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CERTIFICATION REPORT FOR THE AREA 5 EASTERN FIELD

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

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U.S. DEPARTMENT OF ENERGY
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LIST OF ACRONYMS AND ABBREVIATIONS

A5EF	Area 5 Eastern Field
amsl	above mean sea level
ASCOC	area-specific constituent of concern
ASL	analytical support level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	constituent of concern
CRDL	contract required detection limit
CU	certification unit
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FRL	final remediation level
HAMDC	highest allowable minimum detectable concentration
HPGe	high-purity germanium detector
LCS	laboratory control sample
MDC	minimum detectable concentration
mg/kg	milligrams per kilogram
NaI	sodium iodide
OEPA	Ohio Environmental Protection Agency
OSDF	On-Site Disposal Facility
OU	Operable Unit
PAHs	polycyclic aromatic hydrocarbons
pCi/g	picoCuries per gram
PSP	Project Specific Plan
QA/QC	Quality Assurance/Quality Control
RAWP	Remedial Action Work Plan
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSS	Radiation Scanning System
RTIMP	Real-Time Instrumentation Measurement Program
RTRAK	Radiation Tracking System
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
TPU	total propagated uncertainty
UCL	upper confidence level
V&V	verification and validation
WAC	waste acceptance criteria

EXECUTIVE SUMMARY

This certification report presents the information and data used by the U.S. Department of Energy (DOE) to determine that existing area-specific constituents of concern (ASCOCs) concentrations do not exceed the final remediation levels (FRLs) in the Area 5 Eastern Field (A5EF) at the Fernald Environmental Management Project. On the basis of this reported information and supporting project files, DOE has determined that no remedial actions are required in these areas of the site and, therefore, they can be considered "certified." A5EF will be considered certified when the U.S. Environmental Protection Agency (EPA) and Ohio Environmental Protection Agency (OEPA) agree that the certification criteria have been achieved within all three certification units (CUs) into which the area was divided. Upon approval from the regulatory agencies, DOE will proceed with construction of the On-site Disposal Facility (OSDF) Sediment Basin #2 in the A5EF.

During the predesign investigation phase, A5EF was divided into three grid blocks of approximately equal size. These grid blocks meet the size and design criteria for classification as Group 1 CUs, as all are under 62,500 square feet, and are homogeneous in land use and potential for contamination. Therefore, these grid blocks can be considered CUs.

All samples collected from the three A5EF CUs met all certification protocol as identified in the Sitewide Excavation Plan (SEP, DOE 1998). This includes sample density, minimum distance rules, quality control, analysis requirements [including Analytical Support Level (ASL) D], and validation. As a result, these samples can be considered certification samples, and the data can be used for statistical analysis to verify that the certification criteria were achieved.

The A5EF certification samples were analyzed at a contract laboratory, following guidelines set forth in the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ, Procedure FD-1000) and the SEP. Twelve samples per CU were analyzed and reported at the required ASL D. Analytical data packages included sample results with associated quality assurance/quality control data and all applicable raw data. The data were also subjected to the required validation and verification process, which did not identify any significant quality concerns.

All A5EF achieved the certification criteria within all CUs. The determination of passing or failing certification was based on a review of all certification sampling analytical results for each ASCOC in each CU against the certification criteria. Just one of the analytical results exceeded the associated FRL, therefore, statistical analyses was only necessary in just one instance.

In addition to the certification sample data, real-time scanning data collected from the A5EF indicated no above-FRL radiological contamination was present. Moreover, three deep borings at the western end of the northern-most drainage ditch in this area also showed minimal subsurface impacts and total uranium concentrations well below the FRL.

Based on the statistical analysis, all three CUs under the scope of this certification effort achieved the certification criteria. Pending EPA and OEPA concurrence, DOE will move forward with construction of the OSDF Sediment Basin #2 within this area.

In order to use the soil excavated from this area during construction of the OSDF Sediment Basin #2 as clean material, additional conservative measures will be implemented. All soil from within the two A5EF drainage ditches, as well as soil in the immediate vicinity of the arsenic FRL exceedance, will be treated as impacted material. Therefore, it will be excavated and segregated for disposal in the OSDF prior to construction of the basin. To ensure that there is no impacted soil remaining at the excavated surfaces, real-time scan data will be collected in these areas. This data will be provided to the EPA and OEPA as an addendum to this Certification Report.

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 existing area-specific constituents of concern (ASCOC) concentrations do not exceed the final remediation levels (FRLs) within the Area 5 Eastern Field (A5EF). This soil is being certified ahead of other parts of Area 5 in order to proceed with final land use in this area, specifically, construction of the On-Site Disposal Facility (OSDF) Sediment Basin #2. On the basis of this reported information, DOE considers remedial goals achieved in this portion of the site.

1.2 BACKGROUND

In the 1996 Operable Unit (OU) 5 Record of Decision (ROD, DOE 1996a), DOE committed to excavating contaminated soil that exceeds health-based FRLs with final disposition of the excavated material in the OSDF or at an off-site disposal facility if the material exceeds OSDF waste acceptance criteria (WAC). The OU5 Remedial Investigation Report (DOE 1995) defined the extent of soil contamination exceeding the FRLs, and in general, indicated widespread contamination occurring in approximately 430 acres of the 1,050-acre Fernald Environmental Management Project (FEMP). In the OU5 Remedial Action Work Plan (RAWP, DOE 1996b), DOE committed to preparing a Sitewide Excavation Plan (SEP, DOE 1998) to define the overall approach to implementing the soil and at- and below-grade debris cleanup obligations identified in the OU2, OU3, and OU5 RODs. In the SEP, the FEMP has been divided into distinct remedial areas and phases for soil remediation, based on the operable units' remediation schedule.

After all necessary remediation is completed within each area/phase, the soil will be certified as attaining all clean up goals (i.e., FRLs). The SEP describes the general soil remediation and certification process at the FEMP. Excavation Approach E, as described in Section 4.5 of the SEP, was followed in A5EF, and no Integrated Remedial Design Package was necessary. The certification effort began with the collection of real-time precertification scan data in May of 2002, and these data showed primary radiological constituents of concern (COCs) to be below the respective FRLs. Because no remedial excavations were required in this area prior to certification sampling, this report does not include a discussion of remedial activities, as identified in Section 7.0 of the SEP.

1.3 AREA DESCRIPTION

The A5EF is a 3.19-acre, open grassy field. It is located due east of the FEMP East Parking Lot, west and north of the North Access Road, and south of Trailer 83 (see Figure 1-1). The A5EF has been identified as an ideal location for the OSDF Sediment Basin #2, and as a result, it will be certified in advance of other parts of A5.

A5EF is rather flat, with the exception of two deep drainage ditches that cut through the center of this area and collect drainage from the eastern portions of the FEMP. The northern most drainage ditch receives surface water runoff from the eastern perimeter of the Former Production Area and the northeastern portion of A5. The southern most drainage ditch received drainage from what is now the Borrow Area via a culvert beneath the North Access Road.

Based on historical knowledge and a review of historical aerial photographs, there have been no activities in this area since site construction, and a field inspection confirmed that no obvious man-made debris are present. Outside of the airborne deposition, which has had some impact on all portions of the FEMP, the only other potential for source of contamination in the A5EF is potentially impacted surface water drainage being carried through the northern most drainage ditch.

1.4 SCOPE

The scope of this report includes the certification of A5EF. This certification effort includes three certification units (CUs) and nine ASCOCs.

1.5 OBJECTIVES

The objectives of this Certification Report are to:

- Describe previously collected sampling and scanning data.
- Describe the analytical methods, data validation processes, data reduction and statistical processes used to support the certification process
- Present certification sampling results for the three CUs

- Present the statistical analysis showing that all six CUs have passed the certification criteria, including FRL attainment and hot spot criteria

- Describe access controls implemented to prevent recontamination.

1.6 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 to sampling and analysis used for certification
Section 3.0	Overview of Field Activities: Precertification scanning, certification sampling and changes to work scope
Section 4.0	Analytical Methodologies, Data Validation Processes, and Data Reduction
Section 5.0	Certification Evaluation and Conclusions
Section 6.0	Protection of Certified Areas
Appendix A	Certification Design for the Area 5 Eastern Field
Appendix B	Certification Samples, Results and Statistics Tables
Appendix C	Post-Certification Soil Excavation Plan

1.7 FEMP CERTIFICATION MASTER MAP

In order to track the status of certification at the FEMP, DOE will include a site map showing the status of the soil remediation areas and phased areas with all Certification Reports. This map is included in this Certification Report as Figure 1-2, and has been updated to reflect the status of A5EF.

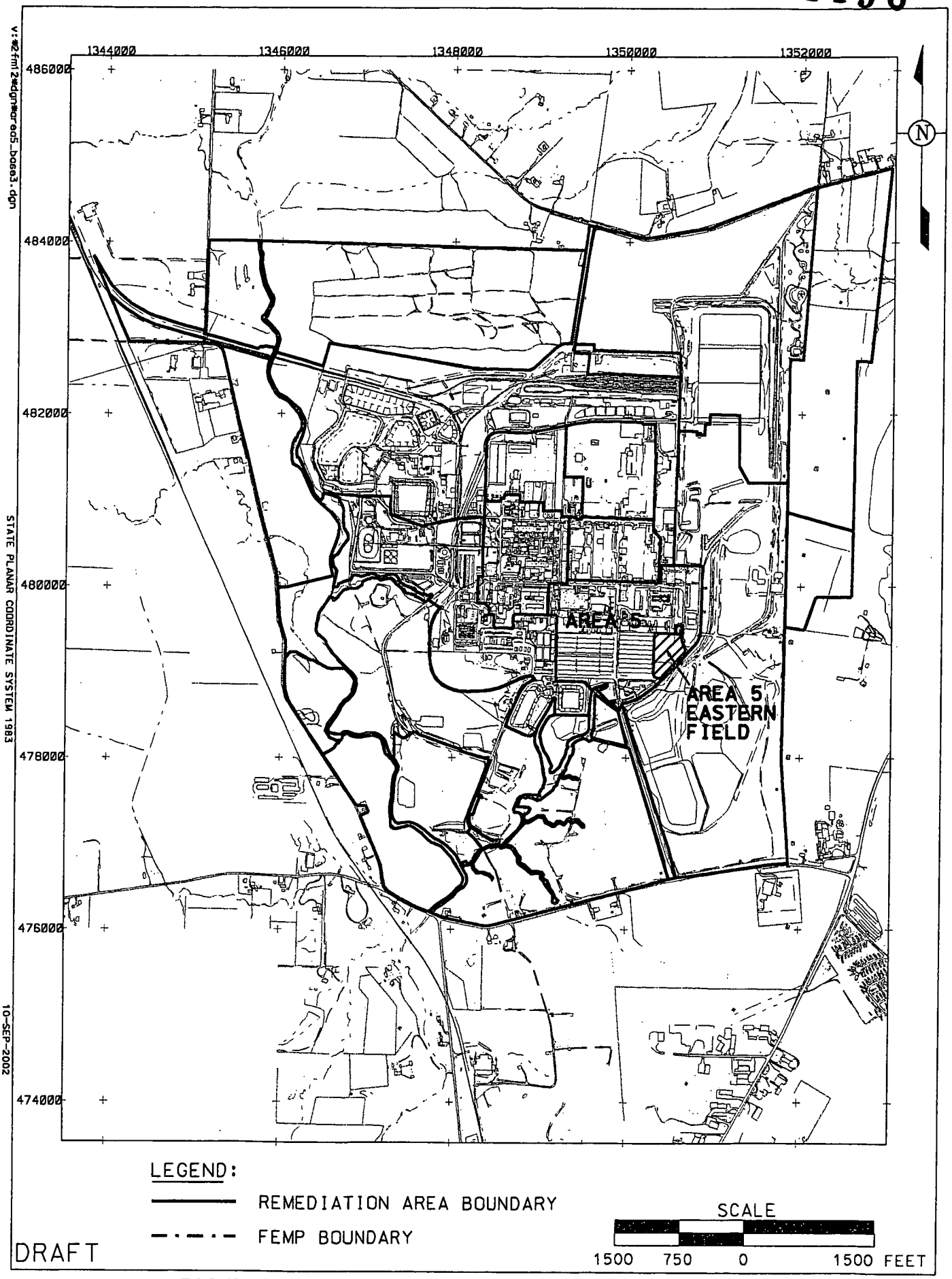
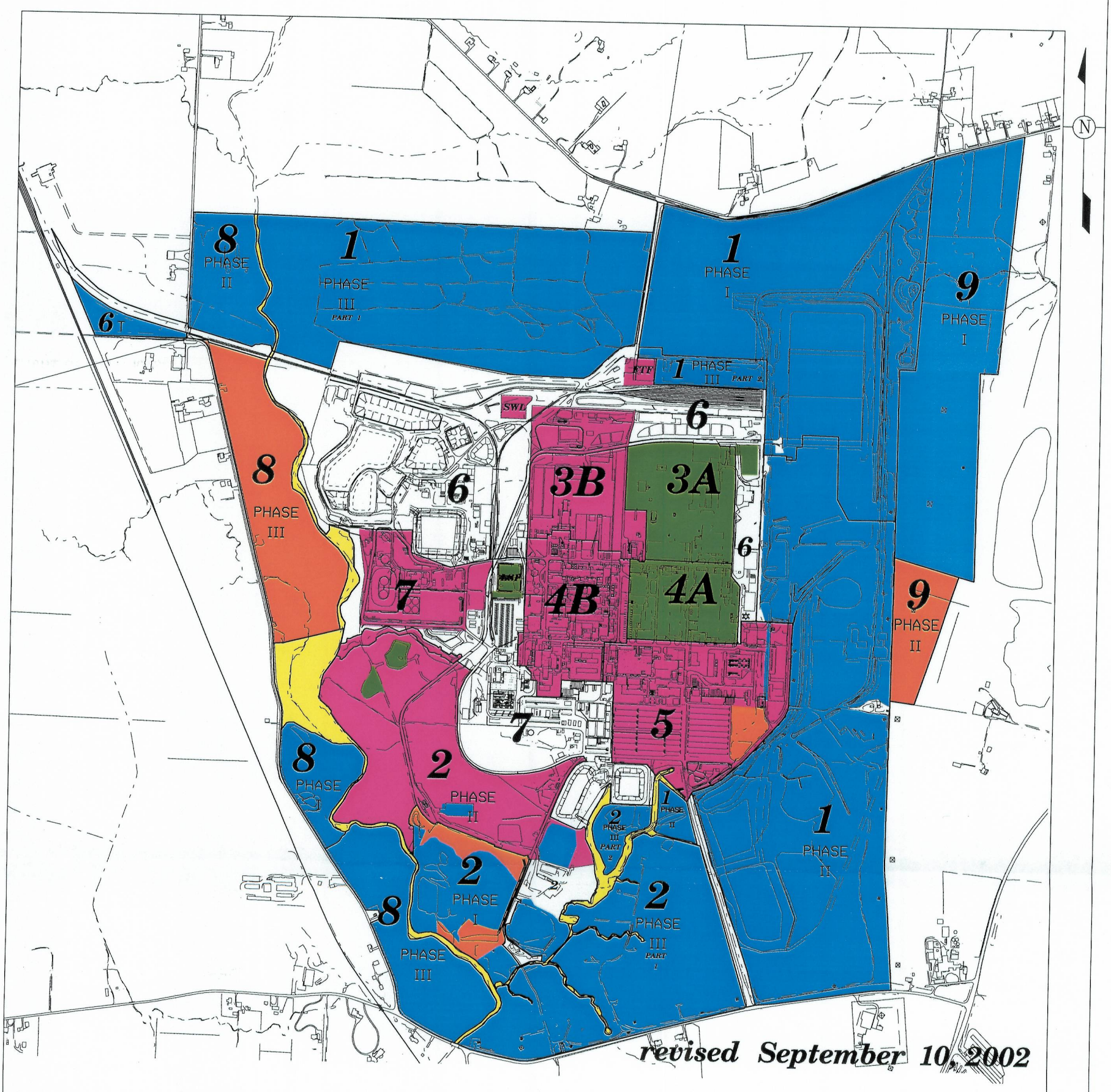


FIGURE 1-1. LOCATION OF THE A5EF AT THE FEMP



AREAS	TOTAL ACRES	APPROVED CERT. ACRES	CERT. ACRES IN PROGRESS	REMEDIATION ACRES IN PROGRESS	PREDESIGN ACRES IN PROGRESS	REMAINING ACRES
AREA 1	390.7	389.9	0	0	0	* 0.8
AREA 2	173.0	99.3	7.5	2.0	57.9	6.3
AREA 3A/4A	41.5	0	0	41.5	0	0
AREA 3B/4B	47.8	0	0	0	47.8	0
AREA 5	48.2	0	3.2	0	45.0	0
AREA 6	143.7	4.4	0	1.2	12.3	125.8
AREA 7	71.1	0	0	0	19.2	51.9
AREA 8	99.2	60.2	39	0	0	0
AREA 10	5.2	0	0	0	0	5.2
PR/SSOD/PPDD	*** 27.9	0	0	0	2.1	25.8
TOTAL ON SITE	1048.3	553.8	49.7	44.7	184.3	215.8
AREA 9	84.5	71.9	12.6	0	0	0
TOTAL OFF SITE	84.5	71.9	0	0	0	0

* AREA 1 REMAINING ACRES INCLUDES THE DISSOLVED OXYGEN FACILITY AREA. THE INTERIM LEACHATE LINE CORRIDOR IS INCLUDED IN AREA 6

*** PADDYS RUN/STORMSEWER OUTFALL DITCH CORRIDOR IS IDENTIFIED IN .

AIPI ROADS EXCLUDED FROM CERTIFICATION.

