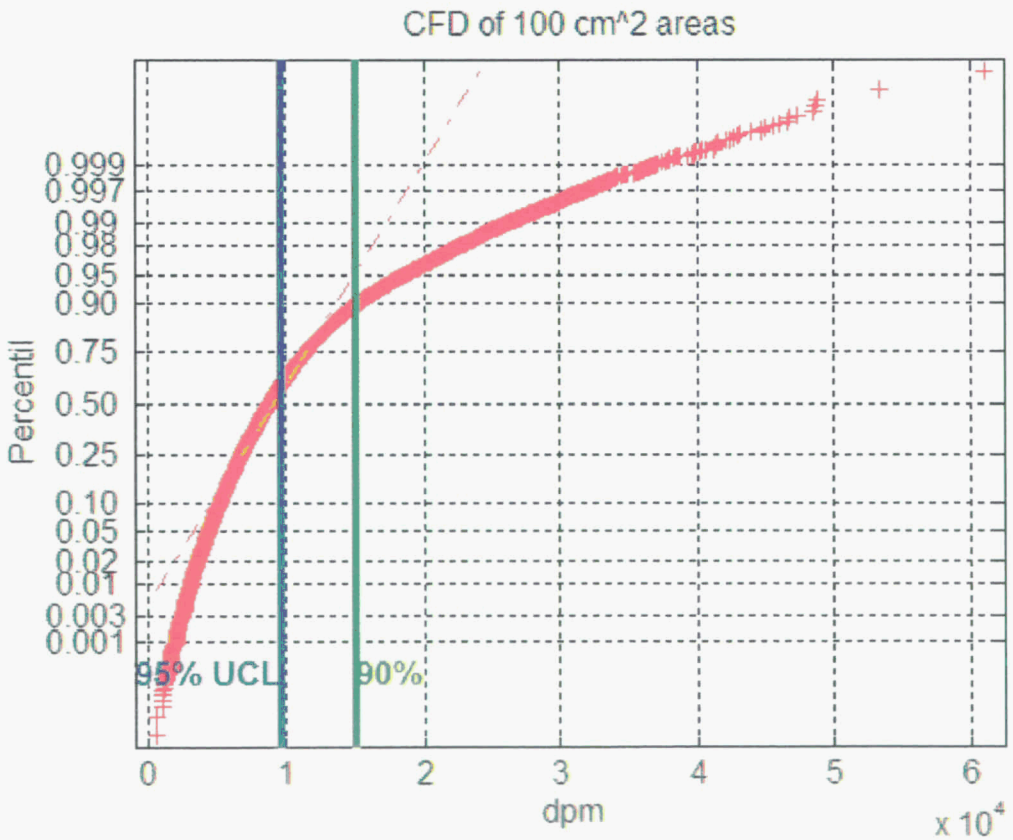


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10⁴ per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP00902A
Survey Date:	September 21, 2006
Survey Equipment:	SCM5
Detector(s):	T180
Survey Mode:	Rolling 4"/sec
Surveyor(s):	SAPP/KIMOKEO
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	T180: 28.0%
SIMS Version:	V5.3l
SCM Version:	V3.4d
Survey Results	
Maximum 100 cm^2:	**233,621 dpm/100 cm^2**
Maximum m^2 Average:	53,027 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012630RP00902A

NOTE: Bold Text Denotes Values Exceeding Criteria.

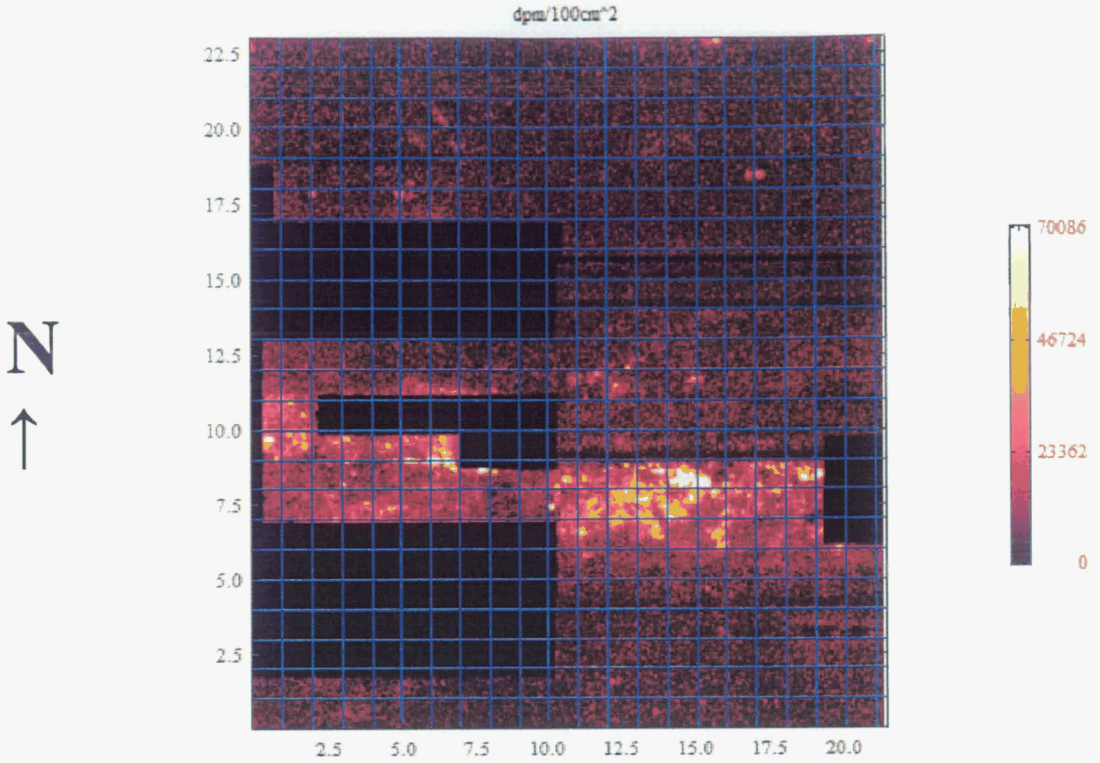


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². The (0,0) point is the Southwest corner of the concrete pad.

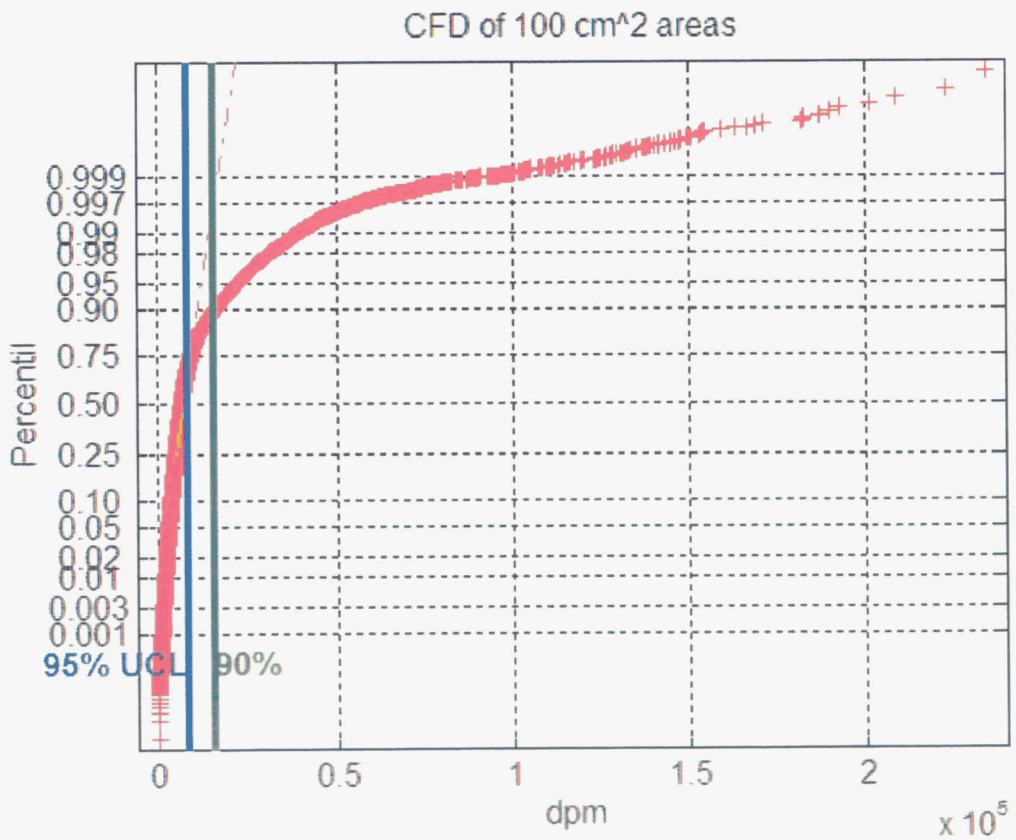


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP01002A
Survey Date:	September 27, 2006
Survey Equipment:	SCM5
Detector(s):	C180
Survey Mode:	Static 4 sec
Surveyor(s):	KIMOKEO
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	C180: 32.4%
SIMS Version:	V5.3l
SCM Version:	V3.4a
Survey Results	
Maximum 100 cm^2:	**260,700 dpm/100 cm^2**
Maximum m^2 Average:	66,700 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012651RP01002A

NOTE: Bold Text Denotes Values Exceeding Criteria.

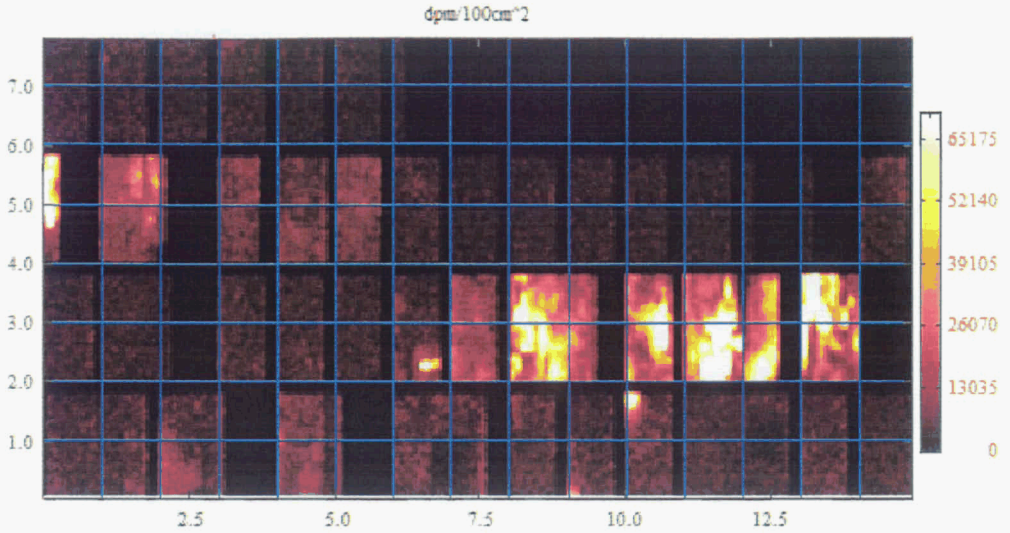


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

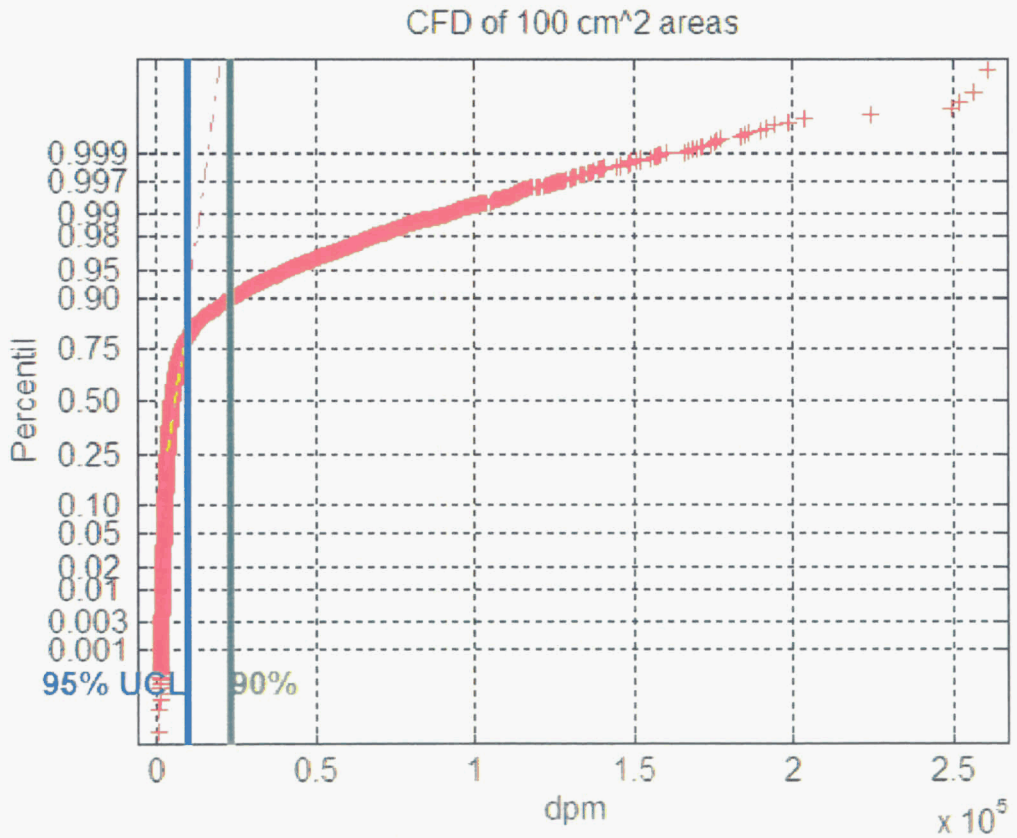


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².

Investigation Report

Survey Location:	Remediation Facility Pad
Survey Unit Area Code:	N0099X
Survey File Name:	RP01102A
Survey Date:	September 27, 2006
Survey Equipment:	SCM5
Detector(s):	C180
Survey Mode:	Static 4 sec
Surveyor(s):	KIMOKEO
Criteria	
Any 100 cm^2 Measurement:	70,000 net dpm/100 cm^2
Average Over Any 1 m^2:	70,000 net dpm/100 cm^2
Investigation Level 100cm^2:	70,000 net dpm/100 cm^2
Investigation Level m^2:	70,000 net dpm/100 cm^2
System Information	
Efficiency (100 cm^2):	C180: 32.4%
SIMS Version:	V5.31
SCM Version:	V3.4a
Survey Results	
Maximum 100 cm^2:	**124,736 dpm/100 cm^2**
Maximum m^2 Average:	25,454 dpm/100 cm^2
Survey Location Code:	N0099X0000FZ0009Z99B001AB0012651RP01102A

NOTE: Bold Text Denotes Values Exceeding Criteria.

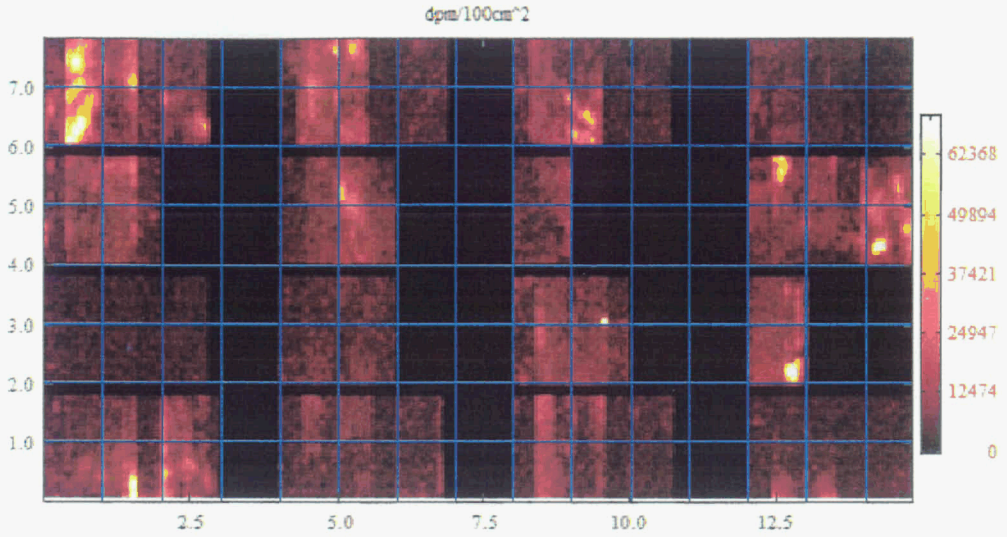


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm² and has been trimmed to 70,000 dpm/100cm². Image is not spatially correlated to field surfaces. Refer to survey map for strip locations.

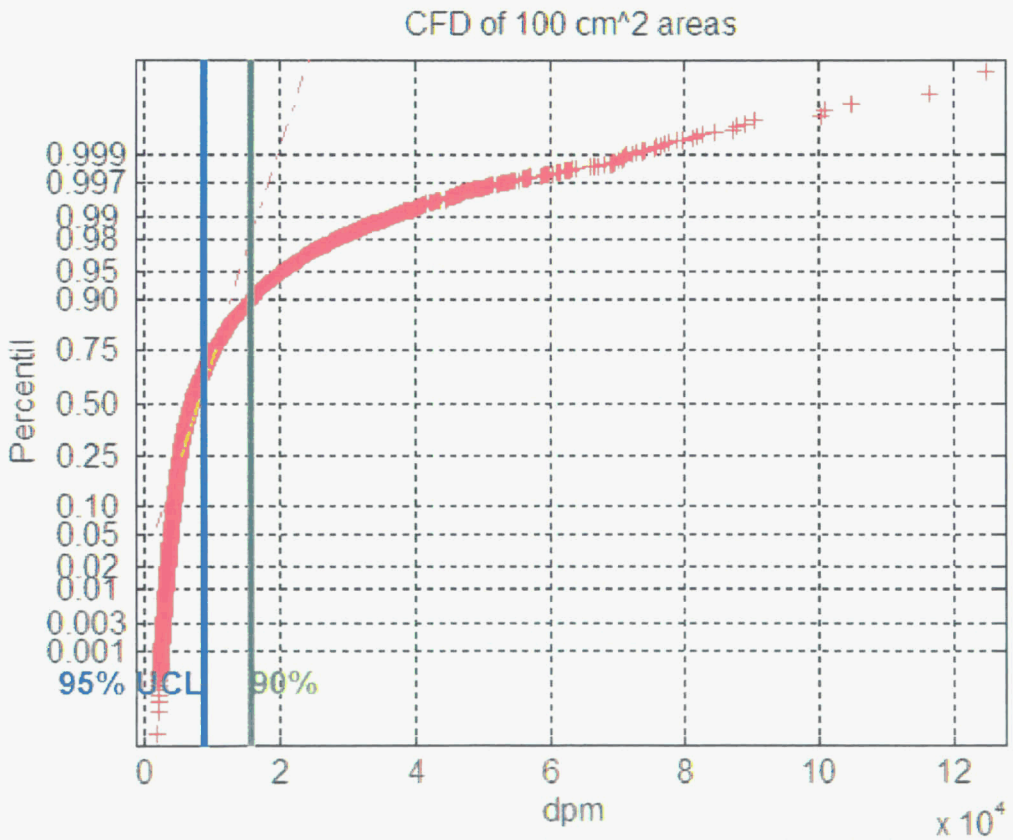


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm x 10^4 per 100cm².

Attachment C.1

Data 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)

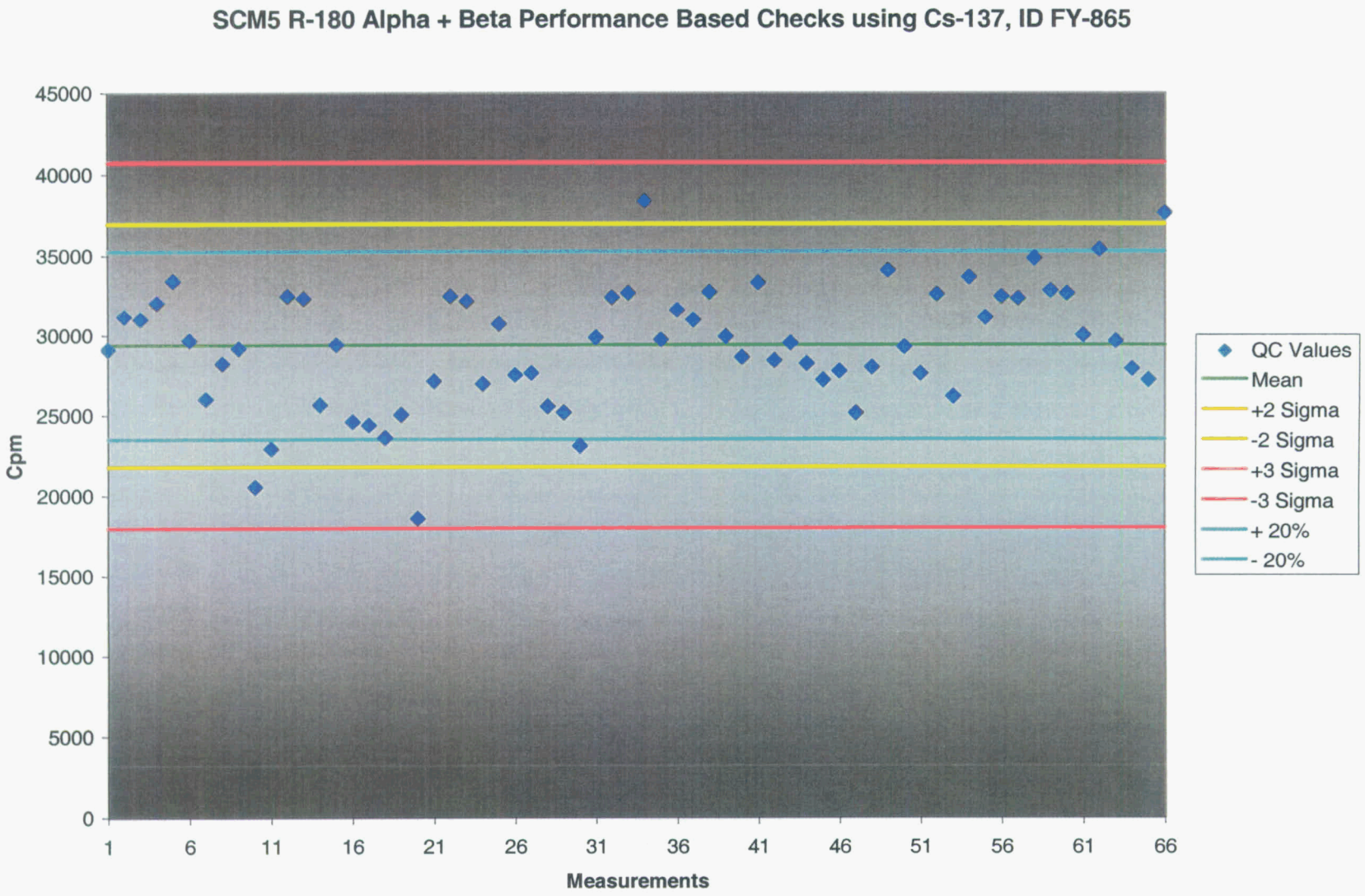
Corner Mode PBCs

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.

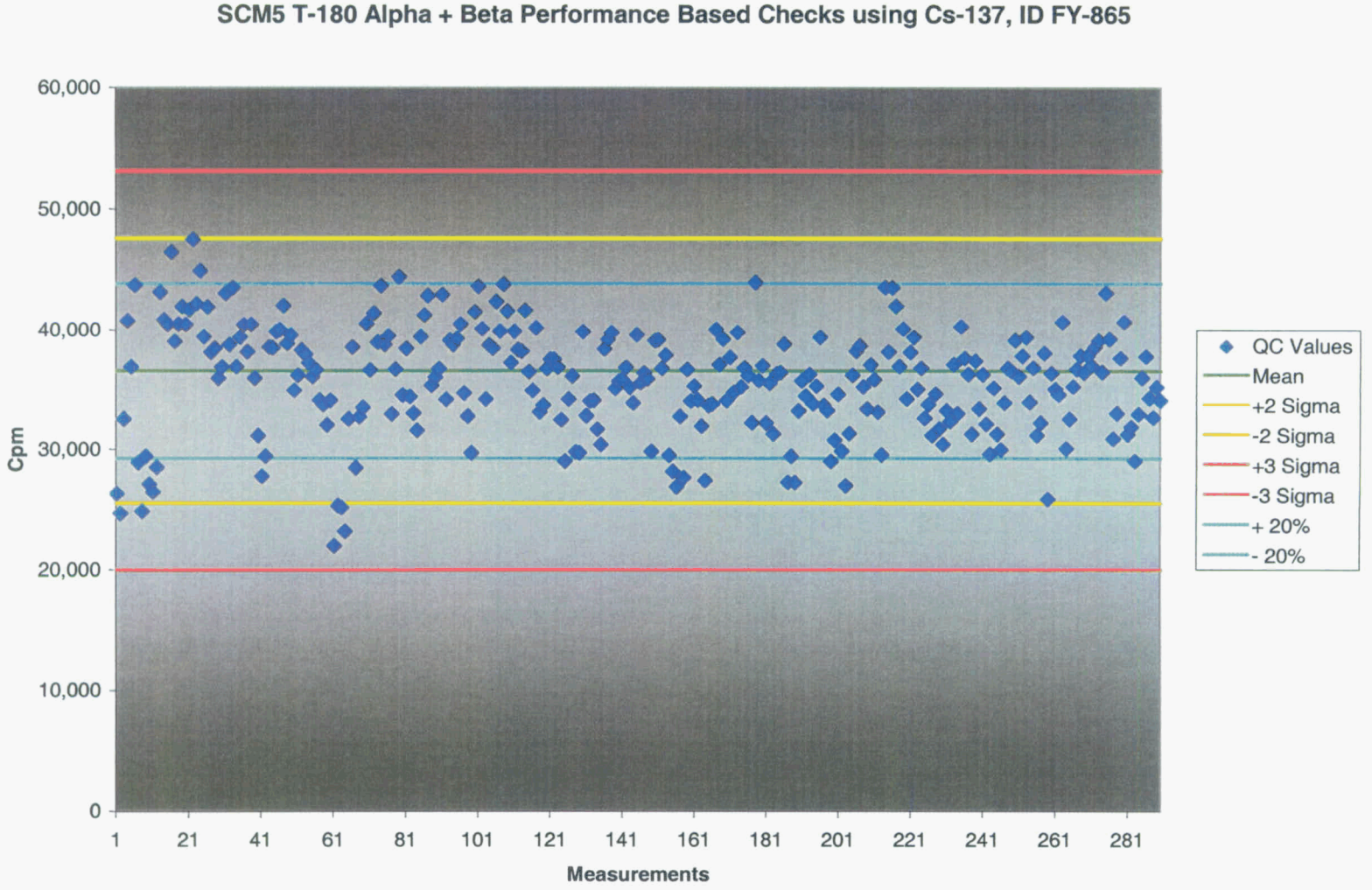
Richard W. Dubiel, CHP



Attachment 1

R-180 Date and PBC # Correlation

Date Time	PBC #	File Name	Gross cpm	Date Time	PBC #	File Name	Gross cpm
3/21/2006	1	B503136A	29087	6/7/2006	43	B506076A	29501
	2		31161		44		28203
	3		31010		45		27175
3/21/2006	4	B503136B	32048	6/7/2006	46	B506076B	27739
	5		33414		47		25126
	6		29667		48		27988
3/21/2006	7	B503146A	25988	6/7/2006	49	B506076C	34078
	8		28218		50		29259
	9		29176		51		27583
3/21/2006	10	B503146B	20539	6/7/2006	52	B506076D	32578
	11		22898		53		26158
	12		32464		54		33634
3/21/2006	13	B503146C	32324	6/7/2006	55	B506076E	31095
	14		25633		56		32421
	15		29396		57		32312
3/21/2006	16	B503156C	24598	6/8/2006	58	B506086A	34810
	17		24381		59		32797
	18		23609		60		32638
3/21/2006	19	B503156D	25036	6/8/2006	61	B506086B	30007
	20		18606		62		35374
	21		27112		63		29619
3/21/2006	22	B503176C	32472	6/8/2006	64	B506086C	27872
	23		32156		65		27182
	24		26944		66		37645
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				