SCALE

1100 550 0 1100 FEET

FIGURE 1-2. FEMP CONTROLLED CERTIFICATION MAP

v:\6cj31\dgn\bmp\certmap3.dgn

STATE PLANAR COORDINATE SYSTEM 1983

20-SEP-2002

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2.0 CERTIFICATION APPROACH

2.1 CERTIFICATION STRATEGY

This section summarizes the ASCOC selection process and the certification approach, including CU establishment, sampling design, and statistical analysis. The general purpose of certification sampling is to verify that the mean concentrations or activities of primary ASCOCs remaining in the soil of a CU following remedial activities are less than the FRLs at the 95 percent upper confidence level (UCL), and at the 90 percent UCL for secondary ASCOCs. The certification process also includes the hot spot criterion, which states that if any of the certification results exceeds two-times the FRL, further action is required, as discussed in Section 3.4.5 of the SEP. If the mean residual ASCOC concentrations or activities are below the FRLs within the respective confidence bounds, and the hot spot criterion is met, then the remedial objectives have been achieved for the CU. It can then be released for final land use. The general certification strategy is described in Section 3.4 of the SEP, and the A5EF-specific strategy is described in Appendix A.

2.1.1 Selection of Area-Specific Constituents of Concern

The OU5 ROD lists 80 soil COCs with established FRLs. These COCs were retained for further investigation based on a screening process that considered the presence of the constituent in site soil and the potential risk to a receptor exposed to soil containing that contaminant. Many of the COCs with established FRLs have a limited distribution in site soil, or the presence of the COC is based on high contract required detection limits (CRDLs). When FRLs were established for these COCs in the OU5 ROD, they were initially screened against site data presented on spatial maps to establish a picture of potential remediation areas.

By reviewing existing remedial investigation data presented on spatial distribution maps, it was possible to reduce the sitewide list of soil COCs from the 80 listed in the OU5 ROD to 30. This reduction was possible because the majority of the COCs with FRLs listed in the OU5 ROD have no detections on site above their corresponding FRL, thus eliminating them from further consideration. The 30 remaining sitewide COCs account for over 99 percent of the combined risk to a site receptor model, and they comprise the list from which all of the remediation ASCOCs are drawn.

As stated in the SEP, the primary radiological COCs (i.e., total uranium, radium-226, radium-228, thorium-228, and thorium-232) will be retained sitewide as ASCOCs in each remediation area. The selection process for retaining secondary ASCOCs for a remediation area is driven by applying a set of decision criteria, as follows:

- It is listed as a soil COC in the OU5 ROD, and it is listed as an ASCOC in Table 2-7 of the SEP for the Remediation Area of interest
- Analytical results show that a contaminant is present above its FRL, and the above-FRL concentrations are not attributable to false positives or elevated CRDLs
- It can be traced to site use, either through process knowledge or known release of the constituent to the environment
- Physical characteristics of the contaminant, such as degradation rate and volatility, indicate it is likely to persist in the soil between time of release and remediation.

2.1.2 ASCOC Selection Process for A5EF

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary COCs, and will be retained as ASCOCs for this reason. The SEP identifies arsenic, beryllium, aroclor-1254, aroclor-1260 and dieldrin as the Area 5 ASCOCs. None of these ASCOCs have historically been analyzed in A5EF. As a conservative measure, all the SEP-listed secondary ASCOCs will be retained for the certification process with the exception of dieldrin, which is only identified as an A5 ASCOC due remedial investigation/feasibility study (RI/FS) detection levels above the FRL. Because there is no reason to suspect dieldrin (a pesticide) contamination in this unused portion of the site, there is no reason to retain it for certification. This is consistent with the handling of dieldrin during previous certification efforts. The selected A5EF ASCOCs are listed on Table 2-1 along with their applicable FRLs. Refer to Appendix A, Section A.5 for more discussion of the ASCOC selection for A5EF.

2.2 CERTIFICATION APPROACH

2.2.1 Certification Design

The certification design for A5EF follows the general approach outlined in Section 3.4 of the SEP. Approach E, as described in Section 4.5 of the SEP, will be used followed for A5EF since this area can be considered as "non-impacted". Due to the small size and the lack of ASCOC data, the smaller, more conservative, Group 1 CUs, which can be no larger than 62,500 square feet, have been located within A5EF.

Historical land uses, soil COC data, precertification data and topography are used to establish CU boundaries. However, A5EF is homogeneous in this regard:

- There were no significant production-related land uses,
- Only one historical physical sample was collected,
- The precertification data were collected relatively constant (see Appendix A), and
- The terrain of A5EF is relatively flat.

As a result, there was no strong driver for CU delineation, and the area was divided into CUs of approximate equal size. The three CUs are as follows:

- **CU A8PIIIS-01** has been established in the northern portion of A5EF
- **CU A8PIIIS-02** has been established in the central portion of A5EF
- **CU A8PIIIS-03** has been established in the southern portion of A5EF.

These CUs are shown in Figure 2-1.

2.2.2 Sample Selection Process

As previously discussed, the certification samples were selected in A5EF during the predesign phase (refer to the Project Specific Plan for Area 5 Predesign Investigation; DOE 2002). However, all aspects of sample selection were consistent with certification protocol as discussed in Section 3.4.2 of the SEP. 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 criterion for the CU. If the minimum distance was not achieved, an alternative random location was selected for that sub-CU, and all the locations were re-tested. This process was continued until all 16 random locations met the minimum distance criterion. All A5EF CUs and the selected certification sampling locations are shown in Figure 2-2.

2.2.3 Certification Sampling and Analysis

Each sample was collected from the 0 to 6-inch (surface) soil interval at the designated and surveyed location. Four of the 16 certification locations per CU (one per each quadrant of the CU) were randomly selected for as "archive" samples and were not collected. The other 12 locations were collected and submitted for analysis at General Engineering Laboratory, an off-site laboratory on Fluor Fernald's list of approved contract laboratories by SCQ-approved methods. Additional information regarding the

sample collection and analysis is provided in the Project Specific Plan (PSP) for Area 5 Predesign Investigation (DOE 2002a).

2.2.4 Statistical Analysis

The statistical analysis of certification samples is discussed in Appendix G of the SEP. Per Section G.2.3 of the SEP, statistical analysis of certification results is not necessary to determine if an ASCOC passed certification in a CU if all of the results for that ASCOC in that CU were below the FRL. If any sample result(s) exceeds the associated FRL, then statistical analyses will be performed and two criteria must be met for the CU to pass certification. If the data distribution is normal or lognormal, the first criterion is to compare the 95 percent UCL on the mean of each primary ASCOC to its FRL, resulting in the pass/fail decision on each individual CU. If the data distribution was not normal or lognormal, the appropriate nonparametric approach discussed in Appendix G of the SEP was used to evaluate the 95 percent UCL on the mean. The second criterion is related to the hot spot criterion, which states that if a certification sample for a primary radiological ASCOC exceeds two-times the FRL, then further action is necessary per Section 3.4.5 and Figure 3-11 of the SEP. When the given UCL on the mean for each COC is less than its FRL and the hot spot criterion is met, the CU will be considered certified.

TABLE 2-1
ASCOC LIST FOR ALL A5EF CERTIFICATION UNITS

ASCOC	FRL	Reason Retained
Total Uranium	82 mg/kg	Retained as a primary ASCOC sitewide
Radium-226	1.7 pCi/g	Retained as a primary ASCOC sitewide
Radium-228	1.8 pCi/g	Retained as a primary ASCOC sitewide
Thorium-228	1.7 pCi/g	Retained as a primary ASCOC sitewide
Thorium-232	1.5 pCi/g	Retained as a primary ASCOC sitewide
Arsenic	12 mg/kg	Area 5 Secondary ASCOC per SEP Identified in similar remediation areas
Beryllium	1.5 mg/kg	Area 5 Secondary ASCOC per SEP Identified in similar remediation areas
Aroclor-1254	0.13 mg/kg	Area 5 Secondary ASCOC per SEP
Aroclor-1260	0.13 mg/kg	Area 5 Secondary ASCOC per SEP

mg/kg – milligrams per kilogram
pCi/g – picoCuries per gram

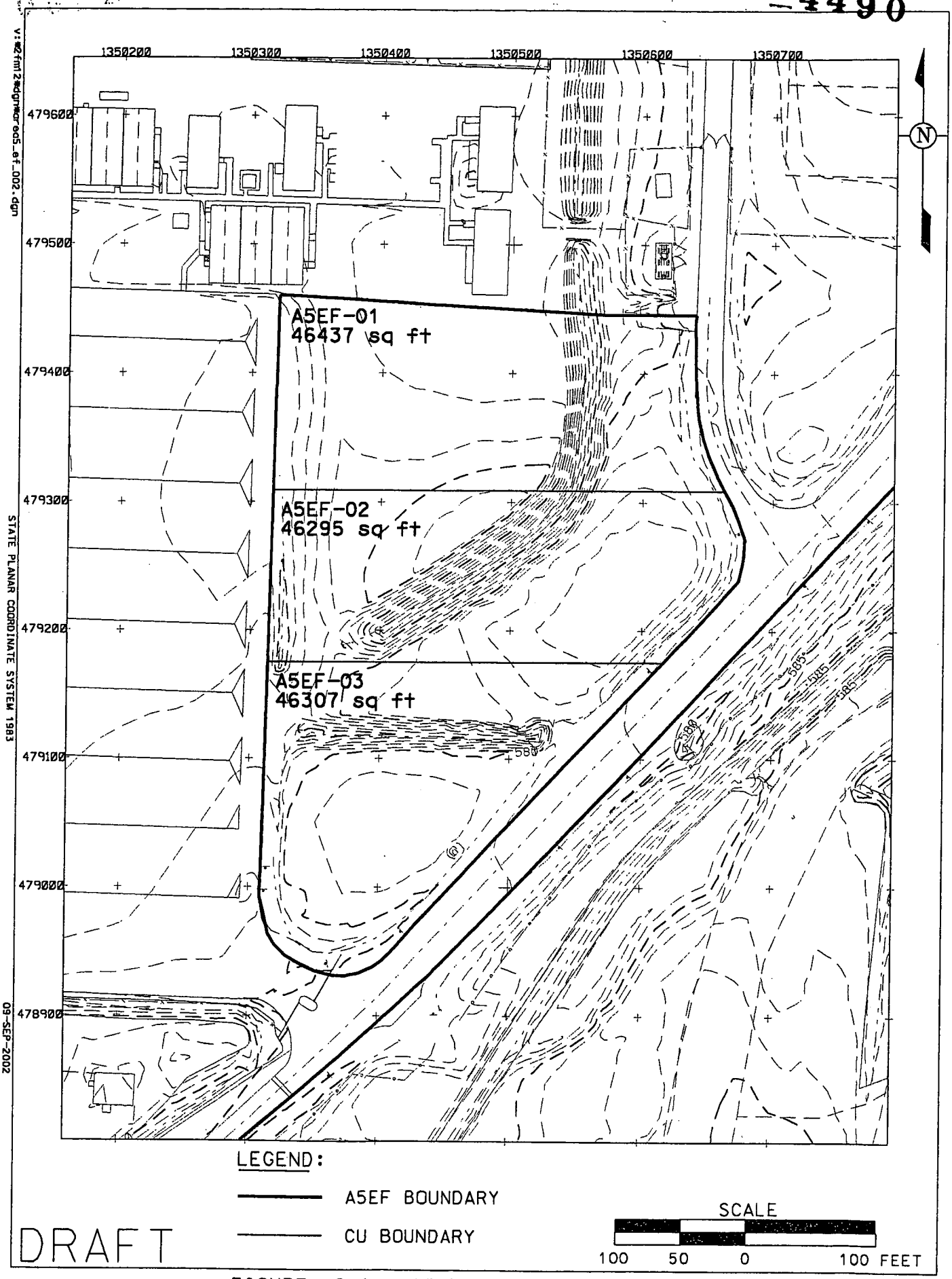

FIGURE 2-1. A5EF CERTIFICATION UNITS

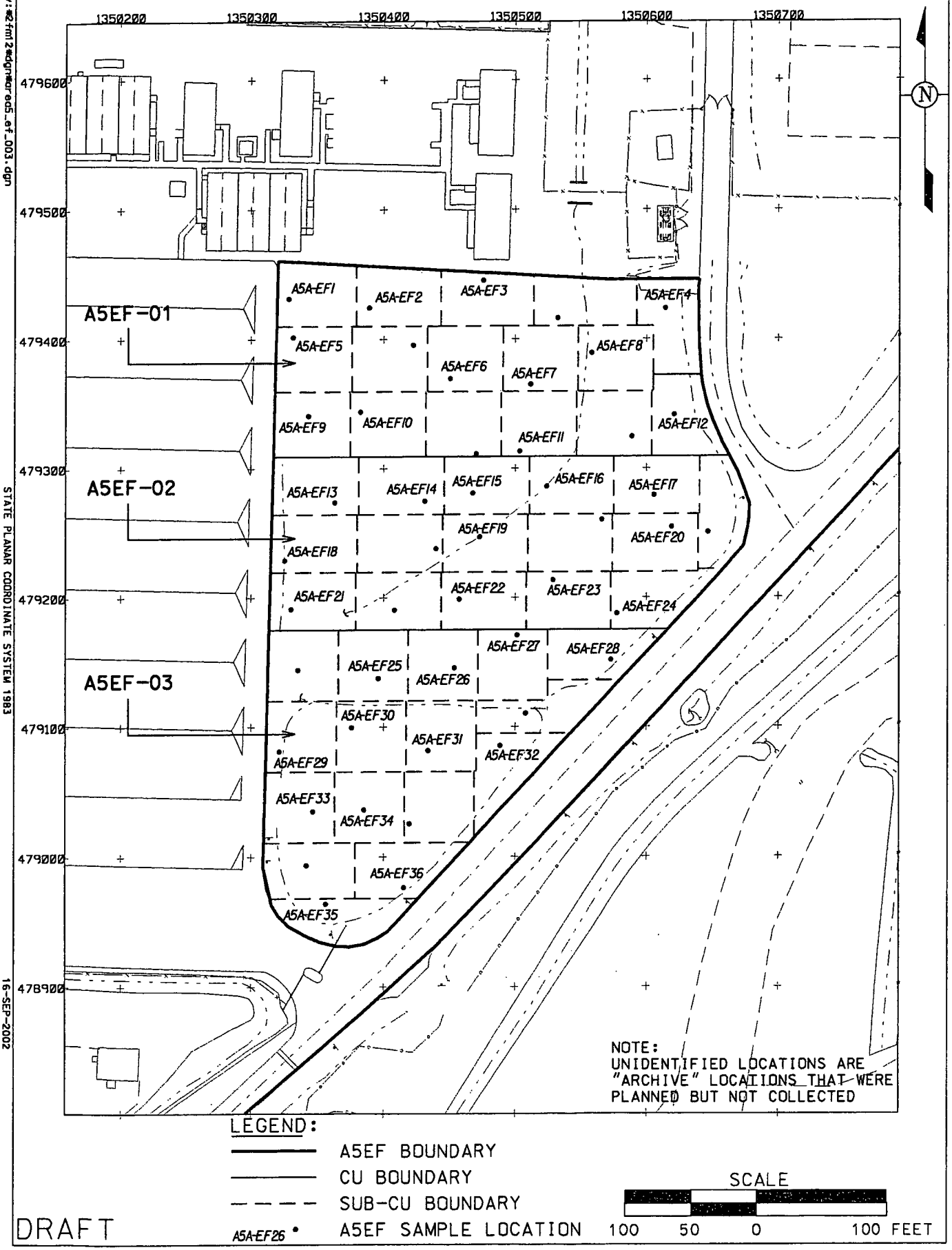

FIGURE 2-2. A5EF CERTIFICATION SAMPLE LOCATIONS

3.0 OVERVIEW OF FIELD ACTIVITIES

3.1 DATA EVALUATION AND PRECERTIFICATION

Based on historical land use (or lack thereof) in the A5EF, along with results of the real-time scan, no soil remediation activities were required prior to certification sampling. The historical data from this part of the FEMP include only one sample that was analyzed only for radiological COCs, and all results are well below the respective FRLs. These results are included in Appendix A, Section A.2.