Attachment 3

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

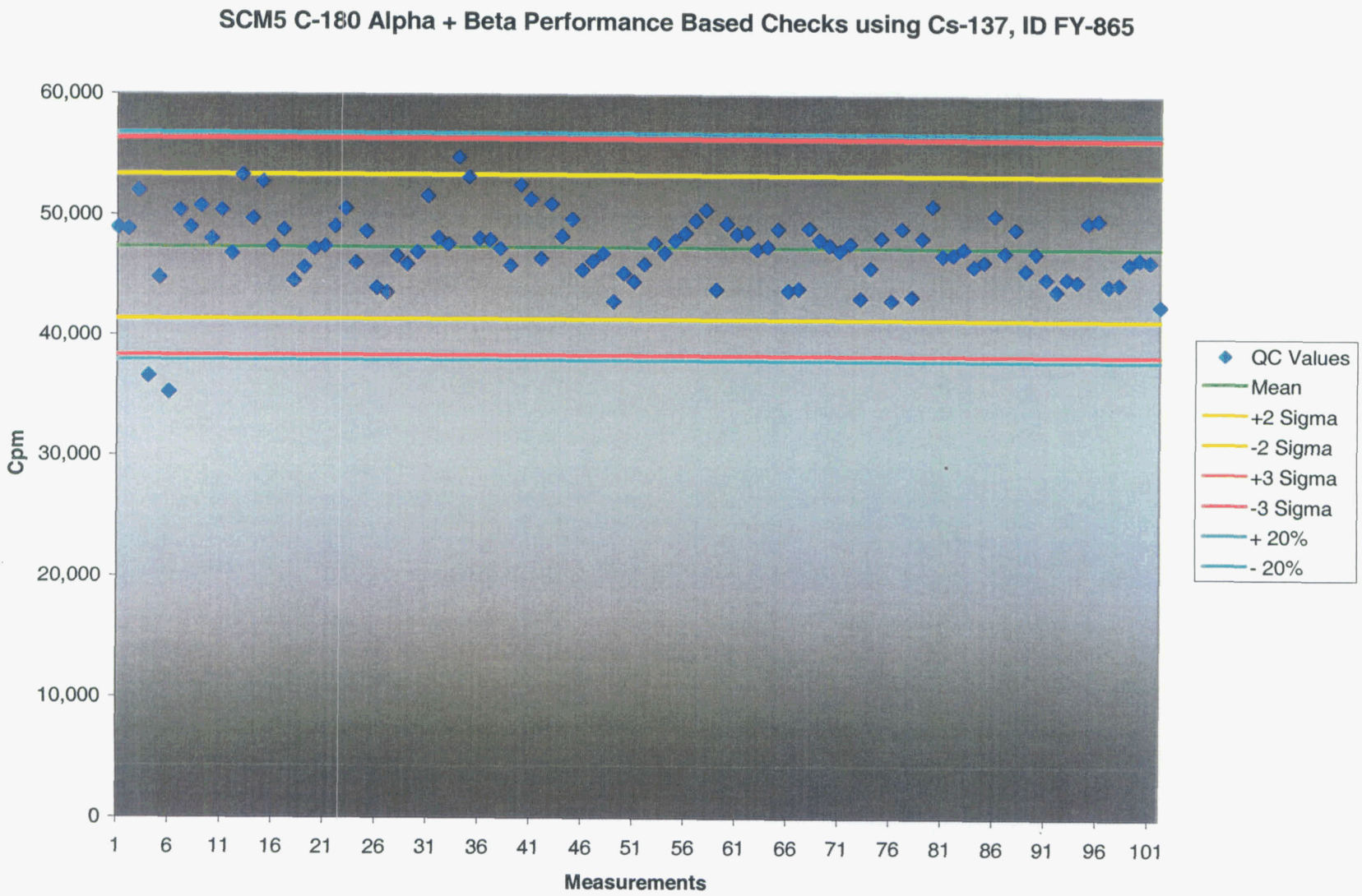
Date	PBC #	File Name	Gross cpm	Date	PBC #	File Name	Gross cpm
4/2/2006	91	B504026A	42953	5/20/2006	139	B505206D	35086
	92		34175		140		35713
	93		39127		141		35822
4/2/2006	94	B504026B	38774	6/9/2006	142	B506096A	36868
	95		39274		143		35160
	96		40493		144		33868
4/2/2006	97	B504026C	34685	6/9/2006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

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

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
Beta-Gamma Scan Surveys

(Hand-Held Detectors)

FEMP COVER SHEET

SURVEY NUMBER 06-09-12-226

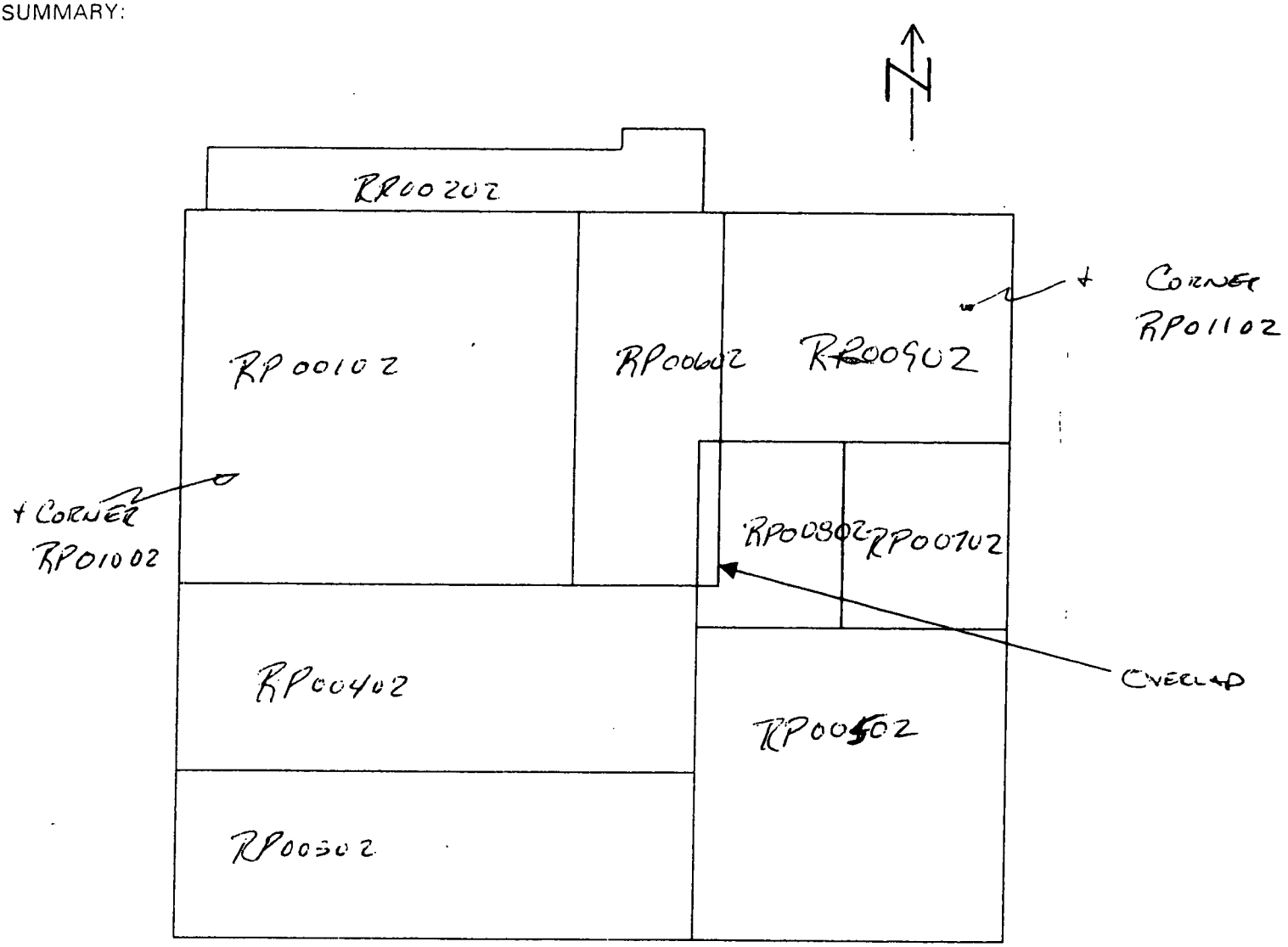
DATE 9-30-06	RCT PRINT Al Momrik	PAGE 1 of 5
TIME 1730	SIGNATURE Al Momrik	BADGE # [redacted]
RWP NUMBER 06-0406	REVIEWER PRINT H. Fennell	DATE 10-1-06
	SIGNATURE H. Fennell	BADGE # [redacted]

LOCATION: Remediation Pad

REASON FOR SURVEY: Survey of Scabbled Areas

N/A

SUMMARY:



COPY

FEMP / RADIOLOGICAL SURVEY REPORT

SURVEY NUMBER: 06-09-17-226 **PAGE** 2 **OF** 5

DATE:	RCT PRINT:	RCT SIGNATURE:	BADGE #:
9-30-06	Al Momrik	Al Momrik	[redacted]
DATE REVIEWED:	**REVIEWED BY (PRINT):**	**REVIEWED BY (SIGNATURE):**	
10-1-06	H. Fennell	H. Fennell	

MODEL	SERIAL NUMBER	TYPE (α, β, γ)	CALIBRATION-DUE DATE	BKGD. (cpm)	EFF./CF	COUNT TIME (min)	MDA (dpm)	INSP./ PERFORMANCE TEST SAT? YES	NO
m-3	77119	B γ	8-07	100	5	NA	500	✓	NA
				A					
				N					

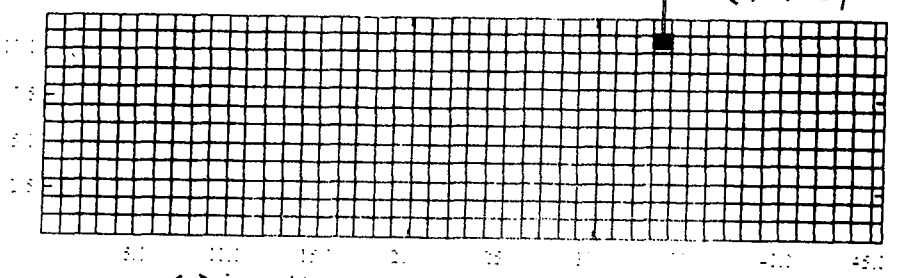
ITEM NUMBER	LOCATION AND/OR DESCRIPTION	DPM/100cm² ALPHA REMOVABLE (1)	DPM/100cm² ALPHA FIXED PLUS REMOVABLE	DPM/100cm² BETA-GAMMA REMOVABLE (1)	DPM/100cm² BETA-GAMMA FIXED PLUS REMOVABLE	CORRECTED DOSE RATE (MREM/HR) γ CONTACT	β CONTACT	γ AT__ FT	β AT__ FT
1	All Surveyed Scabbled Areas	NA	NA	NA	<70k				
								N	A
		N	A						

COPY

Note (1): Values identified by an asterisk (*) indicate results are less than the calculated MDA.

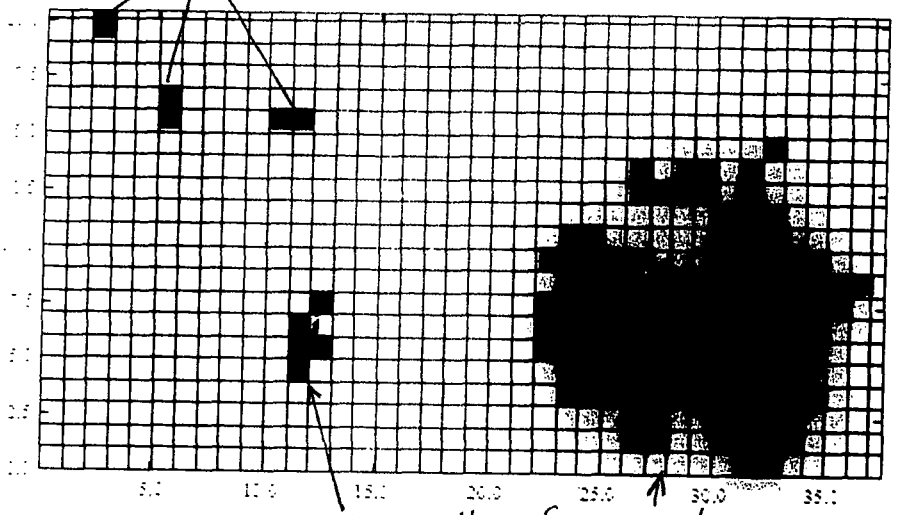
LOCATION: Remediation Pad	DATE: 9-30-06
DOCUMENT TITLE: Scabbled Areas	DOCUMENT NUMBER: 06-09-12-226

RP00202A-17

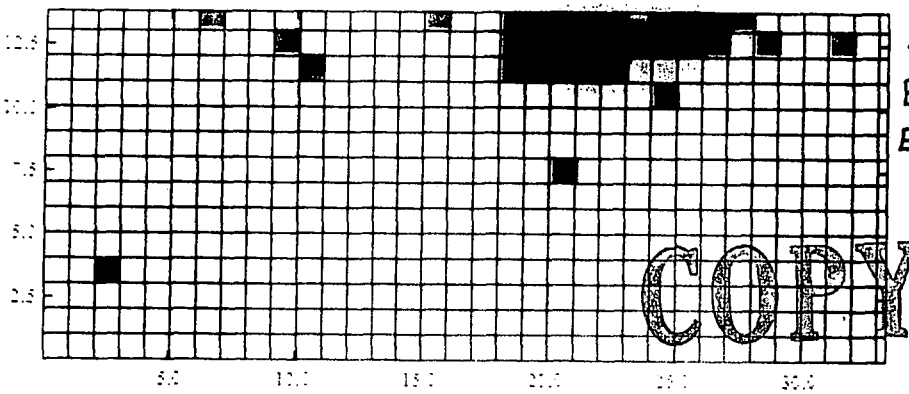


<70k dpm Bγ Direct

RP00402A-25



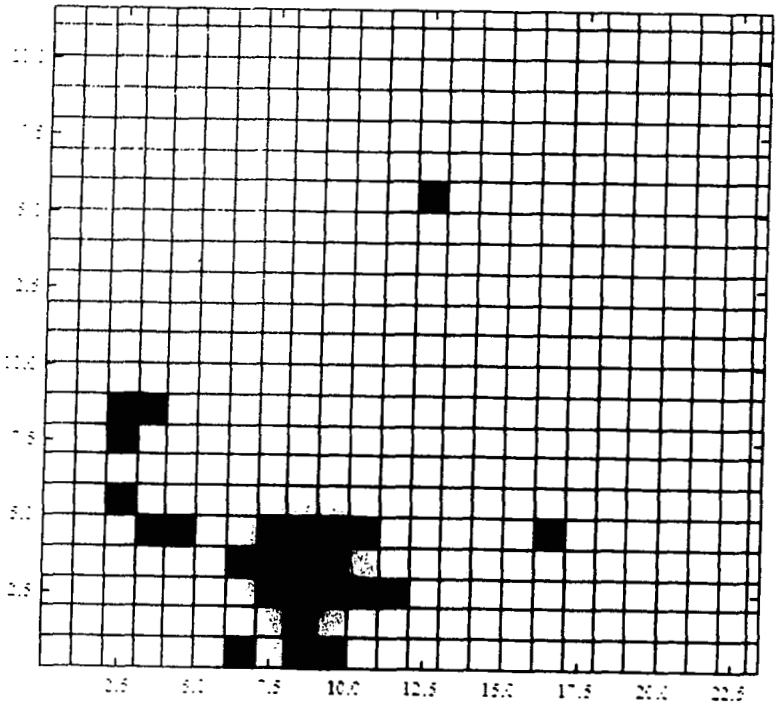
RP00302A-16



ENTERED BY:	REVIEWED BY
(PRINT NAME) Al Momrik	(PRINT NAME)
(SIGNATURE/DATE) 9-30-06	(SIGNATURE/DATE) 10-1-06

LOCATION: Remediation Pad	DATE: 9-30-06
DOCUMENT TITLE: Scabbled Areas	DOCUMENT NUMBER: 06-09-12-226

RP00502B-17



<70k dpm
B-γ Direct
Entire Grid

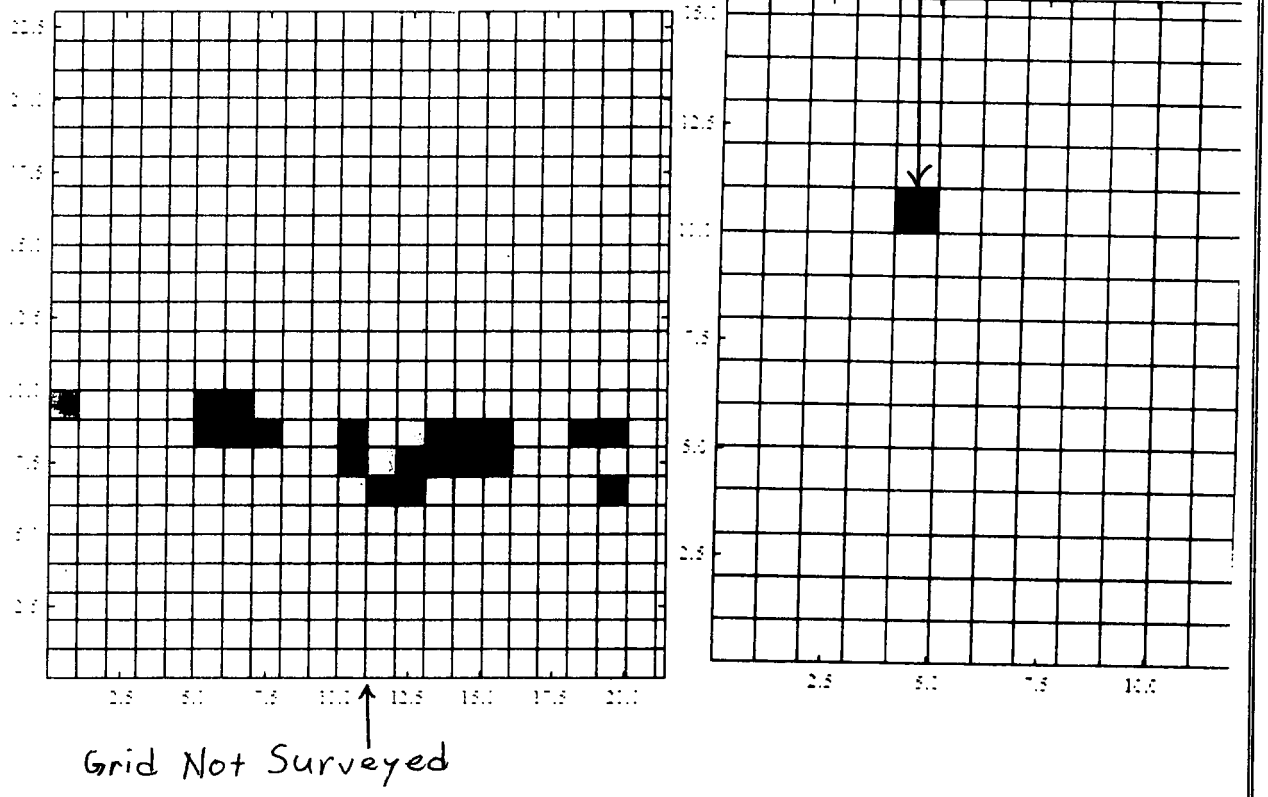
COPY

ENTERED BY:	REVIEWED BY:
(PRINT NAME) Al Momrik	(PRINT NAME) H. Fennell
(SIGNATURE/DATE) 9-30-06	(SIGNATURE/DATE) 10-1-06

SUMMARY AND/OR SPECIAL REPORT FORM

LOCATION: Remediation Pad	DATE: 9-30-06
DOCUMENT TITLE: Scabbled Areas	DOCUMENT NUMBER: 06-09-12-226

<70K dpm Bγ Direct



COPY

ENTERED BY:	REVIEWED BY:
(PRINT NAME) Al Momrik	(PRINT NAME) H. Fennell
(SIGNATURE/DATE) 9-30-06	(SIGNATURE/DATE) 10-1-06

FEMP COVER SHEET		SURVEY NUMBER: 06-10-12-63
DATE: 10/10/06	RCT PRINT: JDaniel	PAGE 1 of 2
TIME 2100	SIGNATURE: [signature]	BADGE # [redacted]
RWP NUMBER 06-0406	REVIEWER PRINT: C/R Hall	DATE 10-11-06
	SIGNATURE: [signature]	BADGE # [redacted]

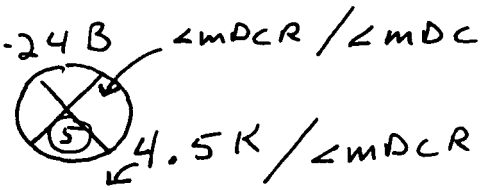
LOCATION: Silos Remediation Pad

REASON FOR SURVEY: Pre / Post Decon of survey points noted on survey 06-10-12-50 by dayshift and on sample point C03-24B prior to removing material

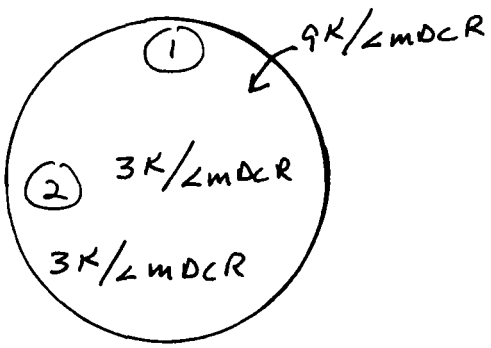
SUMMARY:

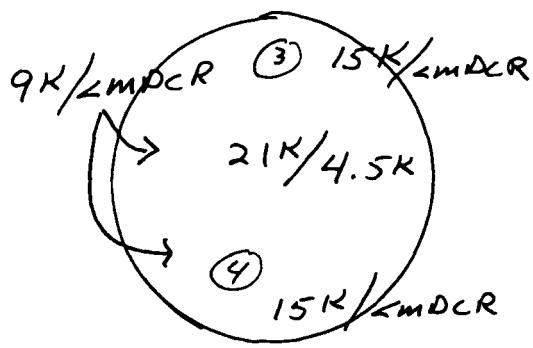
Legend - Contamination levels noted on map are "Pre Decon / Post Decon"

All levels are B γ Fixed + removable in dpm/100cm²



COPY





After locating survey points and verifying B γ Contam. levels (fixed plus Removable only), upper surface was chipped Away (1/4" to 3/4"). Areas re-surveyed to verify Contamination levels were reduced. Debris was bagged up and disposed of in Rad Trash. Areas were coated with marker paint to fix / seal surface after being smeared for loose (removable) Surface Contamination (see page 2 / all <MDA & / <MDA B γ)).

FEMP / RADIOLOGICAL SURVEY REPORT

SURVEY NUMBER: 06-10-1263 **PAGE** 2 **OF** 2

DATE:	RCT PRINT:	RCT SIGNATURE:	BADGE #:
10/10/06	JDaniel		[redacted]
DATE REVIEWED:	**REVIEWED BY (PRINT):**	**REVIEWED BY (SIGNATURE):**	
10-11-06	CRHall	CHall	

MODEL	SERIAL NUMBER	TYPE (α, β, γ)	CALIBRATION-DUE DATE	BKGD. (cpm)	EFF./CF	COUNT TIME (min)	MDA (dpm)	INSP./ PERFORMANCE TEST SAT? YES	NO
3	103353	Bγ	8/07	60	4/30	NA	400/3000	X	
2929	158799	α β	11/06	1.8/38.4	.322/.350	0.5	10/42	X	

ITEM NUMBER	LOCATION AND/OR DESCRIPTION	DPM/100cm² ALPHA REMOVABLE (1)	DPM/100cm² ALPHA FIXED PLUS REMOVABLE	DPM/100cm² BETA-GAMMA REMOVABLE (1)	DPM/100cm² BETA-GAMMA FIXED PLUS REMOVABLE	CORRECTED DOSE RATE (MREM/HR) γ CONTACT	β CONTACT	γ AT__ FT	β AT__ FT
1	See map on Cover	<MDA	NA	<MDA	NA				
2									
3									
4									
5		<MDA		<MDA					

NA NA

Note (1): Values identified by an asterisk (*) indicate results are less than the calculated MDA.

FEMP COVER SHEET		SURVEY NUMBER: 06-10-12-35
DATE: 10-4-06	RCT PRINT: Al Momrik	PAGE 1 of 2
TIME 1515	SIGNATURE: Al Momrik	BADGE # [redacted]
RWP NUMBER 06-0406	REVIEWER PRINT: ROGER LILIE	DATE 10-5-06
	SIGNATURE: Roger Lilie	BADGE # [redacted]
LOCATION:	Remediation Pad	
REASON FOR SURVEY	Two small areas on former Decon Pad, identified on 10-4-06 by Millenium as 140k dpm. & marked for decon. Survey was preformed to verify these readings.	

SUMMARY:

Survey of marked areas using m-3 with 4 probe Bγ detector

Area #1 Highest reading found was 30k dpm Bγ Direct

Area #2 Highest reading found was 10k dpm Bγ Direct

N A

FEMP / RADIOLOGICAL SURVEY REPORT

SURVEY NUMBER: 06-10-12-35 **PAGE** 2 **OF** 2

DATE:	RCT PRINT:	RCT SIGNATURE:	BADGE #:
10-5-06	Al Momrik	Al Momrik	[redacted]
DATE REVIEWED:	**REVIEWED BY (PRINT):**	**REVIEWED BY (SIGNATURE):**	
10-5-06	ROGER ILLIE	Roger Illie	

MODEL	SERIAL NUMBER	TYPE (α, β, γ)	CALIBRATION-DUE DATE	BKGD. (cpm)	EFF./CF	COUNT TIME (min)	MDA (dpm)	INSP./ PERFORMANCE TEST SAT? YES	NO
M-3	77119	B-γ	08-07	100	5	NA	500	✓	NA

ITEM NUMBER	LOCATION AND/OR DESCRIPTION	DPM/100cm² ALPHA		DPM/100cm² BETA-GAMMA		CORRECTED DOSE RATE (MREM/HR)			
		REMOVABLE (1)	FIXED PLUS REMOVABLE	REMOVABLE (1)	FIXED PLUS REMOVABLE	γ CONTACT	β CONTACT	γ AT__ FT	β AT__ FT
1	Area # 1	NA	NA	NA	30k				
2	Area # 2	↓	↓	↓	10k				

Note (1): Values identified by an asterisk (*) indicate results are less than the calculated MDA.

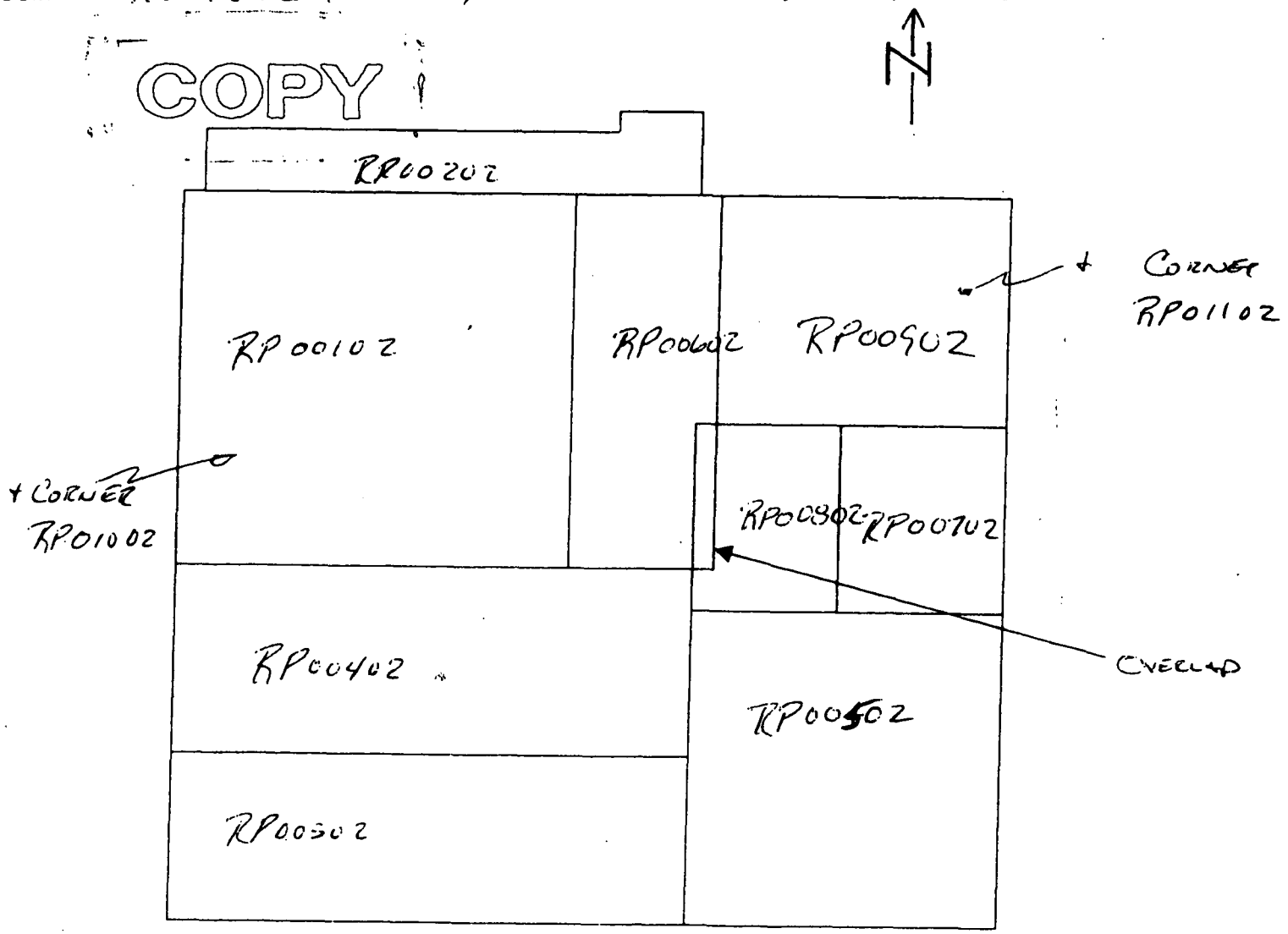
FEMP COVER SHEET		SURVEY NUMBER 06-10-12-16
DATE 9/29/06	RCT PRINT JDaniel	PAGE 1 of 5
TIME 0300	SIGNATURE [signature]	BADGE # [redacted]
RWP NUMBER	REVIEWER PRINT Gary Buckley	DATE 10-3-6
06-0406	SIGNATURE [signature]	BADGE # [redacted]

LOCATION: Remediation Pad

REASON FOR SURVEY	Survey of Scabbled Areas in Grids RP00102 / RP00602 / RP00902 / RP01002 / RP01102.