A comprehensive scan of A5EF was conducted using the Radiation Tracking System (RTRAK), the Radiation Scanning System (RSS) and/or the high-purity germanium (HPGe) detectors. During Phase 1 of precertification, the mobile sodium iodide (NaI) detectors (RTRAK and RSS) were used to scan as much of this land as possible. Typically, the HPGe detector is used to scan areas that are inaccessible to the mobile NaI equipment. However, the vegetated banks of the two drainage ditches in this area were too steep to safely scan with any of the real-time detectors, and therefore, were omitted.

Data collected during this scan were displayed for total gamma activity (as counts per second), total uranium, radium-226, and thorium-232. Overall, results showed fairly constant gamma activity and COC concentrations throughout A5EF. During Phase 2 of precertification, a HPGe reading was obtained at the highest mobile NaI total uranium reading. The reading showed total uranium, thorium-232, and radium-226 results to be below their respective FRLs. Mapped results of this precertification scan are provided in Appendix A.

3.1.1 Deep Borings Collected During the Predesign Investigation

Because the northern-most drainage ditch has carried potentially impacted drainage originating from the eastern edge of the Former Production Area, three deep borings were conducted to determine if there is any soil contamination at depth. The western edge of this ditch near where it enters the culvert represents the most ideal location for this since some pooling of storm water occurs in this area, thus representing the most likely point for subsurface impacts. The three deep boring (locations A5A-EF101, EF102 and EF103) were located in a biased manner along the western end of the northern-most drainage ditch, as shown on Figure 3-1. Samples were collected every 3 feet to the planned bottom depth of the OSDF Sediment Basin #2. All samples showed total uranium results well below the FRL, with a maximum total

uranium result of 10.2 mg/kg (location A5A-EF103; depth of 2.5 to 3 feet). Since impacts were minimal, plans continued for certification of this area and construction of the sediment basin.

3.2 CHANGES TO SCOPE OF WORK

The scope of work for the collection of the certification samples took place as documented in Section 2.1.2 of the A5 Predesign Investigation PSP and there were no significant changes during field implementation. All final certification sampling locations and CU boundaries remain as identified during the design, and all analyses were carried out as planned. There was one minor change from the initial draft PSP. In response to an Ohio Environmental Protection Agency (OEPA) comment, two planned sampling locations immediately adjacent to the northern drainage ditch (A5A-EF16 and -EF19) were moved to and collected from the base of the drainage ditch. This was in an effort to determine any impacts resulting from potentially impacted drainage being carried in this ditch. These moves did not cross CU or sub-CU boundaries and the locations still meet the minimum distance criteria. These final sample locations are identified in Revision 0 of the PSP.

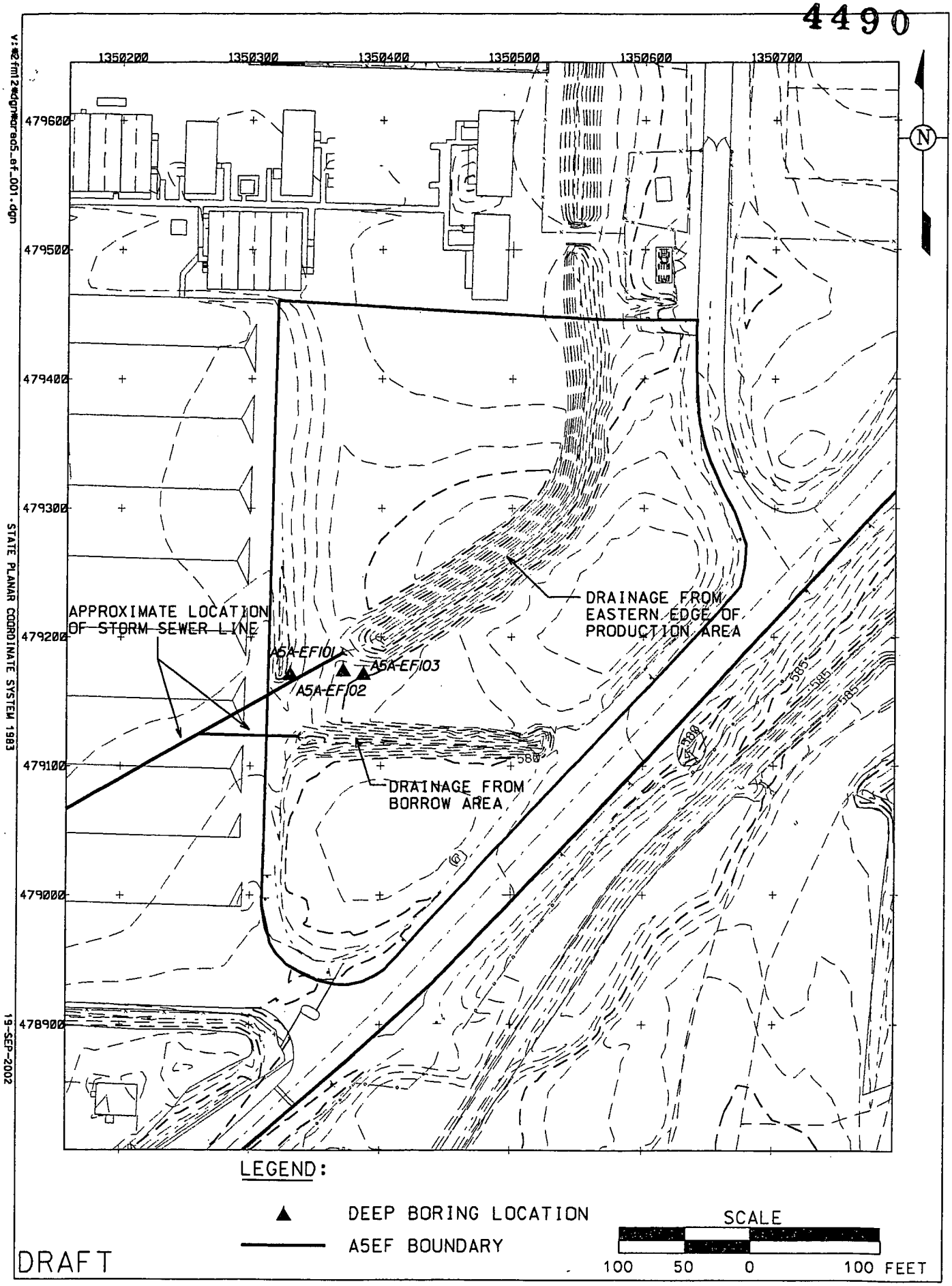

FIGURE 3-1. DEEP BORINGS IN A5EF TO INVESTIGATE SUBSURFACE CONDITIONS

4.0 ANALYTICAL METHODOLOGIES, DATA VALIDATION PROCESSES AND DATA REDUCTION

4.1 ANALYTICAL METHODOLOGIES

The samples for A5EF were analyzed at an approved contract (off-site) laboratory. All laboratories on the list of approved contract laboratories meet the requirements of the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ). The SCQ is the source for analytical methodologies (Appendix G), data validation and verification, and analytical and field quality assurance/quality control (QA/QC) requirements.

For all the certification data, laboratory analysis met all requirements for Analytical Support Level (ASL) D. Because a lower level of detection (10 percent of the FRL) was used for all five target analytes, these analyses are classified as ASL E, though all ASL D analytical requirements were achieved per Appendix G of the SCQ. Also, the on-site laboratory prepared an ASL D data package, which included sample results with associated QA/QC data and all applicable raw data. Certification analytical results are provided in Appendix B, and a summary of the analytical methods follows.

4.1.1 Radiochemical Methods

The radiochemical analytical methods depended on the specific nuclides of interest. Performance-based specification criteria included highest allowable minimum detectable concentration (HAMDC), percent overall tracer/chemical recovery, percent matrix spike recovery, method blank concentration, percent recovery of laboratory control sample, and percent recovery for duplicate samples were specified for each analyte. Laboratories were required to meet these specifications using the methodologies described below.

Total Uranium

Samples were analyzed for uranium-238 using gamma spectrometry, and the results were used to calculate the total uranium value. The calculation used was as follows:

$$\text{Total uranium (mg/kg)} = (2.998544) \times \text{uranium-238 gamma spectrometry result (pCi/g)}$$

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

Radium-226

Samples were analyzed by gamma spectrometry, and radium-226 was quantified by measuring gamma rays emitted by members of its decay chain. This method does not require chemical separation, but the samples must be allowed a 20-day progeny in-growth period before counting. The off-site laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all A5EF certification results.

Radium-228

Following gamma spectrometry analysis, radium-228 was quantified by measuring gamma rays emitted by members of its decay chain. The on-site laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all A5EF certification results.

Isotopic Thorium

Isotopic thorium was also quantified by gamma spectrometry. The contract laboratory used the same gamma ray emission lines and error weighted average methodology to calculate all A5EF thorium-228 and thorium-232 certification results.

4.1.2 Chemical Methods

Metals

Both beryllium and arsenic were analyzed by Method 6020 Inductively Coupled Plasma/Mass Spectrometry.

PCBs

Both aroclor-1254 and aroclor-1260 were analyzed by Method 8082A Gas Chromatography.

4.2 DATA VERIFICATION AND VALIDATION

This section discusses the data verification and validation (V&V) process used to examine the quality of field and laboratory results. Data were qualified to indicate the level of data usability, or level of confidence in the reported analytical results. The U.S. Environmental Protection Agency's (EPA's) National Functional Guidelines for Data Review (EPA 1994), as adapted and approved by EPA Region V, was used for this process.

Specific parameters associated with the data were evaluated during V&V to determine whether or not the data quality objectives were met. Five principal quality assurance parameters, i.e., precision, accuracy, completeness, comparability, and representativeness, were addressed during V&V. Field sampling and handling, laboratory analysis and reporting, and nonconformances and discrepancies in the data were examined to ensure compliance with appropriate and applicable procedures.

The V&V process evaluated the following parameters:

- Specific Field Forms for sample collection and handling
- Chain of Custody forms
- Completeness of Laboratory Data Deliverable.

The data validation process examined the data to determine the level of confidence of the results. General areas examined include the following:

- 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
- Laboratory control sample (LCS) recoveries and compliance with established limits.

Parameters unique to the evaluation of radiochemical analyses include:

- Calibration data for specific energies
- Background checks
- Relative Error ratios
- Tracer yields
- Detector efficiencies
- Background count correction.

For this project, all the radiological data were reviewed and validated for all criteria noted above. Per project requirements identified in the SEP, a minimum 10 percent of the certification data were validated to validation ASL D. This validation included the same review process as for ASL B, but included a systematic review of the raw data and recalculations. To meet this project requirement, all analytical data in one of the three releases from the A5EF certification effort were validated to ASL D.

Following V&V, qualifier codes were applied to specific data points, reflecting the level of confidence assigned to the 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 judgement of the interpretation of the supporting data, such as mass spectra. Caution must be exercised with the use of this data
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 identified one problem affecting the radium-228 results in the validated release. The reported sample specific results for radium-228 did not match the reported sample-specific results for thorium-232. These parameters are both quantified through gamma spectrometry as the weighted mean of specified gamma energy peak concentrations and uncertainties. This method of calculating gamma spectroscopy results for these analytes, and the selection of peaks to be used in these calculations is based on an assumption of near temporal and spatial equilibrium between the parent and progeny radionuclides in soil. Because thorium-232 and radium-228 are assumed to be in both temporal and spatial equilibrium with one another and consequently analytical results for these analytes are calculated using the same combination of gamma peaks. Under these assumptions, the thorium-232 and radium-228 results should be equal.

Upon review of the discrepant thorium-232 and radium-228 results, it was noted that the radium-228 results were calculated using a subset of the gamma peaks used to calculate the thorium-232 results. To

correct the erroneous values, all radium-228 results under this certification effort were replaced with the corresponding thorium-232 values. Consequently, all radium-228 results in A5EF were qualified with a J.

For all other ASCOCs, the validation identified no problems. The majority of the results received no qualification (a - qualifier). Several other ASCOO results received a J qualifier due to slightly elevated uncertainty, or a U qualifier when the result was reported at the minimum detectable concentration.

4.3 DATA REDUCTION

Each sample used to support the A5EF certification decision was entered in the FEMP Sitewide Environmental Database (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 based on location.

Laboratory Information

For each sample result the following information is entered:

- Laboratory Result - The reported analytical value from the laboratory
- Laboratory Qualifier - The qualifier reported from the lab. For radiological parameters non-detect values are assigned a U qualifier
- Total Propagated Uncertainty (TPU) - This value represents the uncertainty associated with the reported result. TPU includes the counting error, as well as uncertainty from other laboratory measurements and data reduction (applicable to radiological parameters only)
- Units - The units in which the Laboratory Result is reported.

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 associated minimum detectable concentration (MDC), the validation result becomes the MDC value
- 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 in which the Validation Result is reported.

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

1. All the data for each CU were queried from SED. All the data were used even if the CU had more than the minimum required data points (though this is not the case for any of the CUs under this scope)
2. The data from the validation fields were used for statistical calculations
3. Data with a qualifier of R or Z was not used in the statistical calculations
4. The highest of the two duplicate results was used in the statistical calculations
5. One half of the non-detect (U or UJ) values was used in the statistical calculations.

5.0 CERTIFICATION EVALUATION AND CONCLUSIONS

5.1 CERTIFICATION RESULTS AND EVALUATION

All CUs for A5EF passed the certification criteria. The determination of successful certification or certification failure was based on a review of certification sample data from each CU against criteria discussed in Section 2.2.4. All three CUs passed on the first round of certification. No additional corrective actions were necessary, and the archived samples did not need to be collected and analyzed. Final certification data are presented in Appendix B. Because only one result exceeded the FRL, no statistical analysis of the data was required except for this ASCOC (arsenic) in this CU (A5EF-02).

5.2 A5EF CERTIFICATION CONCLUSIONS

Based on the certification data, DOE has determined that the remedial objectives in the OU5 ROD have been achieved in A5EF. Therefore, upon EPA and OEPA concurrence, these portions the site will be released for construction of the OSDF Sediment Basin #2.

5.3 LESSONS LEARNED

All field and sampling activities for the certification of A5EF were completed without difficulty. There were no significant lessons learned from the certification process.

5.4 SCHEDULE

The following schedule shows key activities for the completion of the work required for the certification of A5EF.

Activity	Completion Date
Start of Certification Sampling	July 9, 2002
Complete Sampling Field Work	August 29, 2002
Complete Analytical Work	September 9, 2002
Complete Data Validation and Statistical Analysis	September 11, 2002
Submit Certification Report	September 19, 2002

[a] These dates are not OEPA commitments. Schedule is established in order to proceed with construction of the OSDF Sediment Basin #2. Refer to Appendix C for the construction Schedule.