SUMMARY: Also Related to Survey 06-09-12-221 No Hot Spots > 70K in area "00802"

COPY



FEMP / RADIOLOGICAL SURVEY REPORT

SURVEY NUMBER: 06-10-12-16 **PAGE** 2 **OF** 5

DATE:	RCT PRINT:	RCT SIGNATURE:	BADGE #:
9-29-06	JDaniel	[signature]	[redacted]
DATE REVIEWED:	**REVIEWED BY (PRINT):**	**REVIEWED BY (SIGNATURE):**	
10-3-6	Gary Buckley	[signature]	

MODEL	SERIAL NUMBER	TYPE (α, β, γ)	CALIBRATION-DUE DATE	BKGD. (cpm)	EFF./CF	COUNT TIME (min)	MDA (dpm)	INSP./ PERFORMANCE TEST SAT? YES	NO
3	119600	B γ	8/07	100	4.6	NA	460	X	
			V		A				

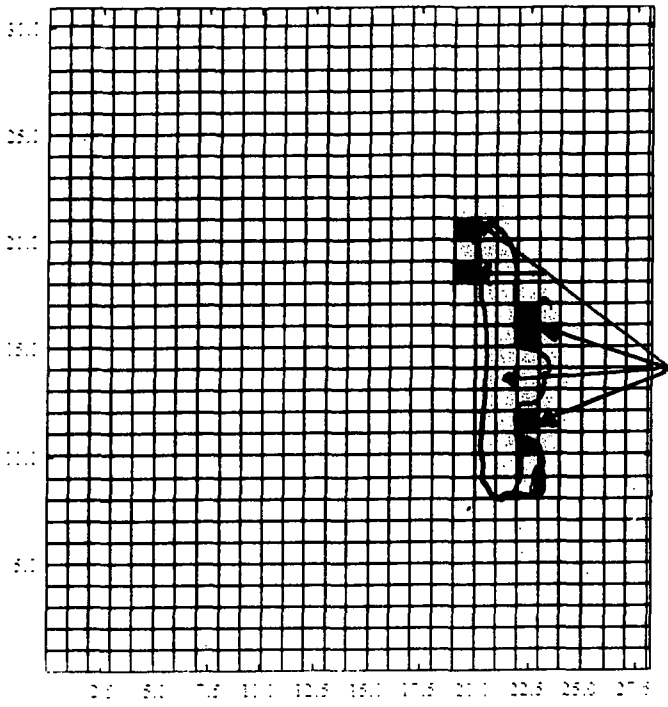
ITEM NUMBER	LOCATION AND/OR DESCRIPTION	DPM/100cm² ALPHA REMOVABLE (1)	DPM/100cm² ALPHA FIXED PLUS REMOVABLE	DPM/100cm² BETA-GAMMA REMOVABLE (1)	DPM/100cm² BETA-GAMMA FIXED PLUS REMOVABLE	CORRECTED DOSE RATE (MREM/HR) γ CONTACT	β CONTACT	γ AT__ FT	β AT__ FT
1	All Surveyed Scabbled Areas	NA	NA	NA	<70K				
	V	A					V	A	

Note (1): Values identified by an asterisk (*) indicate results are less than the calculated MDA.

SUMMARY AND/OR SPECIAL REPORT FORM

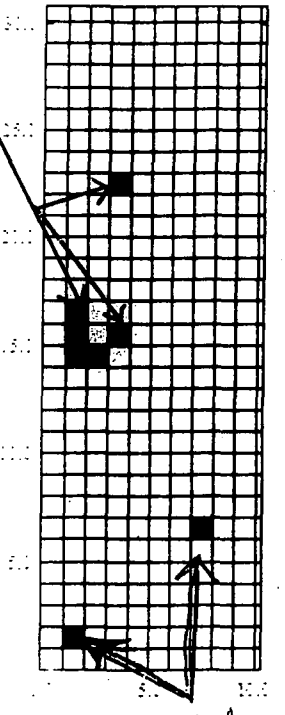
LOCATION: Remediation Pad	DATE: 9/29/06
DOCUMENT TITLE: RP00102/RP00602 Scabbled Areas	DOCUMENT NUMBER: 06-10-12-16

RP00102A-27



RP00602A-12 Rev. 1

<70Kdpm B & Direct



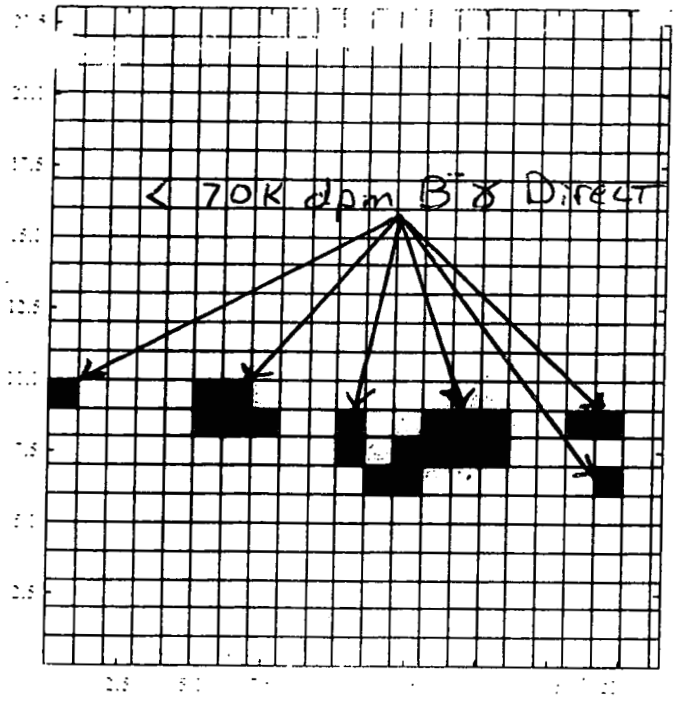
<70Kdpm B & Direct

ENTERED BY:	REVIEWED BY:
(PRINT NAME) J Daniel	(PRINT NAME) Gary Buckley
(SIGNATURE/DATE) 9/29/06	(SIGNATURE/DATE) 10-3-06

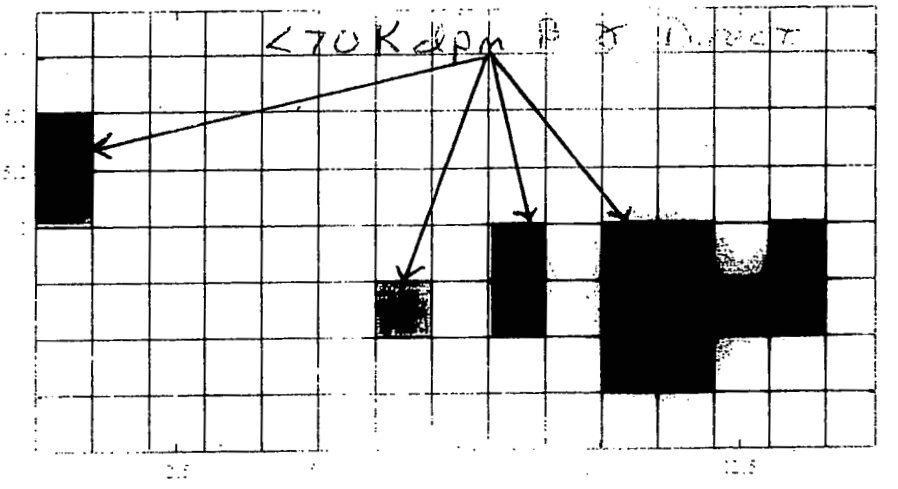
SUMMARY AND/OR SPECIAL REPORT FORM

LOCATION: Remediation Pad Scabbled Area 5	DATE: 9/29/06
DOCUMENT TITLE: RP00902/RP01002	DOCUMENT NUMBER 06-10-12-16

RP00902A



RP01002A



ENTERED BY:	REVIEWED BY:
(PRINT NAME) J Daniel	(PRINT NAME) Gary Buckley
(SIGNATURE/DATE) 9/29/06	(SIGNATURE/DATE) 10-3-06

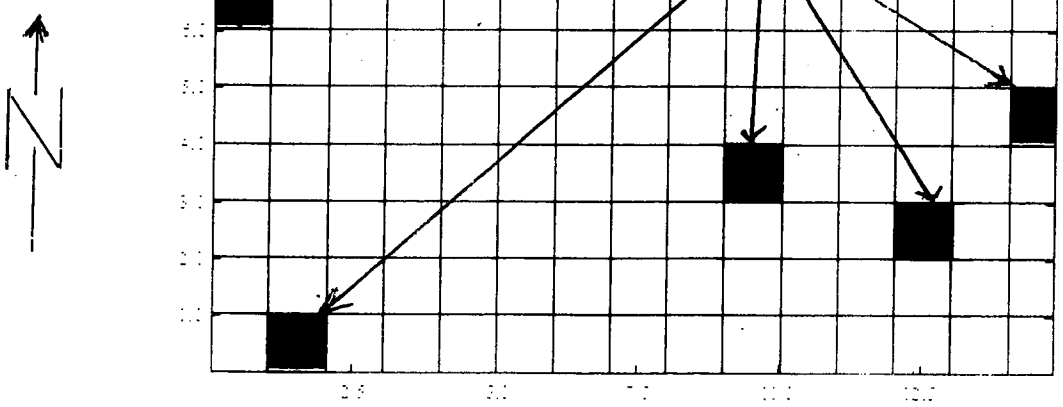
FS-F14265

SUMMARY AND/OR SPECIAL REPORT FORM

LOCATION: Remediation Pad	DATE: 9/29/06
DOCUMENT TITLE: Grid RP01102 Scabbled Areas	DOCUMENT NUMBER: 06.C19-16

RP01102A-6

< 70 K dpm B & Direct



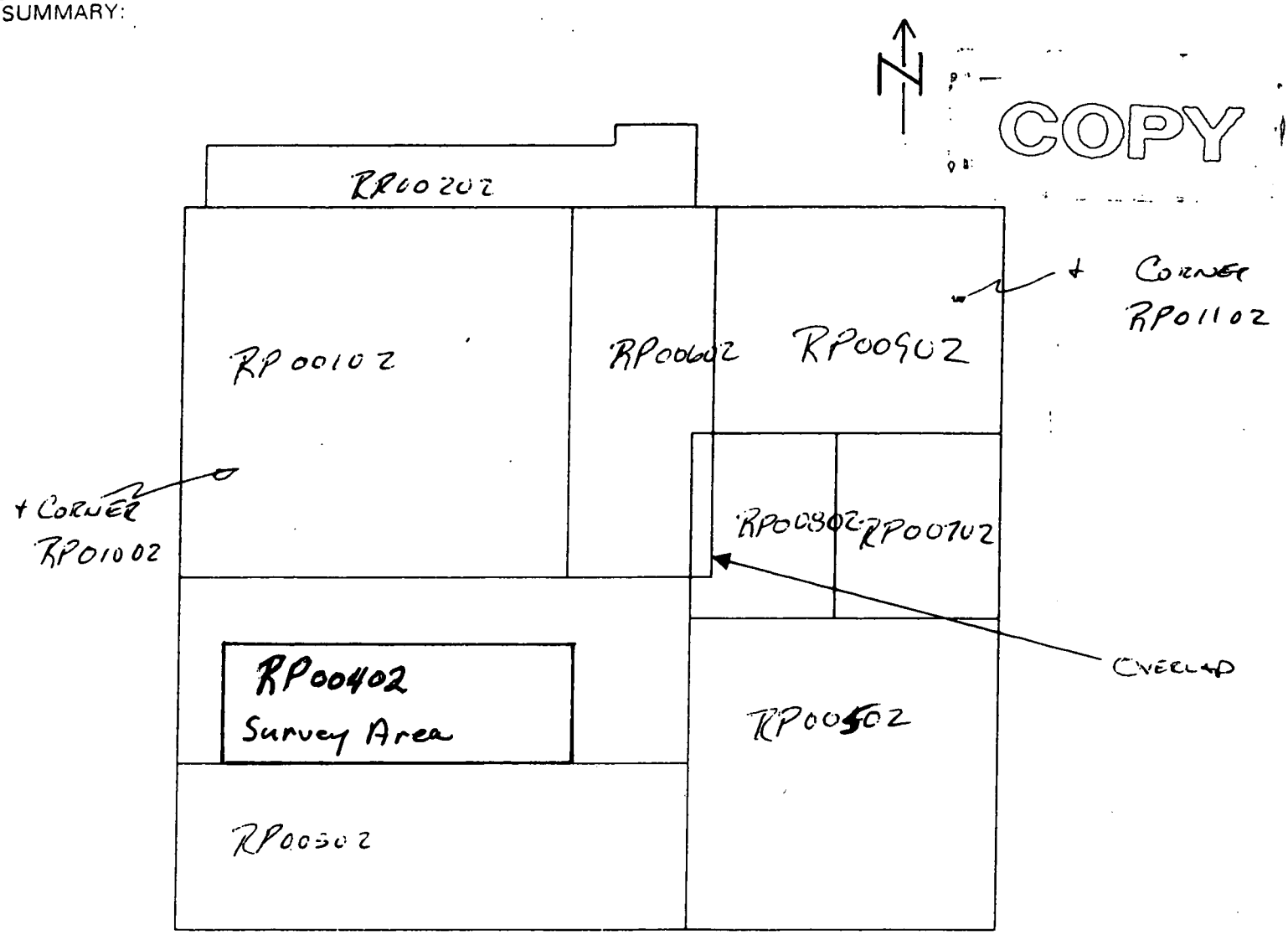
ENTERED BY:	REVIEWED BY:
(PRINT NAME)	(PRINT NAME)
JDaniel	Gary Buckley
(SIGNATURE/DATE)	(SIGNATURE/DATE)
9/29/06	10-3-6

FEMP COVER SHEET		SURVEY NUMBER 0610-12-27
DATE 10-4-06	RCT PRINT Al Momrik	PAGE 1 of 3
TIME 1030	SIGNATURE Al Momrik	BADGE # [redacted]
RWP NUMBER 06-0406	REVIEWER PRINT H-Fennell	DATE 10-6-06
	SIGNATURE H. Fennell	BADGE [redacted]

LOCATION: Remediation Pad

REASON FOR SURVEY: Survey of Scabbled Areas In Supernatant & Flush Tank Secondary Containment. Floor, Walls, Sumps, Trenches & Tank Pads were also Surveyed. (Grid # RP00402)

SUMMARY:



FEMP / RADIOLOGICAL SURVEY REPORT

SURVEY NUMBER: 06-10-12-27 **PAGE** 2 **OF** 3

DATE:	RCT PRINT:	RCT SIGNATURE:	BADGE #:
10-4-06	A Momrik	AMomrik	[redacted]
DATE REVIEWED:	**REVIEWED BY (PRINT):**	**REVIEWED BY (SIGNATURE):**	
10-6-06	H-Fennell	H. Fennell	

MODEL	SERIAL NUMBER	TYPE (α, β, γ)	CALIBRATION-DUE DATE	BKGD. (cpm)	EFF./CF	COUNT TIME (min)	MDA (dpm)	INSP./ PERFORMANCE TEST SAT? YES	NO
M-3	77119	B γ	10-07	100	5	NA	500	✓	NA
		N		A					

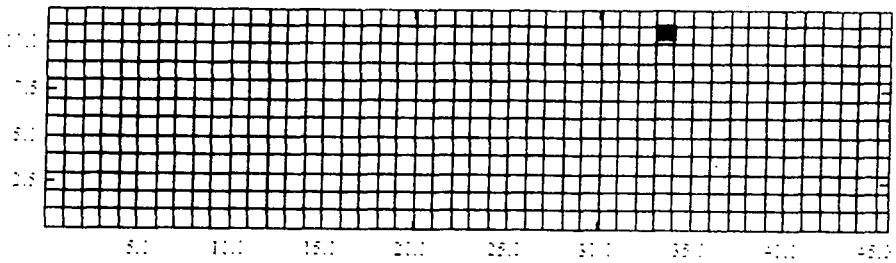
ITEM NUMBER	LOCATION AND/OR DESCRIPTION	DPM/100cm² ALPHA REMOVABLE (1)	DPM/100cm² ALPHA FIXED PLUS REMOVABLE	DPM/100cm² BETA-GAMMA REMOVABLE (1)	DPM/100cm² BETA-GAMMA FIXED PLUS REMOVABLE	CORRECTED DOSE RATE (MREM/HR) γ CONTACT	β CONTACT	γ AT__ FT	β AT__ FT
1	Containment Floor	NA	NA	NA	<70K				
2	↓ Walls	↓	↓	↓	↓				
3	Sumps								
4	↓ Trenches								
5	Supernatant Pad								
6	Flush Tank Pad	↓	↓	↓	↓				
							N	A	
	N	A							

Note (1): Values identified by an asterisk (*) indicate results are less than the calculated MDA.

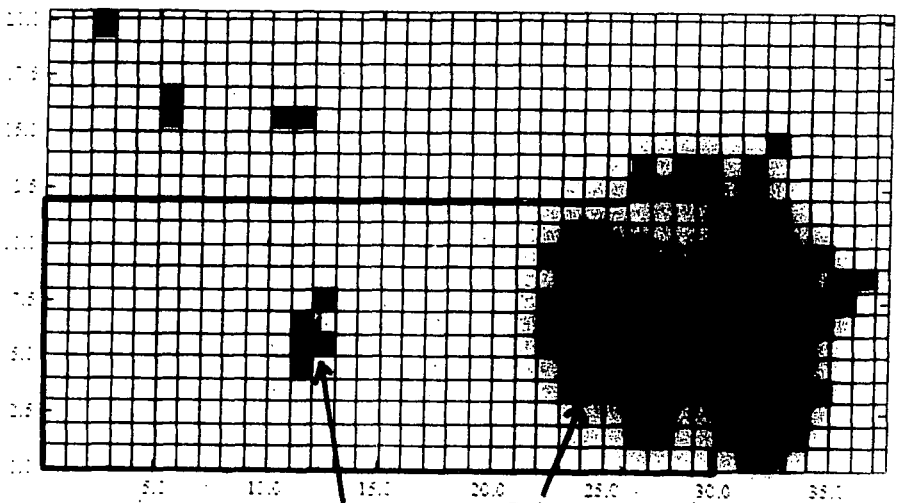
SUMMARY AND/OR SPECIAL REPORT FORM

LOCATION: Remediation Pad	**DATE:** 10-4-06
DOCUMENT TITLE: Scabbled Areas	**DOCUMENT NUMBER:** 06-10-12-27

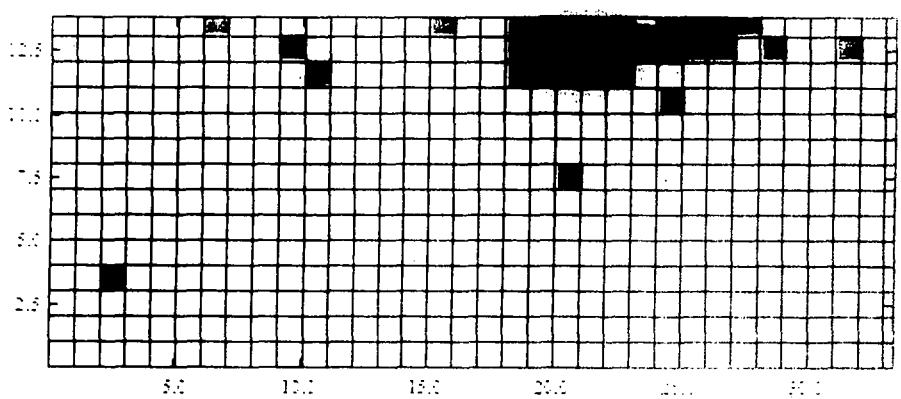
RP00202A-17



RP00402A-25



RP00302A-16



ENTERED BY:	**REVIEWED BY:**
(PRINT NAME) Al Momrik	(PRINT NAME)
(SIGNATURE/DATE) al Momrik 10-4-06	(SIGNATURE/DATE) 10-6-06

FEMP COVER SHEET

SURVEY NUMBER 06-09-12-221

DATE 9-29-06 | PRINT J Daniel | PAGE 1 of 3

TIME 2200	SIGNATURE [signature]	BADGE # [redacted]
RWP NUMBER	REVIEWER PRINT H. Fennell	DATE 9-30-06
06-0406	SIGNATURE H. Fennell	BADGE [redacted]

LOCATION: Silos Remediation Pad

REASON FOR SURVEY	Verification of βγ levels after scabbling / location of "Hot Spots" > 7000 dpm/100cm²

SUMMARY:

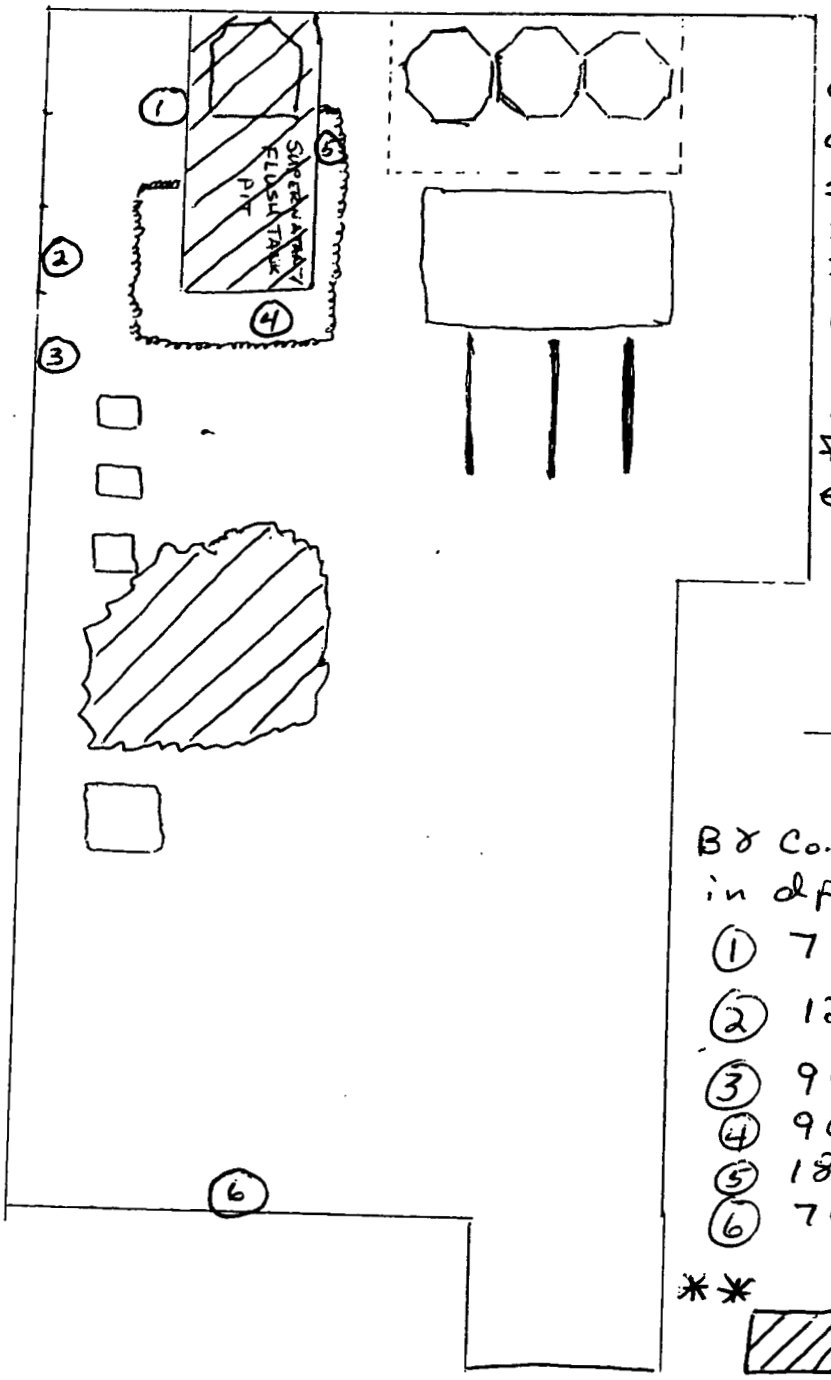
N/A

FS-F-4617
REV. 2: 04/01/99, RP-0023

COPY

SUMMARY AND/OR SPECIAL REPORT FORM

LOCATION: Silos Remediation Pad	DATE: 9/29/06
DOCUMENT TITLE: MAP	DOCUMENT NUMBER: 06-09-12-221



All scabbled areas on pad, as well as other irregular (non smooth finished) ** surfaces surveyed for B & fixed + removable by frisking w/ 4 hand probe

All areas surveyed were found to be < 7000 dpm/100cm² except as noted below.

B & Contamination levels* noted in dpm/100cm²

① 7000
② 12000
③ 9000
④ 9000
⑤ 18000
⑥ 7000

* TOTAL Contamination (fixed + loose)

COPY

** Area Not Surveyed - Standing Water/Debris

ENTERED BY:	REVIEWED BY:
(PRINT NAME) J Daniel [redacted]	(PRINT NAME) H. Farnell
(SIGNATURE/DATE) 9/29/06	(SIGNATURE/DATE) H. Farnell 9-30-06

FS-F-4365

FEMP / RADIOLOGICAL SURVEY REPORT

SURVEY NUMBER: 06-09-12-221 **PAGE** 3 **OF** 3

DATE: 9/30/06	RCT PRINT: JDaniel	RCT SIGNATURE:	BADGE #: [redacted]
DATE REVIEWED: 9-30-06	REVIEWED BY (PRINT): H. Fennell	REVIEWED BY (SIGNATURE): H Fennell	

MODEL	SERIAL NUMBER	TYPE (α, β, γ)	CALIBRATION-DUE DATE	BKGD. (cpm)	EFF./CF	COUNT TIME (min)	MDA (dpm)	INSP./ PERFORMANCE TEST SAT? YES	NO
3	119600	B γ	8/07	100	4.6	NA	460	X	
		"		A					

ITEM NUMBER	LOCATION AND/OR DESCRIPTION	DPM/100cm² ALPHA REMOVABLE (1)	DPM/100cm² ALPHA FIXED PLUS REMOVABLE	DPM/100cm² BETA-GAMMA REMOVABLE (1)	DPM/100cm² BETA-GAMMA FIXED PLUS REMOVABLE	CORRECTED DOSE RATE (MREM/HR) γ CONTACT	β CONTACT	γ AT__ FT	β AT__ FT
1	See Map - Page 2	NA	NA	NA	7K				
2					12K				
3					9K				
4					9K		"	A	
5					18K				
6		NA	NA	NA	7K				
		"	A						

Note (1): Values identified by an asterisk (*) indicate results are less than the calculated MDA.