6.0 PROTECTION OF CERTIFIED AREAS

DOE has restricted access to certified areas in order to maintain their integrity prior to transferal for final land use. FEMP Procedure EP-0008, Access to a Certified Area, has been developed to implement a process to protect certified areas.

The procedure is summarized as follows:

- Prior to the initiation of certification sampling activities for a remediation area, temporary fencing will be installed to delineate the perimeter of the "certified" area if existing fencing is not already present
- Signs indicating approval for entry into the "certified" area is required will be posted along the perimeter at all access points
- Personnel desiring admittance to a "certified area to conduct work will submit a written request to gain access, using Form FS-F-4878, to the Soil and Disposal Facility Project Compliance Section
- The purpose of the entry, including any proposed chemical applications such as pesticides or herbicides, must be described on the form
- Any equipment to be used within the "certified" area must be free of contamination. If the equipment is used off-road in an uncertified area, it must be washed and/or decontaminated per applicable requirements prior to entering a certified area
- Entry team members must be briefed on conditions for entry listed on the approved Form FS-F-4878.

Procedure EP-0008 will apply in A5EF and management practices will be used to prevent introduction of contamination into A5EF during construction of the OSDF Sediment Basin #2. More information on the construction of OSDF Sediment Basin #2 is provided in Appendix C.

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

APPENDIX A

CERTIFICATION DESIGN FOR THE AREA 5 EASTERN FIELD

APPENDIX A
CERTIFICATION DESIGN FOR THE AREA 5 EASTERN FIELD

A.1 AREA DESCRIPTION

The Area 5 Eastern Field (A5EF) is a 3.19-acre, open grassy field. It is located due east of the FEMP East Parking Lot, northwest/west of the North Access Road, and south of the Trailer 83. This area is rather flat, with the exception of two deep drainage ditches that cut through the center of this area and collect drainage from the eastern portions of the FEMP (refer to Figure 2-1). A review of historical aerial photographs reveals that there have been no uses for this part of the site, and a field inspection of the area confirms that there are no suspect areas or debris present. The A5EF has been identified as an ideal location for the OSDF Sediment Basin #2, and as a result, it will be certified in advance of other parts of A5. Because there is no mechanism for contamination (other than some airborne deposition), this area will be treated follow Excavation Approach E (see Section 4.5 of the SEP), and proceed directly to certification.

A.2 HISTORICAL DATA

During the RI/FS, only one soil boring (Zone 3-43) was collected in A5EF, from the surface (0 to 0.5 feet). The sample was analyzed for radiological constituents including all five primary radiological COCs. There were no results that exceeded the respective FRLs. Results of the five primary radiological COCs are as follows:

Boring	Parameter	Result	FRL	Unit
Zone 3-43	Radium-226	1.0	1.7	pCi/g
Zone 3-43	Radium-228	0.9	1.8	pCi/g
Zone 3-43	Thorium-228	0.8	1.7	pCi/g
Zone 3-43	Thorium-232	0.6	1.5	pCi/g
Zone 3-43	Uranium, Total	7.80	82	mg/kg

A.3 REAL-TIME SCAN DATA

The real-time scan of A5EF was performed in May 2002. The Phase 1 mobile NaI detector scan covered the entire area with the exception of the two steep, heavily vegetated stream banks, which were inaccessible to real-time equipment. Results revealed relatively homogeneous total gamma activity. Two isolated total uranium readings in the north-central portion of this area were above the three-times FRL "potential hot spot" limit. However, a Phase 2 HPGe detector reading at the location of the highest reading confirmed that the total uranium concentration (37.4 mg/kg) was well below the FRL. The

radium-226 and thorium-232 HPGe results were also below the FRL. The mapped, real-time results are provided as Figures A-1 through A-4.

A.4 CERTIFICATION UNITS

Although A5EF is being treated as a non-impacted area, Group 1 (250 foot by 250 foot) CUs are being established as an extra conservative measure given the lack of historical data. Because the area is fairly homogeneous with regard to features, historical uses, and real-time data, there is no defining factor for CU boundaries. Therefore, the boundaries have been established to divide the area as equally as possible. The three CUs are as follows:

- CU A5EF-01 (46,637 ft^2): Covers the northern portion of this area
- CU A5EF-02 (46,295 ft^2): Covers the central portion of this area
- CU A5EF-03 (46,307 ft^2): Covers the southern portion of this area.

Figure 2-1 shows these CU boundaries.

A.5 AREA SPECIFIC CONSTITUENTS OF CONCERN

The SEP identifies the five primary radiological constituents and five secondary constituents (arsenic, beryllium, aroclor-1254, aroclor-1260, and dieldrin) as Area 5 ASCOCs. While there is no clear mechanism for contamination, all of these ASCOCs will be retained for certification sampling in A5EF due to the lack of historical data, with the exception of dieldrin. Dieldrin was never detected during the RI/FS, however, the elevated minimum detection levels were above the FRL, and thus it was identified in the SEP as an A5 ASCOC. Because there is no reason for dieldrin (a pesticide) to be introduced to this unused portion of the site, there is no reason to retain it for certification. This is consistent with the handling of dieldrin during previous certification efforts in Remediation Areas where it was identified as an ASCOC. Finally, polycyclic aromatic hydrocarbons (PAHs) were also analyzed in Area 5 during predesign investigation due to their potential presence to determine if they should be added to the list of Area 5 ASCOCs. Because all PAH results were well below the respective FRLs, this was not the case.

A.6 CERTIFICATION APPROACH

The certification approach for the A5EF will be consistent with all certification protocol identified in the SEP. This includes all aspects of sampling, analysis, validation, and statistical evaluation. This information is detailed in the Certification Report. Following EPA and OEPA approval, DOE will proceed with construction of the OSDF Sediment Basin #2.

Figure A-1. Mobile NaI Detector Scan Total Activity Readings in A5EF

N

Total Gross Counts per Second
Field of View to Scale
HPGe DET#: 31265
NaI Batch#: RSS2- 284-285,303
Measurement Dates: 05/21/02 - 05/31/02

NaI TCPS	
0.00 to 3000.00	
3000.00 to 5000.00	
5000.00 to 15000.00	
15000.00 to 18000.00	
18000.00 to 99999.00	

HPGe shown for coverage only.

RTIMP DWG Title: A5_P1_FIG_A1_TC.srf
Project Name: A3A/4A Exc. Char (A5)
Project#: 20200-PSP-0009
Prepared By: Brian McDaniel/11058
Date Prepared: 09/10/02
Support Data: A5_P1_FIG_NaI.xls
A5_P2_FIG_HPGe_31cm.xls

Figure A-2. Real-Time Scan Total Uranium Results in A5EF

Moisture Corrected Total Uranium
Field of View to Scale
HPGe DET#: 31265
NaI Batch#: RSS2- 284-285,303
Measurement Dates: 05/21/02 - 05/31/02

NaI Total U (ppm)	HPGe @ 31cm Total U (ppm)
-214.00 to 246.00	0.00 to 164.00
246.00 to 721.00	164.00 to 928.00
721.00 to 9999.00	928.00 to 9999.00

RTIMP DWG Title: A5_P1_FIG_A2_TU.srf
Project Name: A3A/4A Exc. Char (A5)
Project#: 20200-PSP-0009
Prepared By: Brian McDaniel/11058
Date Prepared: 09/10/02
Support Data: A5_P1_FIG_NaI.xls
A5_P2_FIG_HPGe_31cm.xls

Figure A-3. Real-Time Scan Radium-226 Results in A5EF

Moisture Corrected Radium-226
Field of View to Scale
HPGe DET#: 31265
NaI Batch#: RSS2- 284-285,303
Measurement Dates: 05/21/02 - 05/31/02

NaI RA-226 (pCi/g)	
-2.17 to 5.10	
5.10 to 9999.00	

HPGe @ 31cm RA-226 (pCi/g)	
0.00 to 3.40	
3.40 to 9999.00	

RTIMP DWG Title: A5_P1_FIG_A3_RA.srf
Project Name: A3A/4A Exc. Char (A5)
Project#: 20200-PSP-0009
Prepared By: Brian McDaniel/11058
Date Prepared: 09/10/02
Support Data: A5_P1_FIG_NaI.xls
A5_P2_FIG_HPGe_31cm.xls

Figure A-4. Real-Time Scan Thorium-232 Results in A5EF

Moisture Corrected Thorium-232
Field of View to Scale
HPGe DET#: 31265
NaI Batch#: RSS2- 284-285,303
Measurement Dates: 05/21/02 - 05/31/02

NaI TH-232 (pCi/g)	
-0.09 to 4.50	
4.50 to 9999.00	

HPGe @ 31cm TH-232 (pCi/g)	
0.00 to 3.00	
3.00 to 9999.00	

RTIMP DWG Title: A5_P1_FIG_A4_TH.srf
Project Name: A3A/4A Exc. Char (A5)
Project#: 20200-PSP-0009
Prepared By: Brian McDaniel/11058
Date Prepared: 09/10/02
Support Data: A5_P1_FIG_NaI.xls
A5_P2_FIG_HPGe_31cm.xls

APPENDIX B

CERTIFICATION SAMPLES, ANALYTICAL RESULTS AND STATISTICS TABLES

TABLE B-1
A5EF CERTIFICATION RESULTS

CU	Sample ID	Easting '83	Northing '83	Parameter	FRL	Result	Qual.	Units
A5EF-01	A5A-EF1-1-RMP	1350328.85	479431.26	Aroclor-1254	0.13	0.0143	NV	mg/kg
A5EF-01	A5A-EF1-1-RMP	1350328.85	479431.26	Aroclor-1260	0.13	0.0143	NV	mg/kg
A5EF-01	A5A-EF1-1-RMP	1350328.85	479431.26	Arsenic	12	7.42	NV	mg/kg
A5EF-01	A5A-EF1-1-RMP	1350328.85	479431.26	Beryllium	1.5	0.792	NV	mg/kg
A5EF-01	A5A-EF1-1-RMP	1350328.85	479431.26	Radium-226	1.7	1.15	NV	pCi/g
A5EF-01	A5A-EF1-1-RMP	1350328.85	479431.26	Radium-228	1.8	0.942	NV	pCi/g
A5EF-01	A5A-EF1-1-RMP	1350328.85	479431.26	Thorium-228	1.7	0.95	NV	pCi/g
A5EF-01	A5A-EF1-1-RMP	1350328.85	479431.26	Thorium-232	1.5	0.942	NV	pCi/g
A5EF-01	A5A-EF1-1-RMP	1350328.85	479431.26	Uranium, Total	82	17.8	NV	mg/kg
A5EF-01	A5A-EF2-1-RMP	1350389.6	479424.28	Aroclor-1254	0.13	0.0108	NV	mg/kg
A5EF-01	A5A-EF2-1-RMP	1350389.6	479424.28	Aroclor-1260	0.13	0.0143	NV	mg/kg
A5EF-01	A5A-EF2-1-RMP	1350389.6	479424.28	Arsenic	12	7.79	NV	mg/kg
A5EF-01	A5A-EF2-1-RMP	1350389.6	479424.28	Beryllium	1.5	0.762	NV	mg/kg
A5EF-01	A5A-EF2-1-RMP	1350389.6	479424.28	Radium-226	1.7	1.26	NV	pCi/g
A5EF-01	A5A-EF2-1-RMP	1350389.6	479424.28	Radium-228	1.8	1.27	NV	pCi/g
A5EF-01	A5A-EF2-1-RMP	1350389.6	479424.28	Thorium-228	1.7	1.44	NV	pCi/g
A5EF-01	A5A-EF2-1-RMP	1350389.6	479424.28	Thorium-232	1.5	1.27	NV	pCi/g
A5EF-01	A5A-EF2-1-RMP	1350389.6	479424.28	Uranium, Total	82	26.6	NV	mg/kg
A5EF-01	A5A-EF3-1-RMP	1350475.91	479445.23	Aroclor-1254	0.13	0.0045	NV	mg/kg
A5EF-01	A5A-EF3-1-RMP	1350475.91	479445.23	Aroclor-1260	0.13	0.0142	NV	mg/kg
A5EF-01	A5A-EF3-1-RMP	1350475.91	479445.23	Arsenic	12	8.75	NV	mg/kg
A5EF-01	A5A-EF3-1-RMP	1350475.91	479445.23	Beryllium	1.5	0.754	NV	mg/kg
A5EF-01	A5A-EF3-1-RMP	1350475.91	479445.23	Radium-226	1.7	1.32	NV	pCi/g
A5EF-01	A5A-EF3-1-RMP	1350475.91	479445.23	Radium-228	1.8	1.1	NV	pCi/g
A5EF-01	A5A-EF3-1-RMP	1350475.91	479445.23	Thorium-228	1.7	1.14	NV	pCi/g
A5EF-01	A5A-EF3-1-RMP	1350475.91	479445.23	Thorium-232	1.5	1.1	NV	pCi/g
A5EF-01	A5A-EF3-1-RMP	1350475.91	479445.23	Uranium, Total	82	14.6	NV	mg/kg
A5EF-01	A5A-EF4-1-RMP	1350614.29	479423.53	Aroclor-1254	0.13	0.0139	U	mg/kg
A5EF-01	A5A-EF4-1-RMP	1350614.29	479423.53	Aroclor-1260	0.13	0.0139	U	mg/kg
A5EF-01	A5A-EF4-1-RMP	1350614.29	479423.53	Arsenic	12	7.83	J	mg/kg
A5EF-01	A5A-EF4-1-RMP	1350614.29	479423.53	Beryllium	1.5	0.688	J	mg/kg
A5EF-01	A5A-EF4-1-RMP	1350614.29	479423.53	Radium-226	1.7	1.13	-	pCi/g
A5EF-01	A5A-EF4-1-RMP	1350614.29	479423.53	Radium-228	1.8	0.963	-	pCi/g
A5EF-01	A5A-EF4-1-RMP	1350614.29	479423.53	Thorium-228	1.7	0.956	-	pCi/g
A5EF-01	A5A-EF4-1-RMP	1350614.29	479423.53	Thorium-232	1.5	0.963	-	pCi/g
A5EF-01	A5A-EF4-1-RMP	1350614.29	479423.53	Uranium, Total	82	6.74	-	mg/kg
A5EF-01	A5A-EF5-1-RMP	1350332.06	479401.47	Aroclor-1254	0.13	0.0149	NV	mg/kg
A5EF-01	A5A-EF5-1-RMP	1350332.06	479401.47	Aroclor-1260	0.13	0.0149	NV	mg/kg
A5EF-01	A5A-EF5-1-RMP	1350332.06	479401.47	Arsenic	12	7.63	NV	mg/kg
A5EF-01	A5A-EF5-1-RMP	1350332.06	479401.47	Beryllium	1.5	0.898	NV	mg/kg
A5EF-01	A5A-EF5-1-RMP	1350332.06	479401.47	Radium-226	1.7	1.19	NV	pCi/g
A5EF-01	A5A-EF5-1-RMP	1350332.06	479401.47	Radium-228	1.8	1.07	NV	pCi/g