COPY

APPENDIX D

V/FCNs FOR THE CDL AND CERTIFICATION PSP FOR SELECTED CONCRETE IN THE SILOS 1 AND 2 PROJECT AREA

VARIANCE/FIELD CHANGE NOTICE LOG FOR THE CERTIFICATION DESIGN LETTER AND CERTIFICATION PROJECT SPECIFIC PLAN FOR SELECTED CONCRETE STRUCTURES IN THE SILOS 1 AND 2 PROJECT AREA

Variance No.	Variance Date	Variance Description	Significant? (Y or N)	Date Signed	Date Distributed	EPA/OEPA Approval
20500-PSP-0012-01	3/30/06	Documents the collection of concrete samples from two locations in the Silos 1 and 2 Remediation Facility	N	4/11/06	4/13/06	N/A
20500-PSP-0012-02	7/24/06	Documents the collection of five concrete samples and two composite soil/residue samples from the concrete stockpile area located in Area 6E to evaluate alternate disposal options	N	8/2/06	8/16/06	N/A
20500-PSP-0012-03	8/29/06	Documents the cancellation of four CUs from the CDL/PSP due to the concrete being contaminated and disposed of at an off-site permitted facility.	N	9/8/06	9/18/06	N/A
20500-PSP-0012-04	8/29/06	Documents a change in analytical turnaround time and other analytical requirements for six biased concrete samples from the TTA pad (3-day TAT for gamma spec. data).	N	9/8/06	9/18/06	N/A
20500-PSP-0012-05	8/30/06	Documents the change in analytical turnaround time and other analytical requirements for remaining concrete samples from the TTA pad and Remediation Facility pad, including the use of 7-day in-growth period for radium-226 and gamma spec. analyses. Also corrects the coordinates for two sample locations.	N	9/14/06	9/18/06	N/A
20500-PSP-0012-06	9/28/06	Documents changes to Figure 4-2 and the elimination of two certification sample points due to the off-site disposal of portions of concrete outside of the TTA pad.	Y	10/27/06	10/27/06	

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): NO	V/F: 20500-PSP-0012-01
WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0012 Rev. 0		Page: 1 of 1
PROJECT TITLE: PSP For Selected Concrete Structures In The Silos 1 And 2 Project Area		Date: 3/30/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

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 A), metals (TAL B), and PCBs (TAL C).

The Sampling, Analytical Requirements, and TALs are identical to the PSP and are therefore not attached.

The sample ID for the contaminated sample is A7C-RF-CON01^RMP and the sample ID for the decontaminated sample is A7C-RF-DECON01^RMP.

Where:

A7C = Sample collected from Remediation Area 7 concrete surface (C)
RF = Silo 1 and 2 Remediation Facility
CON01 = Contaminated location 1; DECON01 = Decontaminated location 1
R = radiological analysis; M = metals analysis; P = PCB analysis.

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

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: 3/30/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	4/5/06	X	PROJECT MANAGER: J.D. Chiou	4/11/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: F. Miller	3/30/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul McSwigan	4/11/06		RTIMP Manager	
	WAO		X	Sampling Manager: T. Burbage	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:

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No) No	V/F: 20500-PSP-0012-02
WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0012 Rev. 0		Page: 1 of 3
PROJECT TITLE: PSP For Selected Concrete Structures In The Silos 1 And 2 Project Area		Date: 7/24/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

Five concrete samples and two composite soil/residue sample will be collected from the concrete stockpile area (pile currently being crushed) located in Area 6E to evaluate alternate disposal options for this concrete stockpile. The source for this concrete was largely the TTA, Remediation Facility, and the RCS. The concrete waste stream of interest contains some soil/residue, estimated to be a maximum of 10%, as a result of the demolition process required to rubblize and stockpile the material. In order to properly characterize the waste stream, two composite soil samples biased to soil having high rad frisker levels will be collected.

For the concrete samples, a 3-inch depth by 3-inch diameter core will be collected from the concrete surface of five separate pieces of concrete slab/wall debris in the stockpile. The selection of concrete debris for sampling will be based on 1) a piece of concrete having a large enough finished, flat surface (rather than a rough face) to mount the core drill, and 2) the concrete surface containing the highest rad frisker levels found during the initial walk-over survey.

For the two composite soil samples, selection of the soil/residue to be sampled will be based on the highest rad frisker levels found during the walk-over survey. Each composite sample will be collected by selecting approximately equal portions of soil from various locations (minimum of four separate areas) having the highest rad frisker levels found during the survey. This methodology should be done to the extent practical with safety of the team members traversing around the pile being the first priority. In general, one composite should be formed from various locations on the south and west side of the pile and the one composite formed from various locations on the north and east side.

The sample identifiers and TAL A (rads), TAL D (metals) and TAL E (Tc-99) are summarized in Table B-2 (attachment). Surveying the sample locations is not required, but a detailed figure and description of the sample locations will be included in the field logs. Additionally, the rad frisker readings of the collected samples (concrete finished surface and the composited soil samples) should be recorded in the field logs.

Historical data for shipping: 14.7 pCi/g Radium-226 and 6.9 mg/kg total uranium from contaminated concrete cores collected from the Silo 1&2 Remediation Facility.

Justification:
The data is needed for evaluation and comparison to the waste acceptance criteria (concentration limits) for off-site permitted disposal facilities, including the RACE facility in Memphis, Tennessee.

REQUESTED BY: Mike Frank Date: 7/24/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	7-27-06	X	PROJECT MANAGER: J.D. Chiou	7/27/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Arce	7/26/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul S. Medvigy	8/2/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage Mike Frank for TB	7-24-06

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

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

Analyte	Method	ASL	Sample Matrix	Preservative	TAT	Container	Sample Volume/Mass
Metals (TAL D)	ICP/MS or CVAA	D/E	Concrete or Soil	Cool, 4C	10 days	Plastic Jar	Minimum of 500 g
Rads [TAL A (Pb-210) and TAL E (Tc-99)]	LSC and/or GPC	D/E	Concrete or Soil	None	10 days		
Rads (TAL A)	Gamma Spec	D/E	Concrete or Soil	None	10 day PEDD 30 days final		
					10 days final		

TAL 20500-PSP-0012-A (7 samples)

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

TAL 20500-PSP-0012-D (7 samples)

Component	20X TCLP Limit (mg/kg)	MDL (mg/kg)	Method
Arsenic	100	10	ICP/MS
Barium	2000	200	ICP/MS
Cadmium	20	2.0	ICP/MS
Chromium	100	10	ICP/MS
Lead	100	10	ICP/MS
Mercury	4	0.4	CVAA

Selenium	20	2.0	ICP/MS
Silver	100	10	ICP/MS

TAL 20500-PSP-0012-E (7 samples)

Component	FRL (pCi/g)	MDL (pCi/g)	Method
Tc-99	29.1	2.91	GPC or LSC

TABLE B-1
Sample Identifiers and Locations for Concrete Characterization

Sample/Location Description	Location	Depth*	Sample ID	TAL	North-83	East-83
Concrete Sample 1	Concrete Stockpile Near Crusher	0"-3"	A6-Conc-Pile-01^RM	A,D,E	NA	NA
Concrete Sample 2	Concrete Stockpile Near Crusher	0"-3"	A6-Conc-Pile-02^RM	A,D,E	NA	NA
Concrete Sample 3	Concrete Stockpile Near Crusher	0"-3"	A6-Conc-Pile-03^RM	A,D,E	NA	NA
Concrete Sample 4	Concrete Stockpile Near Crusher	0"-3"	A6-Conc-Pile-04^RM	A,D,E	NA	NA
Concrete Sample 5	Concrete Stockpile Near Crusher	0"-3"	A6-Conc-Pile-05^RM	A,D,E	NA	NA
Soil Sample Composite	Concrete Stockpile Near Crusher	SEE NOTE	A6-Conc-Pile-06^RM	A,D,E	NA	NA
Soil Sample Composite	Concrete Stockpile Near Crusher	SEE NOTE	A6-Conc-Pile-07^RM	A,D,E	NA	NA

Note: Depth of soil samples will generally be <3 inches due to the compositing of several aliquots (minimum four) having high rad frisker readings to complete the sample.

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No) No	V/F: 20500-PSP-0012-03
WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0012 Rev. 0		Page: 1 of 1
PROJECT TITLE: PSP For Selected Concrete Structures In The Silos 1 And 2 Project Area		Date: 8/29/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

Four certification units (CU) under this PSP will be removed from the scope of the CDL/PSP due to a change in the disposition of this concrete. The majority of these concrete structures were demolished and hauled to the concrete staging pile for disposal either in the OSDF or to an off-site permitted disposal facility. A small portion of clean concrete that formed the walls of the Load-Out Bay (maintained as a clean area throughout the waste treatment process) was released following radiological surveys and transported to a local landfill. The four CUs that represent the concrete that did not undergo certification sampling are:

A7C-TT-C01, TTA Building walls.
A7C-TT-C03, TTA Building second floor deck.
A7C-RF-C01, Silo 1 and 2 Remediation Facility; two walls of the Load-Out Area.
A7C-RF-C02, Silo 1 and 2 Remediation Facility; west wall of the facility.

Justification:
As stated in the Executive Summary of the CDL/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 reuse of the concrete onsite.

REQUESTED BY: Mike Frank Date: 8/29/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	9/8/06	X	PROJECT MANAGER: J.D. Chiou	8/30/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: [illegible]	30 Aug 06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McMorgan	8/30/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrage	8-30-06

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

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

VARIANCE / FIELD CHANGE NOTICE	Significant Change (YES or NO) NO	V/F: 20500-PSP-0012-04
WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0012 Rev. 0		**Page: 1 of 3**
PROJECT TITLE: PSP For Selected Concrete Structures In The Silos 1 And 2 Project Area		**Date: 8/29/06**

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This V/FCN changes the turn-around time (TAT) for radiological analyses for six samples collected from the Transfer Tank Area (TTA) concrete pad. The changes include a 3-day TAT for gamma spectroscopy, modified minimum detection limits (MDL) for several metal constituents, and provides for the re-analysis of the sample having the highest radium-226 result using a 21-day in-growth period. The attached TAL and sampling requirements table summarizes these changes.

The biased samples (highest alpha/beta field scan results) with the following sample IDs will be analyzed by the requirements of this V/FCN:

A7C-TT-C02-22B^RMP
A7C-TT-C02-23B^RMP
A7C-TT-C02-25B^RMP
A7C-TT-C02-27B^RMP
A7C-TT-C02-28B^RMP
A7C-TT-C02-29B^RMP

Justification:
The shorter TAT is necessary to assess the impact of contamination on the TTA concrete surface. Additionally, final certification data for radium-226 will now be based on a 7-day in-growth period as described in the footnote on the attached analytical table.

REQUESTED BY: Mike Frank Date: 8/29/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	9/8/06	X	PROJECT MANAGER: J.D. Chiou	8/30/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Khin	8/29/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul S. McSwigan	8/29/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage Mike Frank for TB	8/29/06

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

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

Analyte	Method	ASL	Sample Matrix	Preservative	TAT	Container	Sample Volume/Mass
Metals (TAL B) PCB (TAL C)	ICP/MS or CVAA GC	D/E	Concrete or Soil	Cool, 4C	10 days final	Plastic Jar	Minimum of 405 g
Rads (TAL A Pb-210)	LSC and/or GPC	D/E	Concrete or Soil	None	10 days final		
Rads (TAL A)	Gamma Spec	D/E	Concrete or Soil	None	3 day PEDD; 10 day EDD*; 14 days final		

TAL 20500-PSP-0012-A (6 samples)

Component	FRL	MDL	Method
Total uranium	82 ppm	8.2 ppm	gamma spec
Radium-226	1.7 pCi/g	0.30 pCi/g	gamma spec
Radium-228	1.8 pCi/g	0.30 pCi/g	gamma spec
Thorium-228	1.7 pCi/g	0.30 pCi/g	gamma spec
Thorium-232	1.5 pCi/g	0.30 pCi/g	gamma spec
Lead-210	38 pCi/g	3.8 pCi/g	liquid scintillation or gamma spec

TAL 20500-PSP-0012-B (6 samples)

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

TAL 20500-PSP-0012-C (6 samples)

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

* SEE NOTE BELOW OR ON NEXT PAGE

* 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. After laboratory receipt, a 3-day turnaround time (TAT) is required for gamma spec analyses (using a 2-day in-growth period for Ra-26) with a preliminary electronic data deliverable (PEDD) reported. Additionally, a 7-day in-growth for all gamma spec. analyses is required with the EDD being reported 10 days after laboratory receipt of the samples. The final data package shall be reported 14 days after laboratory receipt of the sample.

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.

VARIANCE / FIELD CHANGE NOTICE

Significant? (Yes or No) No

V/F: 20500-PSP-0012-05

WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0012 Rev. 0

PROJECT TITLE: PSP For Selected Concrete Structures In The Silos 1 And 2 Project Area

Date: 8/30/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This variance includes changes to the analytical turn-around time, the in-growth period for gamma spectroscopy samples, and the selection of one sample from each CU for a 21-day in-growth period. This variance and analytical changes apply to concrete samples collected on or after 8/29/06. See Attachment 1 for analytical changes, in particular the footnote information.

Two sample location coordinates are also corrected in this variance as described below; these two sample locations were incorrectly listed in Appendix B.

A7C-TT-C02-7^RMP : Northing 480360.5 Easting 1347307.0
A7C-TT-C02-8^RMP : Northing 480344.2 Easting 1347345.0

Justification:
Gamma spectroscopy analysis will now be performed after a 7-day in-growth period for soil certification samples. As noted in Attachment 1, one sample (highest Ra-226 result from the 7-day in-growth) from each CU will also be analyzed after a 21-day in-growth period. This modification and supporting data was presented to and accepted by the USEPA and OEPA.