TABLE B-1
A5EF CERTIFICATION RESULTS

CU	Sample ID	Easting '83	Northing '83	Parameter	FRL	Result	Qual.	Units
A5EF-01	A5A-EF5-1-RMP	1350332.06	479401.47	Thorium-228	1.7	1.1	NV	pCi/g
A5EF-01	A5A-EF5-1-RMP	1350332.06	479401.47	Thorium-232	1.5	1.07	NV	pCi/g
A5EF-01	A5A-EF5-1-RMP	1350332.06	479401.47	Uranium, Total	82	10.2	NV	mg/kg
A5EF-01	A5A-EF6-1-RMP	1350450.58	479369.27	Aroclor-1254	0.13	0.0073	NV	mg/kg
A5EF-01	A5A-EF6-1-RMP	1350450.58	479369.27	Aroclor-1260	0.13	0.0148	NV	mg/kg
A5EF-01	A5A-EF6-1-RMP	1350450.58	479369.27	Arsenic	12	6.56	NV	mg/kg
A5EF-01	A5A-EF6-1-RMP	1350450.58	479369.27	Beryllium	1.5	0.692	NV	mg/kg
A5EF-01	A5A-EF6-1-RMP	1350450.58	479369.27	Radium-226	1.7	1.18	NV	pCi/g
A5EF-01	A5A-EF6-1-RMP	1350450.58	479369.27	Radium-228	1.8	1.09	NV	pCi/g
A5EF-01	A5A-EF6-1-RMP	1350450.58	479369.27	Thorium-228	1.7	1.09	NV	pCi/g
A5EF-01	A5A-EF6-1-RMP	1350450.58	479369.27	Thorium-232	1.5	1.09	NV	pCi/g
A5EF-01	A5A-EF6-1-RMP	1350450.58	479369.27	Uranium, Total	82	28.6	NV	mg/kg
A5EF-01	A5A-EF7-1-RMP	1350511.67	479364.8	Aroclor-1254	0.13	0.0073	NV	mg/kg
A5EF-01	A5A-EF7-1-RMP	1350511.67	479364.8	Aroclor-1260	0.13	0.0153	NV	mg/kg
A5EF-01	A5A-EF7-1-RMP	1350511.67	479364.8	Arsenic	12	5.54	NV	mg/kg
A5EF-01	A5A-EF7-1-RMP	1350511.67	479364.8	Beryllium	1.5	0.657	NV	mg/kg
A5EF-01	A5A-EF7-1-RMP	1350511.67	479364.8	Radium-226	1.7	1.24	NV	pCi/g
A5EF-01	A5A-EF7-1-RMP	1350511.67	479364.8	Radium-228	1.8	1.06	NV	pCi/g
A5EF-01	A5A-EF7-1-RMP	1350511.67	479364.8	Thorium-228	1.7	1.06	NV	pCi/g
A5EF-01	A5A-EF7-1-RMP	1350511.67	479364.8	Thorium-232	1.5	1.06	NV	pCi/g
A5EF-01	A5A-EF7-1-RMP	1350511.67	479364.8	Uranium, Total	82	33.3	NV	mg/kg
A5EF-01	A5A-EF8-1-RMP	1350558.42	479389.11	Aroclor-1254	0.13	0.0056	J	mg/kg
A5EF-01	A5A-EF8-1-RMP	1350558.42	479389.11	Aroclor-1260	0.13	0.0155	U	mg/kg
A5EF-01	A5A-EF8-1-RMP	1350558.42	479389.11	Arsenic	12	8.39	J	mg/kg
A5EF-01	A5A-EF8-1-RMP	1350558.42	479389.11	Beryllium	1.5	1.07	J	mg/kg
A5EF-01	A5A-EF8-1-RMP	1350558.42	479389.11	Radium-226	1.7	1.15	-	pCi/g
A5EF-01	A5A-EF8-1-RMP	1350558.42	479389.11	Radium-228	1.8	1.01	-	pCi/g
A5EF-01	A5A-EF8-1-RMP	1350558.42	479389.11	Thorium-228	1.7	1.03	-	pCi/g
A5EF-01	A5A-EF8-1-RMP	1350558.42	479389.11	Thorium-232	1.5	1.01	-	pCi/g
A5EF-01	A5A-EF8-1-RMP	1350558.42	479389.11	Uranium, Total	82	9.18	-	mg/kg
A5EF-01	A5A-EF9-1-RMP	1350343.66	479340.45	Aroclor-1254	0.13	0.0152	NV	mg/kg
A5EF-01	A5A-EF9-1-RMP	1350343.66	479340.45	Aroclor-1260	0.13	0.0152	NV	mg/kg
A5EF-01	A5A-EF9-1-RMP	1350343.66	479340.45	Arsenic	12	5.54	NV	mg/kg
A5EF-01	A5A-EF9-1-RMP	1350343.66	479340.45	Beryllium	1.5	0.892	NV	mg/kg
A5EF-01	A5A-EF9-1-RMP	1350343.66	479340.45	Radium-226	1.7	1.37	NV	pCi/g
A5EF-01	A5A-EF9-1-RMP	1350343.66	479340.45	Radium-228	1.8	1.13	NV	pCi/g
A5EF-01	A5A-EF9-1-RMP	1350343.66	479340.45	Thorium-228	1.7	1.13	NV	pCi/g
A5EF-01	A5A-EF9-1-RMP	1350343.66	479340.45	Thorium-232	1.5	1.13	NV	pCi/g
A5EF-01	A5A-EF9-1-RMP	1350343.66	479340.45	Uranium, Total	82	12.5	NV	mg/kg
A5EF-01	A5A-EF10-1-RMP	1350382.7	479343.68	Aroclor-1254	0.13	0.0113	NV	mg/kg
A5EF-01	A5A-EF10-1-RMP	1350382.7	479343.68	Aroclor-1260	0.13	0.0145	NV	mg/kg
A5EF-01	A5A-EF10-1-RMP	1350382.7	479343.68	Arsenic	12	7.1	NV	mg/kg

TABLE B-1
A5EF CERTIFICATION RESULTS

CU	Sample ID	Easting '83	Northing '83	Parameter	FRL	Result	Qual.	Units
A5EF-01	A5A-EF10-1-RMP	1350382.7	479343.68	Beryllium	1.5	0.818	NV	mg/kg
A5EF-01	A5A-EF10-1-RMP	1350382.7	479343.68	Radium-226	1.7	1.33	NV	pCi/g
A5EF-01	A5A-EF10-1-RMP	1350382.7	479343.68	Radium-228	1.8	1.1	NV	pCi/g
A5EF-01	A5A-EF10-1-RMP	1350382.7	479343.68	Thorium-228	1.7	1.1	NV	pCi/g
A5EF-01	A5A-EF10-1-RMP	1350382.7	479343.68	Thorium-232	1.5	1.1	NV	pCi/g
A5EF-01	A5A-EF10-1-RMP	1350382.7	479343.68	Uranium, Total	82	42	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP	1350503.63	479313.02	Aroclor-1254	0.13	0.0065	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP-D	1350503.63	479313.02	Aroclor-1254	0.13	0.0061	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP	1350503.63	479313.02	Aroclor-1260	0.13	0.0149	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP-D	1350503.63	479313.02	Aroclor-1260	0.13	0.0149	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP	1350503.63	479313.02	Arsenic	12	7.13	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP-D	1350503.63	479313.02	Arsenic	12	5.88	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP	1350503.63	479313.02	Beryllium	1.5	0.703	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP-D	1350503.63	479313.02	Beryllium	1.5	0.597	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP	1350503.63	479313.02	Radium-226	1.7	1.2	NV	pCi/g
A5EF-01	A5A-EF11-1-RMP-D	1350503.63	479313.02	Radium-226	1.7	1.17	NV	pCi/g
A5EF-01	A5A-EF11-1-RMP	1350503.63	479313.02	Radium-228	1.8	1.07	NV	pCi/g
A5EF-01	A5A-EF11-1-RMP-D	1350503.63	479313.02	Radium-228	1.8	1.01	NV	pCi/g
A5EF-01	A5A-EF11-1-RMP	1350503.63	479313.02	Thorium-228	1.7	1.06	NV	pCi/g
A5EF-01	A5A-EF11-1-RMP-D	1350503.63	479313.02	Thorium-228	1.7	0.99	NV	pCi/g
A5EF-01	A5A-EF11-1-RMP	1350503.63	479313.02	Thorium-232	1.5	1.07	NV	pCi/g
A5EF-01	A5A-EF11-1-RMP-D	1350503.63	479313.02	Thorium-232	1.5	1.01	NV	pCi/g
A5EF-01	A5A-EF11-1-RMP-D	1350503.63	479313.02	Uranium, Total	82	28.1	NV	mg/kg
A5EF-01	A5A-EF11-1-RMP	1350503.63	479313.02	Uranium, Total	82	24.7	NV	mg/kg
A5EF-01	A5A-EF12-1-RMP	1350621.12	479341.06	Aroclor-1254	0.13	0.0141	U	mg/kg
A5EF-01	A5A-EF12-1-RMP	1350621.12	479341.06	Aroclor-1260	0.13	0.0141	U	mg/kg
A5EF-01	A5A-EF12-1-RMP	1350621.12	479341.06	Arsenic	12	8.33	J	mg/kg
A5EF-01	A5A-EF12-1-RMP	1350621.12	479341.06	Beryllium	1.5	0.691	J	mg/kg
A5EF-01	A5A-EF12-1-RMP	1350621.12	479341.06	Radium-226	1.7	1.16	-	pCi/g
A5EF-01	A5A-EF12-1-RMP	1350621.12	479341.06	Radium-228	1.8	0.941	-	pCi/g
A5EF-01	A5A-EF12-1-RMP	1350621.12	479341.06	Thorium-228	1.7	0.925	-	pCi/g
A5EF-01	A5A-EF12-1-RMP	1350621.12	479341.06	Thorium-232	1.5	0.941	-	pCi/g
A5EF-01	A5A-EF12-1-RMP	1350621.12	479341.06	Uranium, Total	82	7.31	-	mg/kg
A5EF-02	A5A-EF13-1-RMP	1350363.29	479273.52	Aroclor-1254	0.13	0.0145	NV	mg/kg
A5EF-02	A5A-EF13-1-RMP	1350363.29	479273.52	Aroclor-1260	0.13	0.0145	NV	mg/kg
A5EF-02	A5A-EF13-1-RMP	1350363.29	479273.52	Arsenic	12	6.89	NV	mg/kg
A5EF-02	A5A-EF13-1-RMP	1350363.29	479273.52	Beryllium	1.5	0.725	NV	mg/kg
A5EF-02	A5A-EF13-1-RMP	1350363.29	479273.52	Radium-226	1.7	0.975	NV	pCi/g
A5EF-02	A5A-EF13-1-RMP	1350363.29	479273.52	Radium-228	1.8	0.968	NV	pCi/g
A5EF-02	A5A-EF13-1-RMP	1350363.29	479273.52	Thorium-228	1.7	0.965	NV	pCi/g
A5EF-02	A5A-EF13-1-RMP	1350363.29	479273.52	Thorium-232	1.5	0.968	NV	pCi/g
A5EF-02	A5A-EF13-1-RMP	1350363.29	479273.52	Uranium, Total	82	11.2	NV	mg/kg

TABLE B-1
A5EF CERTIFICATION RESULTS

CU	Sample ID	Easting '83	Northing '83	Parameter	FRL	Result	Qual.	Units
A5EF-02	A5A-EF14-1-RMP	1350431.5	479274.57	Aroclor-1254	0.13	0.0052	NV	mg/kg
A5EF-02	A5A-EF14-1-RMP	1350431.5	479274.57	Aroclor-1260	0.13	0.0143	NV	mg/kg
A5EF-02	A5A-EF14-1-RMP	1350431.5	479274.57	Arsenic	12	6.77	NV	mg/kg
A5EF-02	A5A-EF14-1-RMP	1350431.5	479274.57	Beryllium	1.5	0.689	NV	mg/kg
A5EF-02	A5A-EF14-1-RMP	1350431.5	479274.57	Radium-226	1.7	1.16	NV	pCi/g
A5EF-02	A5A-EF14-1-RMP	1350431.5	479274.57	Radium-228	1.8	1.12	NV	pCi/g
A5EF-02	A5A-EF14-1-RMP	1350431.5	479274.57	Thorium-228	1.7	1.11	NV	pCi/g
A5EF-02	A5A-EF14-1-RMP	1350431.5	479274.57	Thorium-232	1.5	1.12	NV	pCi/g
A5EF-02	A5A-EF14-1-RMP	1350431.5	479274.57	Uranium, Total	82	32.4	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP	1350467.85	479280.69	Aroclor-1254	0.13	0.0105	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP-D	1350467.85	479280.69	Aroclor-1254	0.13	0.0073	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP-D	1350467.85	479280.69	Aroclor-1260	0.13	0.0143	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP	1350467.85	479280.69	Aroclor-1260	0.13	0.0142	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP-D	1350467.85	479280.69	Arsenic	12	7.7	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP	1350467.85	479280.69	Arsenic	12	6.6	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP-D	1350467.85	479280.69	Beryllium	1.5	0.615	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP	1350467.85	479280.69	Beryllium	1.5	0.567	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP-D	1350467.85	479280.69	Radium-226	1.7	1.15	NV	pCi/g
A5EF-02	A5A-EF15-1-RMP	1350467.85	479280.69	Radium-226	1.7	1.12	NV	pCi/g
A5EF-02	A5A-EF15-1-RMP-D	1350467.85	479280.69	Radium-228	1.8	1.1	NV	pCi/g
A5EF-02	A5A-EF15-1-RMP	1350467.85	479280.69	Radium-228	1.8	1	NV	pCi/g
A5EF-02	A5A-EF15-1-RMP-D	1350467.85	479280.69	Thorium-228	1.7	1.11	NV	pCi/g
A5EF-02	A5A-EF15-1-RMP	1350467.85	479280.69	Thorium-228	1.7	1.01	NV	pCi/g
A5EF-02	A5A-EF15-1-RMP-D	1350467.85	479280.69	Thorium-232	1.5	1.1	NV	pCi/g
A5EF-02	A5A-EF15-1-RMP	1350467.85	479280.69	Thorium-232	1.5	1	NV	pCi/g
A5EF-02	A5A-EF15-1-RMP	1350467.85	479280.69	Uranium, Total	82	19.5	NV	mg/kg
A5EF-02	A5A-EF15-1-RMP-D	1350467.85	479280.69	Uranium, Total	82	18.2	NV	mg/kg
A5EF-02	A5A-EF16-1-RMP	1350522.49	479274.43	Aroclor-1254	0.13	0.0152	NV	mg/kg
A5EF-02	A5A-EF16-1-RMP	1350522.49	479274.43	Aroclor-1260	0.13	0.0152	NV	mg/kg
A5EF-02	A5A-EF16-1-RMP	1350522.49	479274.43	Arsenic	12	9.2	NV	mg/kg
A5EF-02	A5A-EF16-1-RMP	1350522.49	479274.43	Beryllium	1.5	0.917	NV	mg/kg
A5EF-02	A5A-EF16-1-RMP	1350522.49	479274.43	Radium-226	1.7	1.11	NV	pCi/g
A5EF-02	A5A-EF16-1-RMP	1350522.49	479274.43	Radium-228	1.8	1.06	NV	pCi/g
A5EF-02	A5A-EF16-1-RMP	1350522.49	479274.43	Thorium-228	1.7	1.07	NV	pCi/g
A5EF-02	A5A-EF16-1-RMP	1350522.49	479274.43	Thorium-232	1.5	1.06	NV	pCi/g
A5EF-02	A5A-EF16-1-RMP	1350522.49	479274.43	Uranium, Total	82	7.78	NV	mg/kg
A5EF-02	A5A-EF17-1-RMP	1350605.9	479278.9	Aroclor-1254	0.13	0.0044	NV	mg/kg
A5EF-02	A5A-EF17-1-RMP	1350605.9	479278.9	Aroclor-1260	0.13	0.0144	NV	mg/kg
A5EF-02	A5A-EF17-1-RMP	1350605.9	479278.9	Arsenic	12	12.5	NV	mg/kg
A5EF-02	A5A-EF17-1-RMP	1350605.9	479278.9	Beryllium	1.5	0.844	NV	mg/kg
A5EF-02	A5A-EF17-1-RMP	1350605.9	479278.9	Radium-226	1.7	1.2	NV	pCi/g
A5EF-02	A5A-EF17-1-RMP	1350605.9	479278.9	Radium-228	1.8	1.04	NV	pCi/g

TABLE B-1
A5EF CERTIFICATION RESULTS

CU	Sample ID	Easting '83	Northing '83	Parameter	FRL	Result	Qual.	Units
A5EF-02	A5A-EF17-1-RMP	1350605.9	479278.9	Thorium-228	1.7	1.03	NV	pCi/g
A5EF-02	A5A-EF17-1-RMP	1350605.9	479278.9	Thorium-232	1.5	1.04	NV	pCi/g
A5EF-02	A5A-EF17-1-RMP	1350605.9	479278.9	Uranium, Total	82	8.65	NV	mg/kg
A5EF-02	A5A-EF18-1-RMP	1350325.79	479228.75	Aroclor-1254	0.13	0.0142	NV	mg/kg
A5EF-02	A5A-EF18-1-RMP	1350325.79	479228.75	Aroclor-1260	0.13	0.0142	NV	mg/kg
A5EF-02	A5A-EF18-1-RMP	1350325.79	479228.75	Arsenic	12	9.59	NV	mg/kg
A5EF-02	A5A-EF18-1-RMP	1350325.79	479228.75	Beryllium	1.5	0.819	NV	mg/kg
A5EF-02	A5A-EF18-1-RMP	1350325.79	479228.75	Radium-226	1.7	1.13	NV	pCi/g
A5EF-02	A5A-EF18-1-RMP	1350325.79	479228.75	Radium-228	1.8	0.897	NV	pCi/g
A5EF-02	A5A-EF18-1-RMP	1350325.79	479228.75	Thorium-228	1.7	0.888	NV	pCi/g
A5EF-02	A5A-EF18-1-RMP	1350325.79	479228.75	Thorium-232	1.5	0.897	NV	pCi/g
A5EF-02	A5A-EF18-1-RMP	1350325.79	479228.75	Uranium, Total	82	7.82	NV	mg/kg
A5EF-02	A5A-EF19-1-RMP	1350482.23	479250.29	Aroclor-1254	0.13	0.0054	J	mg/kg
A5EF-02	A5A-EF19-1-RMP	1350482.23	479250.29	Aroclor-1260	0.13	0.0139	U	mg/kg
A5EF-02	A5A-EF19-1-RMP	1350482.23	479250.29	Arsenic	12	5.95	J	mg/kg
A5EF-02	A5A-EF19-1-RMP	1350482.23	479250.29	Beryllium	1.5	0.466	J	mg/kg
A5EF-02	A5A-EF19-1-RMP	1350482.23	479250.29	Radium-226	1.7	0.7	-	pCi/g
A5EF-02	A5A-EF19-1-RMP	1350482.23	479250.29	Radium-228	1.8	0.578	-	pCi/g
A5EF-02	A5A-EF19-1-RMP	1350482.23	479250.29	Thorium-228	1.7	0.572	-	pCi/g
A5EF-02	A5A-EF19-1-RMP	1350482.23	479250.29	Thorium-232	1.5	0.578	-	pCi/g
A5EF-02	A5A-EF19-1-RMP	1350482.23	479250.29	Uranium, Total	82	6.65	-	mg/kg
A5EF-02	A5A-EF20-1-RMP	1350619.22	479254.21	Aroclor-1254	0.13	0.0146	U	mg/kg
A5EF-02	A5A-EF20-1-RMP	1350619.22	479254.21	Aroclor-1260	0.13	0.0146	U	mg/kg
A5EF-02	A5A-EF20-1-RMP	1350619.22	479254.21	Arsenic	12	7.57	J	mg/kg
A5EF-02	A5A-EF20-1-RMP	1350619.22	479254.21	Beryllium	1.5	0.734	J	mg/kg
A5EF-02	A5A-EF20-1-RMP	1350619.22	479254.21	Radium-226	1.7	1.16	-	pCi/g
A5EF-02	A5A-EF20-1-RMP	1350619.22	479254.21	Radium-228	1.8	0.957	-	pCi/g
A5EF-02	A5A-EF20-1-RMP	1350619.22	479254.21	Thorium-228	1.7	0.96	-	pCi/g
A5EF-02	A5A-EF20-1-RMP	1350619.22	479254.21	Thorium-232	1.5	0.957	-	pCi/g
A5EF-02	A5A-EF20-1-RMP	1350619.22	479254.21	Uranium, Total	82	13.7	-	mg/kg
A5EF-02	A5A-EF21-1-RMP	1350330.61	479191.01	Aroclor-1254	0.13	0.0146	NV	mg/kg
A5EF-02	A5A-EF21-1-RMP	1350330.61	479191.01	Aroclor-1260	0.13	0.0146	NV	mg/kg
A5EF-02	A5A-EF21-1-RMP	1350330.61	479191.01	Arsenic	12	11.2	NV	mg/kg
A5EF-02	A5A-EF21-1-RMP	1350330.61	479191.01	Beryllium	1.5	0.831	NV	mg/kg
A5EF-02	A5A-EF21-1-RMP	1350330.61	479191.01	Radium-226	1.7	1.13	NV	pCi/g
A5EF-02	A5A-EF21-1-RMP	1350330.61	479191.01	Radium-228	1.8	0.984	NV	pCi/g
A5EF-02	A5A-EF21-1-RMP	1350330.61	479191.01	Thorium-228	1.7	0.978	NV	pCi/g
A5EF-02	A5A-EF21-1-RMP	1350330.61	479191.01	Thorium-232	1.5	0.984	NV	pCi/g
A5EF-02	A5A-EF21-1-RMP	1350330.61	479191.01	Uranium, Total	82	8.15	NV	mg/kg
A5EF-02	A5A-EF22-1-RMP	1350457.57	479198.4	Aroclor-1254	0.13	0.0096	J	mg/kg
A5EF-02	A5A-EF22-1-RMP	1350457.57	479198.4	Aroclor-1260	0.13	0.0146	U	mg/kg
A5EF-02	A5A-EF22-1-RMP	1350457.57	479198.4	Arsenic	12	5.57	J	mg/kg

TABLE B-1
A5EF CERTIFICATION RESULTS

CU	Sample ID	Easting '83	Northing '83	Parameter	FRL	Result	Qual.	Units
A5EF-02	A5A-EF22-1-RMP	1350457.57	479198.4	Beryllium	1.5	0.453	J	mg/kg
A5EF-02	A5A-EF22-1-RMP	1350457.57	479198.4	Radium-226	1.7	0.731	-	pCi/g
A5EF-02	A5A-EF22-1-RMP	1350457.57	479198.4	Radium-228	1.8	0.689	-	pCi/g
A5EF-02	A5A-EF22-1-RMP	1350457.57	479198.4	Thorium-228	1.7	0.693	-	pCi/g
A5EF-02	A5A-EF22-1-RMP	1350457.57	479198.4	Thorium-232	1.5	0.689	-	pCi/g
A5EF-02	A5A-EF22-1-RMP	1350457.57	479198.4	Uranium, Total	82	12.6	-	mg/kg
A5EF-02	A5A-EF23-1-RMP	1350529.06	479213.09	Aroclor-1254	0.13	0.0047	J	mg/kg
A5EF-02	A5A-EF23-1-RMP	1350529.06	479213.09	Aroclor-1260	0.13	0.0146	U	mg/kg
A5EF-02	A5A-EF23-1-RMP	1350529.06	479213.09	Arsenic	12	7.15	J	mg/kg
A5EF-02	A5A-EF23-1-RMP	1350529.06	479213.09	Beryllium	1.5	0.654	J	mg/kg
A5EF-02	A5A-EF23-1-RMP	1350529.06	479213.09	Radium-226	1.7	1.12	-	pCi/g
A5EF-02	A5A-EF23-1-RMP	1350529.06	479213.09	Radium-228	1.8	1.04	-	pCi/g
A5EF-02	A5A-EF23-1-RMP	1350529.06	479213.09	Thorium-228	1.7	1.04	-	pCi/g
A5EF-02	A5A-EF23-1-RMP	1350529.06	479213.09	Thorium-232	1.5	1.04	-	pCi/g
A5EF-02	A5A-EF23-1-RMP	1350529.06	479213.09	Uranium, Total	82	22.8	-	mg/kg
A5EF-02	A5A-EF24-1-RMP	1350577.98	479187.28	Aroclor-1254	0.13	0.0146	U	mg/kg
A5EF-02	A5A-EF24-1-RMP	1350577.98	479187.28	Aroclor-1260	0.13	0.0146	U	mg/kg
A5EF-02	A5A-EF24-1-RMP	1350577.98	479187.28	Arsenic	12	6.82	J	mg/kg
A5EF-02	A5A-EF24-1-RMP	1350577.98	479187.28	Beryllium	1.5	0.595	J	mg/kg
A5EF-02	A5A-EF24-1-RMP	1350577.98	479187.28	Radium-226	1.7	1.03	-	pCi/g
A5EF-02	A5A-EF24-1-RMP	1350577.98	479187.28	Radium-228	1.8	0.855	-	pCi/g
A5EF-02	A5A-EF24-1-RMP	1350577.98	479187.28	Thorium-228	1.7	0.844	-	pCi/g
A5EF-02	A5A-EF24-1-RMP	1350577.98	479187.28	Thorium-232	1.5	0.855	-	pCi/g
A5EF-02	A5A-EF24-1-RMP	1350577.98	479187.28	Uranium, Total	82	11.9	-	mg/kg
A5EF-03	A5A-EF25-1-RMP	1350396.47	479137.53	Aroclor-1254	0.13	0.0092	J	mg/kg
A5EF-03	A5A-EF25-1-RMP	1350396.47	479137.53	Aroclor-1260	0.13	0.0147	U	mg/kg
A5EF-03	A5A-EF25-1-RMP	1350396.47	479137.53	Arsenic	12	6.97	J	mg/kg
A5EF-03	A5A-EF25-1-RMP	1350396.47	479137.53	Beryllium	1.5	0.835	J	mg/kg
A5EF-03	A5A-EF25-1-RMP	1350396.47	479137.53	Radium-226	1.7	1.24	-	pCi/g
A5EF-03	A5A-EF25-1-RMP	1350396.47	479137.53	Radium-228	1.8	1.07	-	pCi/g
A5EF-03	A5A-EF25-1-RMP	1350396.47	479137.53	Thorium-228	1.7	1.05	-	pCi/g
A5EF-03	A5A-EF25-1-RMP	1350396.47	479137.53	Thorium-232	1.5	1.07	-	pCi/g
A5EF-03	A5A-EF25-1-RMP	1350396.47	479137.53	Uranium, Total	82	20.8	-	mg/kg
A5EF-03	A5A-EF26-1-RMP	1350453.83	479145.41	Aroclor-1254	0.13	0.0104	J	mg/kg
A5EF-03	A5A-EF26-1-RMP	1350453.83	479145.41	Aroclor-1260	0.13	0.0146	U	mg/kg
A5EF-03	A5A-EF26-1-RMP	1350453.83	479145.41	Arsenic	12	7.47	J	mg/kg
A5EF-03	A5A-EF26-1-RMP	1350453.83	479145.41	Beryllium	1.5	0.759	J	mg/kg
A5EF-03	A5A-EF26-1-RMP	1350453.83	479145.41	Radium-226	1.7	1.15	-	pCi/g
A5EF-03	A5A-EF26-1-RMP	1350453.83	479145.41	Radium-228	1.8	1.01	-	pCi/g
A5EF-03	A5A-EF26-1-RMP	1350453.83	479145.41	Thorium-228	1.7	0.992	-	pCi/g
A5EF-03	A5A-EF26-1-RMP	1350453.83	479145.41	Thorium-232	1.5	1.01	-	pCi/g
A5EF-03	A5A-EF26-1-RMP	1350453.83	479145.41	Uranium, Total	82	18.5	-	mg/kg

TABLE B-1
A5EF CERTIFICATION RESULTS

CU	Sample ID	Easting '83	Northing '83	Parameter	FRL	Result	Qual.	Units
A5EF-03	A5A-EF27-1-RMP	1350501.66	479170.58	Aroclor-1254	0.13	0.011	J	mg/kg
A5EF-03	A5A-EF27-1-RMP	1350501.66	479170.58	Aroclor-1260	0.13	0.0145	U	mg/kg
A5EF-03	A5A-EF27-1-RMP	1350501.66	479170.58	Arsenic	12	8.06	J	mg/kg
A5EF-03	A5A-EF27-1-RMP	1350501.66	479170.58	Beryllium	1.5	0.632	J	mg/kg
A5EF-03	A5A-EF27-1-RMP	1350501.66	479170.58	Radium-226	1.7	1.03	-	pCi/g
A5EF-03	A5A-EF27-1-RMP	1350501.66	479170.58	Radium-228	1.8	0.891	-	pCi/g
A5EF-03	A5A-EF27-1-RMP	1350501.66	479170.58	Thorium-228	1.7	0.893	-	pCi/g
A5EF-03	A5A-EF27-1-RMP	1350501.66	479170.58	Thorium-232	1.5	0.891	-	pCi/g
A5EF-03	A5A-EF27-1-RMP	1350501.66	479170.58	Uranium, Total	82	8.1	-	mg/kg
A5EF-03	A5A-EF28-1-RMP	1350573.44	479151.44	Aroclor-1254	0.13	0.0138	U	mg/kg
A5EF-03	A5A-EF28-1-RMP	1350573.44	479151.44	Aroclor-1260	0.13	0.0138	U	mg/kg
A5EF-03	A5A-EF28-1-RMP	1350573.44	479151.44	Arsenic	12	5.27	J	mg/kg
A5EF-03	A5A-EF28-1-RMP	1350573.44	479151.44	Beryllium	1.5	0.644	J	mg/kg
A5EF-03	A5A-EF28-1-RMP	1350573.44	479151.44	Radium-226	1.7	0.871	-	pCi/g
A5EF-03	A5A-EF28-1-RMP	1350573.44	479151.44	Radium-228	1.8	0.656	-	pCi/g
A5EF-03	A5A-EF28-1-RMP	1350573.44	479151.44	Thorium-228	1.7	0.665	-	pCi/g
A5EF-03	A5A-EF28-1-RMP	1350573.44	479151.44	Thorium-232	1.5	0.656	-	pCi/g
A5EF-03	A5A-EF28-1-RMP	1350573.44	479151.44	Uranium, Total	82	3.57	-	mg/kg
A5EF-03	A5A-EF29-1-RMP	1350321.7	479081.12	Aroclor-1254	0.13	0.014	U	mg/kg
A5EF-03	A5A-EF29-1-RMP	1350321.7	479081.12	Aroclor-1260	0.13	0.014	U	mg/kg
A5EF-03	A5A-EF29-1-RMP	1350321.7	479081.12	Arsenic	12	5.63	J	mg/kg
A5EF-03	A5A-EF29-1-RMP	1350321.7	479081.12	Beryllium	1.5	0.669	J	mg/kg
A5EF-03	A5A-EF29-1-RMP	1350321.7	479081.12	Radium-226	1.7	0.811	-	pCi/g
A5EF-03	A5A-EF29-1-RMP	1350321.7	479081.12	Radium-228	1.8	0.836	-	pCi/g
A5EF-03	A5A-EF29-1-RMP	1350321.7	479081.12	Thorium-228	1.7	0.821	-	pCi/g
A5EF-03	A5A-EF29-1-RMP	1350321.7	479081.12	Thorium-232	1.5	0.836	-	pCi/g
A5EF-03	A5A-EF29-1-RMP	1350321.7	479081.12	Uranium, Total	82	13	-	mg/kg
A5EF-03	A5A-EF30-1-RMP-D	1350376.25	479099.52	Aroclor-1254	0.13	0.0151	U	mg/kg
A5EF-03	A5A-EF30-1-RMP	1350376.25	479099.52	Aroclor-1254	0.13	0.015	U	mg/kg
A5EF-03	A5A-EF30-1-RMP-D	1350376.25	479099.52	Aroclor-1260	0.13	0.0151	U	mg/kg
A5EF-03	A5A-EF30-1-RMP	1350376.25	479099.52	Aroclor-1260	0.13	0.015	U	mg/kg
A5EF-03	A5A-EF30-1-RMP	1350376.25	479099.52	Arsenic	12	8.75	J	mg/kg
A5EF-03	A5A-EF30-1-RMP-D	1350376.25	479099.52	Arsenic	12	7.42	J	mg/kg
A5EF-03	A5A-EF30-1-RMP	1350376.25	479099.52	Beryllium	1.5	1.17	J	mg/kg
A5EF-03	A5A-EF30-1-RMP-D	1350376.25	479099.52	Beryllium	1.5	1.03	J	mg/kg
A5EF-03	A5A-EF30-1-RMP	1350376.25	479099.52	Radium-226	1.7	1.4	-	pCi/g
A5EF-03	A5A-EF30-1-RMP-D	1350376.25	479099.52	Radium-226	1.7	1.33	-	pCi/g
A5EF-03	A5A-EF30-1-RMP	1350376.25	479099.52	Radium-228	1.8	1.19	-	pCi/g
A5EF-03	A5A-EF30-1-RMP-D	1350376.25	479099.52	Radium-228	1.8	1.11	-	pCi/g
A5EF-03	A5A-EF30-1-RMP	1350376.25	479099.52	Thorium-228	1.7	1.18	-	pCi/g
A5EF-03	A5A-EF30-1-RMP-D	1350376.25	479099.52	Thorium-228	1.7	1.17	-	pCi/g
A5EF-03	A5A-EF30-1-RMP	1350376.25	479099.52	Thorium-232	1.5	1.19	-	pCi/g