REQUESTED BY: Mike Frank Date: 8/30/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: R. Friske	9/8/06	X	PROJECT MANAGER: J.D. Chiou	9/1/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Abu	25 Sept 06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McGuigan	8/30/06		RTIMP Manager	
	WAO		X	SAMPLING MANAGER: T. Buhrlage	9/14/06

VARIANCE/FCN APPROVED [X]YES [ ]NO

REVISION REQUIRED: [ ]YES [x]NO

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

Analyte	Method	ASL	Sample Matrix	Preservative	TAT	Container	Sample Volume/Mass
Metals (TAL B) PCB (TAL C)	ICP/MS or CVAA GC	D/E	Concrete or Soil	Cool, 4C	10 days final	Plastic Jar	Minimum of 405 g
Rads (TAL A Pb-210)	LSC and/or GPC	D/E	Concrete or Soil	None	10 days final		
Rads (TAL A)	Gamma Spec	D/E	Concrete or Soil	None	10 day EDD* 14 days final		

TAL 20500-PSP-0012-A (approx. 84 samples)

Component	FRL	MDL	Method
Total uranium	82 ppm	8.2 ppm	gamma spec
Radium-226	1.7 pCi/g	0.30 pCi/g	gamma spec
Radium-228	1.8 pCi/g	0.30 pCi/g	gamma spec
Thorium-228	1.7 pCi/g	0.30 pCi/g	gamma spec
Thorium-232	1.5 pCi/g	0.30 pCi/g	gamma spec
Lead-210	38 pCi/g	3.8 pCi/g	liquid scintillation or gamma spec

TAL 20500-PSP-0012-B (approx. 84 samples)

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

TAL 20500-PSP-0012-C (approx. 84 samples)

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

* SEE NOTE BELOW OR ON NEXT PAGE

*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. After laboratory receipt, a 10-day turnaround time (TAT) is required for gamma spec analyses (using a 7-day in-growth period for Ra-26) with a preliminary electronic data deliverable (PEDD) reported. The final data package shall be reported 14 days after laboratory receipt of the sample.

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.

VARIANCE / FIELD CHANGE NOTICE	Significant? (Yes or No): Yes	V/F: 20500-PSP-0012-06
WBS NO.: PROJECT/DOCUMENT/ECDC # 20500-PSP-0012 Rev. 0		Page: 1 of 3
PROJECT TITLE: PSP For Selected Concrete Structures In The Silos 1 And 2 Project Area		Date: 9/28/06

VARIANCE / FIELD CHANGE NOTICE (Include justification):

This variance includes changes to Figure 4-2 and documents the elimination of two certification sample points due to the off-site disposal of portions of concrete outside of the TTA pad.

Figure 4-2 (attachment) has been revised to correct two sample point identifiers (A7C-TT-C02-3 and A7C-TT-C02-4) that were reversed on the original figure included in the CDL/PSP.

Two samples were eliminated from the CDL/PSP due to the off-site disposal of the concrete that the samples were intended to represent for characterization. Location A7C-TT-C02-23 was originally added the CDL/PSP to provide certification data on concrete footers (supporting pipe rack) positioned outside the northeast corner of the TTA pad. Location A7C-TT-C02-25 also represented concrete footers outside of the TTA pad on the south side where the stairway structure was located. This concrete was also removed for off-site disposal. Refer to the sample locations on the attached Figure 4-2. A total of four concrete locations outside the TTA pad were sampled as planned to represent other concrete footers and pads that remained. A total 32 certification samples were collected from this CU included biased samples.

Additionally, two sample identifiers included on Figure 4-2 and listed in Appendix B (attached) were changed as follows:

Original ID: A7C-TT-C02-22 New ID: A7C-TT-C02-31
Original ID: A7C-TT-C02-27 New ID: A7C-TT-C02-30
The duplicate sample location was changed from sample location #13 to location #16 (due to less concrete thickness to drill through at location #16).

Justification:
Justification is included above for each modification.

REQUESTED BY: Mike Frank Date: 9/28/06

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
X	QUALITY ASSURANCE: E. Friske	10-3-06	X	PROJECT MANAGER: J.D. Chico	10/6/06
	DATA QUALITY MANAGEMENT		X	CHARACTERIZATION MANAGER: R. Point	10/3/06
X	ANALYTICAL CUSTOMER SUPPORT: Paul J. McAuryan	9/29/06		RTIMP Manager	
	WAC		X	SAMPLING MANAGER: T. Buhrlage for TB	9/28/06

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

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

APPENDIX B

SILO 1 AND 2 PROJECT AREA CONCRETE CERTIFICATION SAMPLE LOCATIONS AND IDENTIFIERS (Rev. 1)

CU	Location	Depth	Sample ID	TAL	North-83	East-83	Vertical Distance From Wall Bottom*	Horizontal Distance From Reference Point*	Comment
TTA Floor - CU2	2-1	0"-1"	A7C-TT-C02-1^RMP	A, B, C	480385.7	1347221.6	NA	NA	
	2-2	0"-1"	A7C-TT-C02-2^RMP	A, B, C	480406.7	1347262.8	NA	NA	
	2-3	0"-1"	A7C-TT-C02-3^RMP	A, B, C	480338.9	1347253.3	NA	NA	
	2-4	0"-1"	A7C-TT-C02-4^RMP	A, B, C	480360.5	1347252.8	NA	NA	
	2-5	0"-1"	A7C-TT-C02-5^RMP	A, B, C	480407.6	1347318.1	NA	NA	
	2-6	0"-1"	A7C-TT-C02-6^RMP	A, B, C	480384.2	1347321.9	NA	NA	
	2-7	0"-1"	A7C-TT-C02-7^RMP	A, B, C	480344.2	1347345.0	NA	NA	
	2-8	0"-1"	A7C-TT-C02-8^RMP	A, B, C	480360.5	1347307.0	NA	NA	
	2-9	0"-1"	A7C-TT-C02-9^RMP	A, B, C	480327.6	1347213.6	NA	NA	
	2-10	0"-1"	A7C-TT-C02-10^RMP	A, B, C	480315.2	1347251.0	NA	NA	
	2-11	0"-1"	A7C-TT-C02-11^RMP	A, B, C	480278.5	1347255.7	NA	NA	
	2-12	0"-1"	A7C-TT-C02-12^RMP	A, B, C	480268.8	1347217.4	NA	NA	
	2-13	0"-1"	A7C-TT-C02-13^RMP	A, B, C	480328.5	1347296.5	NA	NA	
	2-14	0"-1"	A7C-TT-C02-14^RMP	A, B, C	480310.4	1347327.1	NA	NA	
	2-15	0"-1"	A7C-TT-C02-15^RMP	A, B, C	480283.5	1347296.6	NA	NA	
	2-16	0"-1"	A7C-TT-C02-16^RMP	A, B, C	480266.3	1347344.0	NA	NA	
			A7C-TT-C02-16^RMP-D				NA	NA	
	2-17	0"-1"	A7C-TT-C02-17B^RMP	A, B, C	480372.6	1347243.1	NA	NA	
	2-18	0"-1"	A7C-TT-C02-18B^RMP	A, B, C	480370.3	1347316.8	NA	NA	
	2-19	0"-1"	A7C-TT-C02-19B^RMP	A, B, C	480298.1	1347240.2	NA	NA	
	2-20	0"-1"	A7C-TT-C02-20B^RMP	A, B, C	480296.0	1347314.9	NA	NA	
	2-21	0"-1"	A7C-TT-C02-21B^RMP	A, B, C	480334.4	1347279.6	NA	NA	
	2-22	0"-1"	A7C-TT-C02-31B^RMP	A, B, C	480385.2	1347196.1	NA	NA	
	~~2-23~~	~~0"-1"~~	~~A7C-TT-C02-23B^RMP~~	~~A, B, C~~	~~480394.8~~	~~1347367.4~~	~~NA~~	~~NA~~	DELETED
	2-24	0"-1"	A7C-TT-C02-24B^RMP	A, B, C	480250.5	1347242.1	NA	NA	
	~~2-25~~	~~0"-1"~~	~~A7C-TT-C02-25B^RMP~~	~~A, B, C~~	~~480244.9~~	~~1347285.3~~	~~NA~~	~~NA~~	DELETED
	2-26	0"-1"	A7C-TT-C02-26B^RMP	A, B, C	480196.4	1347322.5	NA	NA	
	2-27	0"-1"	A7C-TT-C02-30B^RMP	A, B, C	480414.1	1347285.1	NA	NA	

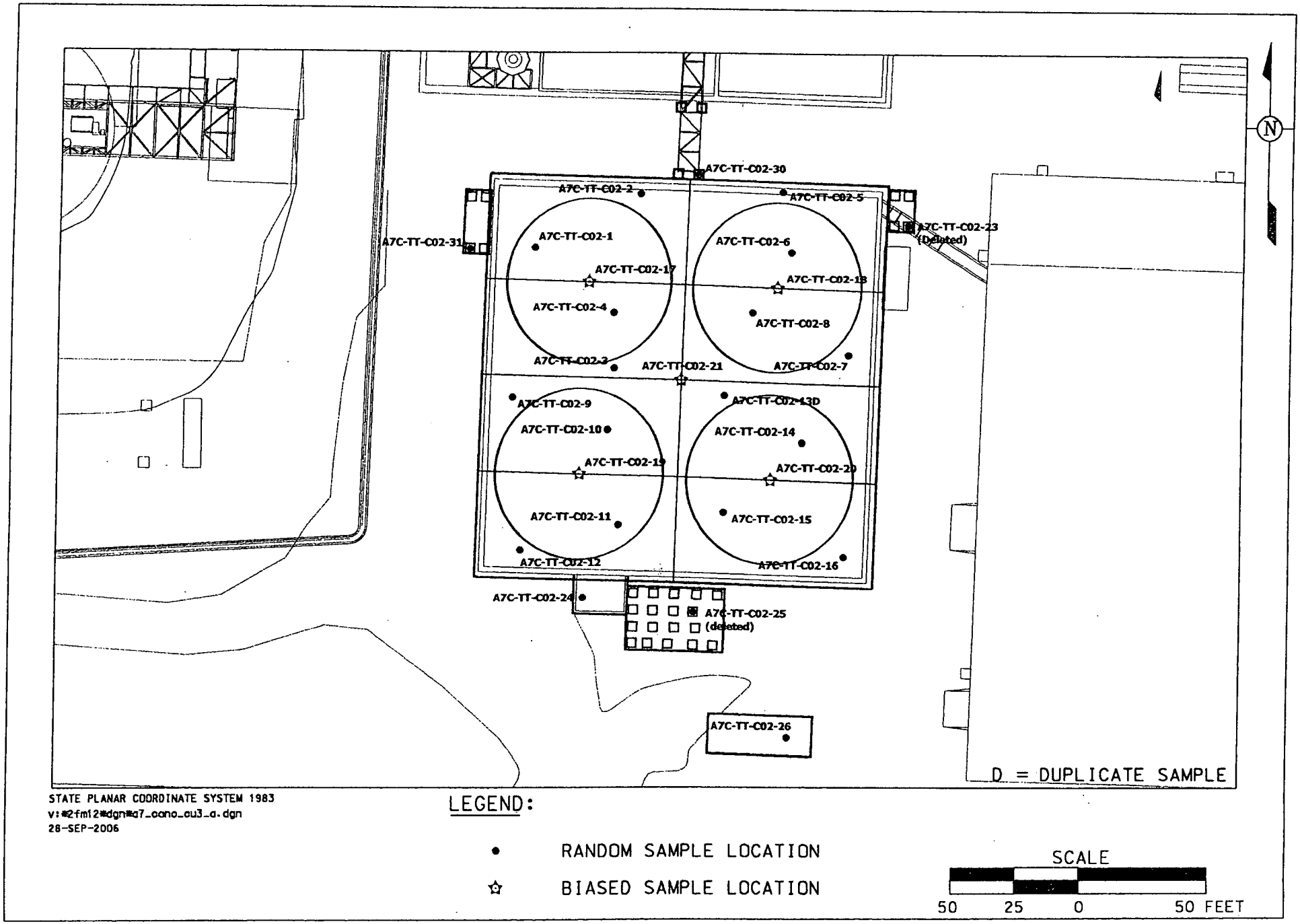

FIGURE 4-2. TTA BUILDING CERTIFICATION UNIT RANDOM AND BIASED SAMPLE LOCATIONS (REV 1)

APPENDIX E

CORRECTION OF 7-DAY RADIUM-226 RESULTS

APPENDIX D
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.

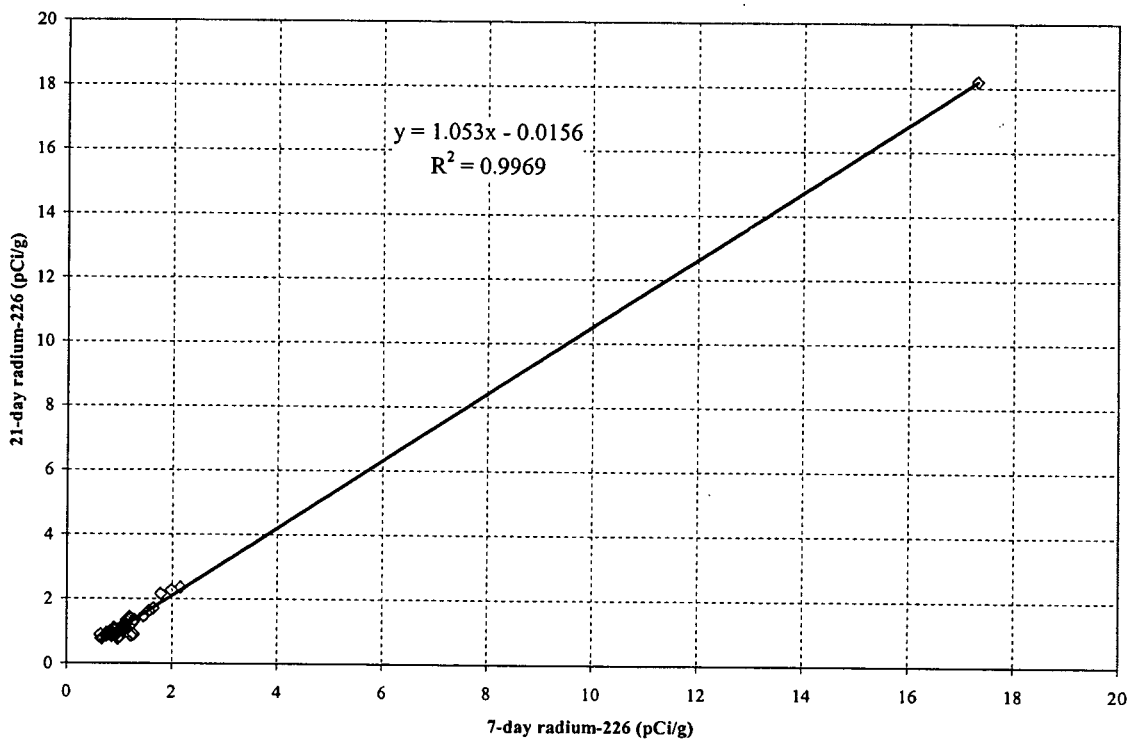

FIGURE 1. Regression analysis of radium-226 data based on 7- and 21-day in-growth period for radon-222