TABLE B-1
A5EF CERTIFICATION RESULTS

CU	Sample ID	Easting '83	Northing '83	Parameter	FRL	Result	Qual.	Units
A5EF-03	A5A-EF30-1-RMP-D	1350376.25	479099.52	Thorium-232	1.5	1.11	-	pCi/g
A5EF-03	A5A-EF30-1-RMP-D	1350376.25	479099.52	Uranium, Total	82	10.8	-	mg/kg
A5EF-03	A5A-EF30-1-RMP	1350376.25	479099.52	Uranium, Total	82	9.05	-	mg/kg
A5EF-03	A5A-EF31-1-RMP	1350434.07	479081.56	Aroclor-1254	0.13	0.0138	U	mg/kg
A5EF-03	A5A-EF31-1-RMP	1350434.07	479081.56	Aroclor-1260	0.13	0.0138	U	mg/kg
A5EF-03	A5A-EF31-1-RMP	1350434.07	479081.56	Arsenic	12	6.13	J	mg/kg
A5EF-03	A5A-EF31-1-RMP	1350434.07	479081.56	Beryllium	1.5	0.642	J	mg/kg
A5EF-03	A5A-EF31-1-RMP	1350434.07	479081.56	Radium-226	1.7	0.919	-	pCi/g
A5EF-03	A5A-EF31-1-RMP	1350434.07	479081.56	Radium-228	1.8	0.687	-	pCi/g
A5EF-03	A5A-EF31-1-RMP	1350434.07	479081.56	Thorium-228	1.7	0.662	-	pCi/g
A5EF-03	A5A-EF31-1-RMP	1350434.07	479081.56	Thorium-232	1.5	0.687	-	pCi/g
A5EF-03	A5A-EF31-1-RMP	1350434.07	479081.56	Uranium, Total	82	3.62	-	mg/kg
A5EF-03	A5A-EF32-1-RMP	1350488.85	479085.23	Aroclor-1254	0.13	0.0148	U	mg/kg
A5EF-03	A5A-EF32-1-RMP	1350488.85	479085.23	Aroclor-1260	0.13	0.0148	U	mg/kg
A5EF-03	A5A-EF32-1-RMP	1350488.85	479085.23	Arsenic	12	5.15	J	mg/kg
A5EF-03	A5A-EF32-1-RMP	1350488.85	479085.23	Beryllium	1.5	0.582	J	mg/kg
A5EF-03	A5A-EF32-1-RMP	1350488.85	479085.23	Radium-226	1.7	1.22	-	pCi/g
A5EF-03	A5A-EF32-1-RMP	1350488.85	479085.23	Radium-228	1.8	1.13	-	pCi/g
A5EF-03	A5A-EF32-1-RMP	1350488.85	479085.23	Thorium-228	1.7	1.13	-	pCi/g
A5EF-03	A5A-EF32-1-RMP	1350488.85	479085.23	Thorium-232	1.5	1.13	-	pCi/g
A5EF-03	A5A-EF32-1-RMP	1350488.85	479085.23	Uranium, Total	82	11.1	-	mg/kg
A5EF-03	A5A-EF33-1-RMP	1350346.96	479034.83	Aroclor-1254	0.13	0.0138	U	mg/kg
A5EF-03	A5A-EF33-1-RMP	1350346.96	479034.83	Aroclor-1260	0.13	0.0138	U	mg/kg
A5EF-03	A5A-EF33-1-RMP	1350346.96	479034.83	Arsenic	12	6.37	J	mg/kg
A5EF-03	A5A-EF33-1-RMP	1350346.96	479034.83	Beryllium	1.5	0.703	J	mg/kg
A5EF-03	A5A-EF33-1-RMP	1350346.96	479034.83	Radium-226	1.7	0.814	-	pCi/g
A5EF-03	A5A-EF33-1-RMP	1350346.96	479034.83	Radium-228	1.8	0.713	-	pCi/g
A5EF-03	A5A-EF33-1-RMP	1350346.96	479034.83	Thorium-228	1.7	0.731	-	pCi/g
A5EF-03	A5A-EF33-1-RMP	1350346.96	479034.83	Thorium-232	1.5	0.713	-	pCi/g
A5EF-03	A5A-EF33-1-RMP	1350346.96	479034.83	Uranium, Total	82	6.71	-	mg/kg
A5EF-03	A5A-EF34-1-RMP	1350385.55	479036.18	Aroclor-1254	0.13	0.0072	J	mg/kg
A5EF-03	A5A-EF34-1-RMP	1350385.55	479036.18	Aroclor-1260	0.13	0.0139	U	mg/kg
A5EF-03	A5A-EF34-1-RMP	1350385.55	479036.18	Arsenic	12	8.39	J	mg/kg
A5EF-03	A5A-EF34-1-RMP	1350385.55	479036.18	Beryllium	1.5	0.713	J	mg/kg
A5EF-03	A5A-EF34-1-RMP	1350385.55	479036.18	Radium-226	1.7	1.1	-	pCi/g
A5EF-03	A5A-EF34-1-RMP	1350385.55	479036.18	Radium-228	1.8	0.827	-	pCi/g
A5EF-03	A5A-EF34-1-RMP	1350385.55	479036.18	Thorium-228	1.7	0.847	-	pCi/g
A5EF-03	A5A-EF34-1-RMP	1350385.55	479036.18	Thorium-232	1.5	0.827	-	pCi/g
A5EF-03	A5A-EF34-1-RMP	1350385.55	479036.18	Uranium, Total	82	5.13	-	mg/kg
A5EF-03	A5A-EF35-1-RMP	1350356.66	478963.85	Aroclor-1254	0.13	0.0142	NV	mg/kg
A5EF-03	A5A-EF35-1-RMP	1350356.66	478963.85	Aroclor-1260	0.13	0.0142	NV	mg/kg
A5EF-03	A5A-EF35-1-RMP	1350356.66	478963.85	Arsenic	12	5.36	NV	mg/kg

TABLE B-1
A5EF CERTIFICATION RESULTS

CU	Sample ID	Easting '83	Northing '83	Parameter	FRL	Result	Qual.	Units
A5EF-03	A5A-EF35-1-RMP	1350356.66	478963.85	Beryllium	1.5	0.729	NV	mg/kg
A5EF-03	A5A-EF35-1-RMP	1350356.66	478963.85	Radium-226	1.7	0.897	NV	pCi/g
A5EF-03	A5A-EF35-1-RMP	1350356.66	478963.85	Radium-228	1.8	0.697	NV	pCi/g
A5EF-03	A5A-EF35-1-RMP	1350356.66	478963.85	Thorium-228	1.7	0.69	NV	pCi/g
A5EF-03	A5A-EF35-1-RMP	1350356.66	478963.85	Thorium-232	1.5	0.697	NV	pCi/g
A5EF-03	A5A-EF35-1-RMP	1350356.66	478963.85	Uranium, Total	82	4.87	NV	mg/kg
A5EF-03	A5A-EF36-1-RMP	1350415.92	478976.35	Aroclor-1254	0.13	0.0143	U	mg/kg
A5EF-03	A5A-EF36-1-RMP	1350415.92	478976.35	Aroclor-1260	0.13	0.0143	U	mg/kg
A5EF-03	A5A-EF36-1-RMP	1350415.92	478976.35	Arsenic	12	5.35	J	mg/kg
A5EF-03	A5A-EF36-1-RMP	1350415.92	478976.35	Beryllium	1.5	0.646	J	mg/kg
A5EF-03	A5A-EF36-1-RMP	1350415.92	478976.35	Radium-226	1.7	0.866	-	pCi/g
A5EF-03	A5A-EF36-1-RMP	1350415.92	478976.35	Radium-228	1.8	0.739	-	pCi/g
A5EF-03	A5A-EF36-1-RMP	1350415.92	478976.35	Thorium-228	1.7	0.747	-	pCi/g
A5EF-03	A5A-EF36-1-RMP	1350415.92	478976.35	Thorium-232	1.5	0.739	-	pCi/g
A5EF-03	A5A-EF36-1-RMP	1350415.92	478976.35	Uranium, Total	82	6.09	-	mg/kg

TABLE B-2
CERTIFICATION STATISTICS FOR CU A5EF-01

Station Number	Aroclor-1254	Aroclor-1260	Arsenic	Beryllium	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
A5A-EF01-1-RMP	14.3 UNV	14.3 UNV	7.42 NV	0.792 NV	1.15 NV	0.942 NV	0.95 NV	0.942 NV	17.8 NV
A5A-EF02-1-RMP	10.8 NV	14.3 UNV	7.79 NV	0.762 NV	1.26 NV	1.27 NV	1.44 NV	1.27 NV	26.6 NV
A5A-EF03-1-RMP	4.5 NV	14.2 UNV	8.75 NV	0.754 NV	1.32 NV	1.1 NV	1.14 NV	1.1 NV	14.6 NV
A5A-EF04-1-RMP	13.9 U	13.9 U	7.83 J	0.688 J	1.13 -	0.963 -	0.956 -	0.963 -	6.74 -
A5A-EF05-1-RMP	14.9 UNV	14.9 UNV	7.63 NV	0.898 NV	1.19 NV	1.07 NV	1.1 NV	1.07 NV	10.2 NV
A5A-EF06-1-RMP	7.3 NV	14.8 UNV	6.56 NV	0.692 NV	1.18 NV	1.09 NV	1.09 NV	1.09 NV	28.6 NV
A5A-EF07-1-RMP	7.3 NV	15.3 UNV	5.54 NV	0.657 NV	1.24 NV	1.06 NV	1.06 NV	1.06 NV	33.3 NV
A5A-EF08-1-RMP	5.6 J	15.5 U	8.39 J	1.07 J	1.15 -	1.01 -	1.03 -	1.01 -	9.18 -
A5A-EF09-1-RMP	15.2 UNV	15.2 UNV	5.54 NV	0.892 NV	1.37 NV	1.13 NV	1.13 NV	1.13 NV	12.5 NV
A5A-EF10-1-RMP	11.3 NV	14.5 UNV	7.1 NV	0.818 NV	1.33 NV	1.1 NV	1.1 NV	1.1 NV	42 NV
A5A-EF11-1-RMP	6.5 NV	14.9 UNV	7.13 NV	0.703 NV	1.2 NV	1.07 NV	1.06 NV	1.07 NV	24.7 NV
A5A-EF11-1-RMP-D	6.1 NV	14.9 UNV	5.88 NV	0.597 NV	1.17 NV	1.01 NV	0.99 NV	1.01 NV	28.1 NV
A5A-EF12-1-RMP	14.1 U	14.1 U	8.33 J	0.691 J	1.16 -	0.941 -	0.925 -	0.941 -	7.31 -
FRL	130	130	12	1.5	1.7	1.8	1.7	1.5	82
Units	ug/kg	ug/kg	mg/kg	mg/kg	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg
Confidence Level	90%	90%	90%	90%	95%	95%	95%	95%	95%
Max Result	11.3 @	15.5 U @	8.75 @	1.07 @	1.37 @	1.27 @	1.44 @	1.27 @	42.0 @
Standardized Skewness	--	--	--	--	--	--	--	--	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	5	12	0	0	0	0	0	0	0
Estimated Mean**	--	--	--	--	--	--	--	--	--
UCL of the Mean	--	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--
Size Calculation	--	--	--	--	--	--	--	--	--

Note: Est. Mean** = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)
The maximum value of the two duplicates was used in all statistical equations.
W-Statistic Probability* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

TABLE B-3
CERTIFICATION STATISTICS FOR CU A5EF-02

Station Number	Aroclor-1254	Aroclor-1260	Arsenic	Beryllium	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
A5A-EF13-1-RMP	14.5 UNV	14.5 UNV	6.89 NV	0.725 NV	0.975 NV	0.968 NV	0.965 NV	0.968 NV	11.2 NV
A5A-EF14-1-RMP	5.2 NV	14.3 UNV	6.77 NV	0.689 NV	1.16 NV	1.12 NV	1.11 NV	1.12 NV	32.4 NV
A5A-EF15-1-RMP	10.5 NV	14.2 UNV	6.6 NV	0.567 NV	1.12 NV	1.0 NV	1.01 NV	1.0 NV	19.5 NV
A5A-EF15-1-RMP-D	7.3 NV	14.3 UNV	7.7 NV	0.615 NV	1.15 NV	1.1 NV	1.11 NV	1.1 NV	18.2 NV
A5A-EF16-1-RMP	15.2 UNV	15.2 UNV	9.2 NV	0.917 NV	1.11 NV	1.06 NV	1.07 NV	1.06 NV	7.78 NV
A5A-EF17-1-RMP	4.4 NV	14.4 UNV	12.5 NV	0.844 NV	1.2 NV	1.04 NV	1.03 NV	1.04 NV	8.65 NV
A5A-EF18-1-RMP	14.2 UNV	14.2 UNV	9.59 NV	0.819 NV	1.13 NV	0.897 NV	0.888 NV	0.897 NV	7.82 NV
A5A-EF19-1-RMP	5.4 J	13.9 U	5.95 J	0.466 J	0.7 -	0.578 -	0.572 -	0.578 -	6.65 -
A5A-EF20-1-RMP	14.6 U	14.6 U	7.57 J	0.734 J	1.16 -	0.957 -	0.96 -	0.957 -	13.7 -
A5A-EF21-1-RMP	14.6 UNV	14.6 UNV	11.2 NV	0.831 NV	1.13 NV	0.984 NV	0.978 NV	0.984 NV	8.15 NV
A5A-EF22-1-RMP	9.6 J	14.6 U	5.57 J	0.453 J	0.731 -	0.689 -	0.693 -	0.689 -	12.6 -
A5A-EF23-1-RMP	4.7 J	14.6 U	7.15 J	0.654 J	1.12 -	1.04 -	1.04 -	1.04 -	22.8 -
A5A-EF24-1-RMP	14.6 U	14.6 U	6.82 J	0.595 J	1.03 -	0.855 -	0.844 -	0.855 -	11.9 -
FRL	130	130	12	1.5	1.7	1.8	1.7	1.5	82
Units	ug/kg	ug/kg	mg/kg	mg/kg	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg
Confidence Level	90%	90%	90%	90%	95%	95%	95%	95%	95%
Max Result	10.5 @	15.2 UNV	12.5	0.917 @	1.20 @	1.12 @	1.11 @	1.12 @	32.4 @
Standardized Skewness	- -	- -	1.45	- -	- -	- -	- -	- -	- -
W-Statistic Probability *	- -	- -	0.446	- -	- -	- -	- -	- -	- -
Test Procedure	- -	- -	t-Test (LN)	- -	- -	- -	- -	- -	- -
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	6	12	0	0	0	0	0	0	0
Estimated Mean**	- -	- -	8.087	- -	- -	- -	- -	- -	- -
UCL of the Mean	- -	- -	8.98	- -	- -	- -	- -	- -	- -
Non-Parametric Prob.	- -	- -	- -	- -	- -	- -	- -	- -	- -
Est. Mean - Pass / Fail	- -	- -	Pass	- -	- -	- -	- -	- -	- -
2x Rule - Pass / Fail	- -	- -	Pass	- -	- -	- -	- -	- -	- -
a posteriori Sample	- -	- -	3	- -	- -	- -	- -	- -	- -
Size Calculation	- -	- -	Pass	- -	- -	- -	- -	- -	- -

Note: Est. Mean** = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)
The maximum value of the two duplicates was used in all statistical equations.
W-Statistic Probability* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

TABLE B-4
CERTIFICATION STATISTICS FOR CU A5AEF-03

Station Number	Aroclor-1254	Aroclor-1260	Arsenic	Beryllium	Radium-226	Radium-228	Thorium-228	Thorium-232	Uranium, Total
A5A-EF25-1-RMP	9.2 J	14.7 U	6.97 J	0.835 J	1.24 -	1.07 -	1.05 -	1.07 -	20.8 -
A5A-EF26-1-RMP	10.4 J	14.6 U	7.47 J	0.759 J	1.15 -	1.01 -	0.992 -	1.01 -	18.5 -
A5A-EF27-1-RMP	11 J	14.5 U	8.06 J	0.632 J	1.03 -	0.891 -	0.893 -	0.891 -	8.1 -
A5A-EF28-1-RMP	13.8 U	13.8 U	5.27 J	0.644 J	0.871 -	0.656 -	0.665 -	0.656 -	3.57 -
A5A-EF29-1-RMP	14 U	14 U	5.63 J	0.669 J	0.811 -	0.836 -	0.821 -	0.836 -	13.0 -
A5A-EF30-1-RMP	15 U	15 U	8.75 J	1.17 J	1.40 -	1.19 -	1.18 -	1.19 -	9.05 -
A5A-EF30-1-RMP-D	15.1 U	15.1 U	7.42 J	1.03 J	1.33 -	1.11 -	1.17 -	1.11 -	10.8 -
A5A-EF31-1-RMP	13.8 U	13.8 U	6.13 J	0.642 J	0.919 -	0.687 -	0.662 -	0.687 -	3.62 -
A5A-EF32-1-RMP	14.8 U	14.8 U	5.15 J	0.582 J	1.22 -	1.13 -	1.13 -	1.13 -	11.1 -
A5A-EF33-1-RMP	13.8 U	13.8 U	6.37 J	0.703 J	0.814 -	0.713 -	0.731 -	0.713 -	6.71 -
A5A-EF34-1-RMP	7.2 J	13.9 U	8.39 J	0.713 J	1.10 -	0.827 -	0.847 -	0.827 -	5.13 -
A5A-EF35-1-RMP	14.2 UNV	14.2 UNV	5.36 NV	0.729 NV	0.897 NV	0.697 NV	0.69 NV	0.697 NV	4.87 NV
A5A-EF36-1-RMP	14.3 U	14.3 U	5.35 J	0.646 J	0.866 -	0.739 -	0.747 -	0.739 -	6.09 -
FRL	130	130	12	1.5	1.7	1.8	1.7	1.5	82
Units	ug/kg	ug/kg	mg/kg	mg/kg	pCi/g	pCi/g	pCi/g	pCi/g	mg/kg
Confidence Level	90%	90%	90%	90%	95%	95%	95%	95%	95%
Max Result	11.0 @	15.1 U @	8.75 @	1.17 @	1.40 @	1.19 @	1.18 @	1.19 @	20.8 @
Standardized Skewness	--	--	--	--	--	--	--	--	--
W-Statistic Probability *	--	--	--	--	--	--	--	--	--
Test Procedure	--	--	--	--	--	--	--	--	--
Sample Size	12	12	12	12	12	12	12	12	12
Number of NDs	8	12	0	0	0	0	0	0	0
Estimated Mean**	--	--	--	--	--	--	--	--	--
UCL of the Mean	--	--	--	--	--	--	--	--	--
Non-Parametric Prob.	--	--	--	--	--	--	--	--	--
Est. Mean - Pass / Fail	--	--	--	--	--	--	--	--	--
2x Rule - Pass / Fail	--	--	--	--	--	--	--	--	--
a posteriori Sample	--	--	--	--	--	--	--	--	--
Size Calculation	--	--	--	--	--	--	--	--	--

Note: Est. Mean** = Estimated measure of central tendency(Normal: Mean; LogNormal: Est. Mean; Non-Parametric: Median)
The maximum value of the two duplicates was used in all statistical equations.
W-Statistic Probability* This is the highest reported probability of the Shapiro-Wilk W-statistic for tests for the validity of the normality assumption.
The test is performed on the raw data (untransformed) data (N) and the log-transformed data (LN) to test for lognormality.

APPENDIX C

POST-CERTIFICATION EXCAVATION PLAN FOR THE AREA 5 EASTERN FIELD

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APPENDIX C
POST-CERTIFICATION EXCAVATION PLAN FOR THE AREA 5 EASTERN FIELD

C.1 INTRODUCTION

After a soil remediation area at the FEMP is considered "certified," the area is released for final land use, which typically involves natural resource restoration. In the case of the A5EF, this soil is being certified prior to construction of the permanent OSDF Sediment Basin #2, and a large volume of soil will need to be removed from this area. Because this area has been certified, DOE now considers this soil as "clean". However, DOE will take extra, conservative measures to ensure that no impacted soil is reused. While data collected during the A5EF certification effort demonstrate that the surface soil contains ASCOC concentrations below their respective FRLs, the impacts from potentially contaminated surface water drainage in the two drainage ditches running through A5EF cannot be completely established at every point along the ditch. Therefore, the soil in the immediate vicinity of these ditches will be treated as "impacted," and as a result, it will be excavated and segregated for disposal in the OSDF. Similarly, soil in the immediate vicinity of the lone FRL exceedance identified in A5EF at location A5A-EF17 (refer to Figure 2-2 in the Certification Report) will also be treated as impacted. These volumes of soil will be referred to hereinafter as "potentially impacted soil". The potentially impacted soil will be removed in advance of OSDF Sediment Basin #2 construction and disposed at the OSDF. This will be followed by a real-time scan of the excavated surfaces to verify that no residual primary radiological COCs exceed their respective FRL. These real-time scan data will be provided to EPA and OEPA as an Addendum to the A5EF Certification Report.

C.2 PURPOSE

The purpose of this Post-Certification Excavation Plan is to describe the measures that will be taken to remove the potentially impacted soil from A5EF for disposal in the OSDF and the collection of real-time data to demonstrate that remaining soil is not impacted. Construction details and design drawings related to the actual construction of the OSDF Sediment Basin #2 lies outside the scope of this appendix.

C.3 GENERAL DESCRIPTION OF THE AREA

Two major drainage ditches flow through A5EF, as shown on Figure C-1. One drainage ditch (referred to as the northern ditch) enters the area from the north, then bends to the southwest. It carries surface water drainage from the western perimeter Area 1 Phase I and Area 1 Phase II, along with the northeastern portions of A5. It carries this drainage across A5EF and into a culvert near the west-central

end of A5EF. This culvert enters a storm sewer beneath the Main Parking Lot, where it eventually flows into Paddys Run in an uncontrolled manner. This ditch is approximately 7 to 8 feet deep from the top of its bank to its base.

The second drainage ditch (referred to as the southern ditch) enters this area through a culvert beneath the North Access Road. It carries drainage from the Borrow Area across A5EF, and into another culvert along the western end of the area. This culvert leads into a storm sewer beneath the Main Parking Lot, and also leads into Paddys Run in an uncontrolled manner. This ditch is approximately 6 feet deep from the top of its bank to its base.

Steep, heavily vegetated banks line both of the northern and southern ditches. The vegetation consists of shrubs, saplings and small trees (maximum of approximately 5 inches diameter at breast height). All other parts of A5EF, including the area in the immediate vicinity of the above-FRL arsenic concentration, can be described as an open, grass field that is routinely maintained by mowing.

C.4 POST-CERTIFICATION CONSTRUCTION AND REAL-TIME SCANNING ACTIVITIES

The post-certification activities in the A5EF must take place within A5EF before full construction of the OSDF Sediment Basin #2 can begin, as follows:

1. brush clearing along the banks of the two drainage ditches;
2. excavation of potentially impacted material; and,
3. real-time scanning to demonstrate that the excavated surfaces are not impacted.

These activities are discussed individually in the following subsections. After the real-time data are evaluated and demonstrate that no impacted material remains, the area will be released for construction of the sediment basin, and any soil generated from further Sediment Basin #2 construction will be considered "clean".

C.4.1 Activity 1 – Tree and Brush Removal

The first step field activity that must take place prior to construction of the sediment basin will be to clear all brush along the banks of the northern and southern ditches. Because soil in the ditch is being treated as impacted, this must be accomplished by first cutting off all vegetation above the ground. All brush and wood will be chipped and hauled to the Borrow Area for use in the Borrow Area Restoration Project. Per Appendix D of the SEP, tree tissue at the Fernald site does not contain COC concentrations

above the soil FRLs, and therefore, can be used as brush or mulch to support restoration projects in certified areas.

C.4.2 Activity 2 – Potentially Impacted Material Excavation

The second activity will be to conduct soil excavations to remove the potentially impacted materials in A5EF. These excavations will remove all soil (along with imbedded tree roots) from the existing ditch lines, since this has been exposed to the potentially impacted drainage. In addition, the soil in the vicinity of the above-FRL arsenic sample will also be removed. Details of these excavations are as follows:

- Along the entire perimeter of both drainage ditches, a minimum 1-foot of soil will be excavated. This will involve removing at least a foot of soil from the top of the bank down to beneath the existing base.

- At the base of the northern ditch, the excavation will be sufficient to take the base down to an elevation of 570.5 feet above mean sea level (amsl), which is the planned bottom depth of the basin. This additional excavation is because this ditch has more potential for impacts from drainage than the southern ditch, given the origin of the drainage. In addition, the existing base of this ditch is deeper than the southern ditch, and thus, the 1-foot excavation will almost reach the 570.5 feet amsl depth at some points (i.e., this will not involve the removal of a large amount of additional material.

- At certification location A5A-EF17 where the above-FRL arsenic result was identified, one backhoe scoop of soil will be removed. The depth of the scoop will be sufficient to remove all above-FRL soil, which is currently being determined by analysis of samples under Variance/Field Change Notice 20810-PSP-0005-3. Under this variance, soil samples are being collected every foot at depth for arsenic analysis, and the top depth of the next sample below surface that shows arsenic concentrations below the FRL will be the depth of this excavation. This information will be provided to Soil and Disposal Facility Project Construction Personnel prior to mobilization for this excavation.

All of the above potentially impacted material will be transferred to the OSDF for disposal after excavation is complete. To protect the certified status of A5EF, this soil will not be stockpiled in the certified area. Upon excavation, it will be loaded directly into dump trucks and transferred to the OSDF.

C.4.3 Activity 3 – Real-Time Scan of the Excavated Surface

Upon achieving the excavation criteria (i.e., design grades) as stated above, the excavated surface of both ditch lines, as well as the arsenic result above the FRL, will undergo a real-time scan to verify that residual soil contains radiological COC concentrations below the FRL. This scan will follow guidance

and requirements for Precertification Scans, as detailed in the Real Time Instrumentation Measurement Program (RTIMP) Protocols (User Guidelines, Measurement Strategies, and Operational Factors for Deployment of *In Situ* Gamma Spectrometry at the Fernald Site, DOE 2002b). During Phase 1, mobile NaI detectors will be used to scan as much of this area as possible. Due to the steep side slopes and the depth of this excavation, it is likely that only the Excavation Monitoring System can be used for this scan. If necessary based on exceedances of trigger levels identified in Revision 3 of the RTIMP Protocols, Phase 2 HPGe readings will be collected.

In the unlikely event that results of this real-time scan indicate that any above-FRL material is present, it will be removed as impacted material and the newly excavated surface will be re-scanned. This process will continue until results demonstrate that the excavated surfaces in both ditch lines are below the FRL. At that time, construction of the OSDF Sediment Basin #2 can proceed.

All data collected during this real-time scan will be mapped as total uranium, thorium-232 and radium-226 results. These maps will be compiled into an addendum to the A5EF Certification Report and provided to the EPA and OEPA. Results of physical samples collected from the boring at location A5A-EF17 will also be included in this report.

C.5 CONSTRUCTION OF THE OSDF SEDIMENT BASIN #2

As mentioned above, information related to the design and construction of the OSDF Sediment Basin #2 in A5EF lies outside of this appendix to the A5EF Certification Report. This information in provided in Drawing number 90X-6000-G-00367 for the Subgrade Plan III - Cell 6 Liner System and OSDF Sedimentation Basin #2. Further information is also provided in the pending Design Change Notice 20104-006.

C.6 SCHEDULE OF FIELD ACTIVITIES

The following schedule for the post-certification excavation activities described in this appendix has been established to support a planned date of October 7, 2002 for construction of the OSDF Sediment Basin #2. The field activities and their planned start dates are as follows:

FIELD ACTIVITY	PLANNED START-DATE
Activity 1 – Brush Clearing	September 22, 2002
Activity 2 – Excavation of Potentially Impacted Soil	September 29, 2002
Activity 3 – Real-Time Scan	October 3, 2002

1

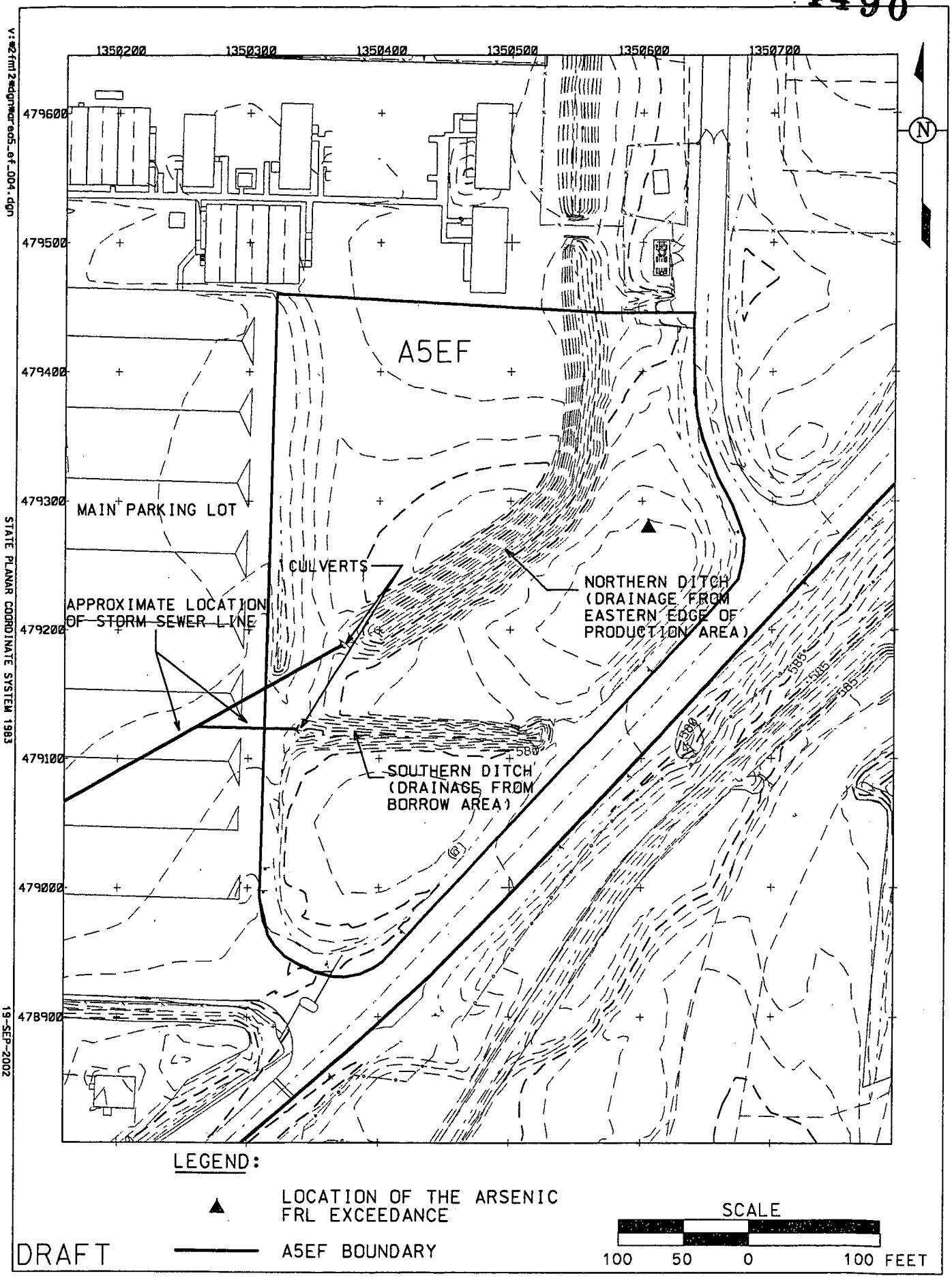

FIGURE C-1. THE AREA 5 EASTERN FIELD SURFACE FEATURES