5890

CERTIFICATION DESIGN LETTER FOR AREA 4A

FERNALD CLOSURE PROJECT
FERNALD, OHIO

MARCH 2005

U.S. DEPARTMENT OF ENERGY

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LIST OF ACRONYMS AND ABBREVIATIONS

ASCOC	area-specific constituent of concern
ASL	analytical support level
BTV	benchmark toxicity value
CDL	Certification Design Letter
COC	constituent of concern
CRDL	contract required detection limit
CU	certification unit
DOE	U.S. Department of Energy
ECOC	ecological constituent of concern
EPA	U.S. Environmental Protection Agency
FPA	Former Production Area
FCP	Fernald Closure Project
FRL	final remediation level
GMA	Great Miami Aquifer
HWMU	hazardous waste management unit
MDC	Main Drainage Corridors
mg/kg	milligrams per kilogram
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
pCi/g	picoCuries per gram
ppm	parts per million
PSP	Project Specific Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
UCL	Upper Confidence Limit
UST	underground storage tank
VSL	validation support level
WAC	waste acceptance criteria
yd^3	cubic yards

EXECUTIVE SUMMARY

This Certification Design Letter (CDL) describes the certification approach for Area 4A. The following information is included:

- The boundary of Area 4A (Figure 1-1) and a description of the areas to be certified under the guidance of this CDL;
- A discussion of historical data from the area proposed for certification;
- A discussion of the area-specific constituent of concern (ASCOC) selection process and list of ASCOCs assigned to Area 4A;
- A presentation of the certification unit (CU) boundaries and proposed sampling strategy;
- The analytical requirements and the statistical methodology that will be employed; and
- The proposed schedule for the certification activities.

The scope of this CDL is limited to the certification of Area 4A, as shown on Figure 1-1. Remediation was complete in Area 4A in 2004, thus initiating the certification process described in this CDL. Field sampling in Area 4A is scheduled to begin immediately following approval of the Area 4A CDL and Project Specific Plan for Area 4A Certification Sampling (DOE 2005).

The certification design presented in this CDL follows the general approach outlined in Section 3.4 of the Sitewide Excavation Plan (DOE 1998). The selection of Area 4A ASCOCs was accomplished using constituent of concern (COC) lists in the Operable Unit 5 Record of Decision (DOE 1996), previous investigation data, and process knowledge. Nine CUs have been defined for this CDL. Total uranium, thorium-228, thorium-232, radium-226, and radium-228 (the sitewide primary radiological COCs) are considered ASCOCs in each CU. Secondary COCs are identified for specific CUs within the certification area, including those for closure of underground storage tank #14.

1.0 INTRODUCTION

This Certification Design Letter (CDL) describes the certification approach for demonstrating that soil in Area 4A meets the final remediation levels (FRLs) for all area-specific constituents of concern (ASCOCs). The format of this CDL follows guidelines presented in the Sitewide Excavation Plan (SEP, DOE 1998). Accordingly, this CDL consists of six sections:

1.0 Introduction - Presentation of the purpose, objectives, and scope of this CDL

2.0 Historical and Precertification Data - Discussion of historical soil data and presentation of precertification data from Area 4A

3.0 Area-Specific Constituents of Concern - Discussion of selection criteria and ASCOCs for Area 4A

4.0 Certification Approach - Presentation of design, sampling and analytical methodologies for Area 4A

5.0 Schedule

References

1.1 OBJECTIVES

The primary objectives of this document are to:

- Define the boundaries of the area to be certified under the guidance of this CDL;
- Present maps for newly acquired real-time data;
- Define the ASCOC selection process and list the selected Area 4A ASCOCs;
- Present the certification unit (CU) boundaries and proposed certification sampling strategy;
- Summarize the analytical requirements and the statistical methodology that will be employed; and
- Present the proposed schedule for the certification activities.

1.2 SCOPE AND AREA DESCRIPTION

The scope of this CDL includes details of certification sampling, analysis and validation that will take place in Area 4A. The Area 4A certification area has been reduced for the scope of this CDL due to the location of the Main Drainage Corridor (MDC) and the field location of the run-on/run-off controls,

which were based on the current area topography. Figure 1-1 depicts the original layout of Area 4A and Figure 1-2 depicts the area in 4A that is to be certified under this CDL.

Area 4A is located in the southeast quadrant of the Former Production Area (FPA) and is bound by 2nd Street to the north, "E" Street to the east, 1st Street to the south, and "B" Street to the west, as shown on Figure 1-1. Predominant structures formerly located in Area 4A include Plant 4, Plant 5, Plant 6, and Plant 7. Area 4A also includes a high-leachability zone where the total uranium FRL is 20 milligrams per kilogram (mg/kg); underground storage tank (UST) #14; and hazardous waste management unit (HWMU) #36, as shown on Figure 1-3. The entire Area 4A was approximately 17.33 acres. However, due to the MDC, only approximately 10.58 acres will be included in the scope of this CDL (Figure 1-2). The Area 4A area perimeter to the north, to the south, to the east, and to the west outside of the run-on control ditches, and HWMU #36 will be included in the scope of the MDC CDL or another adjacent area. Figure 1-4 depicts the topography of Area 4A to be certified.

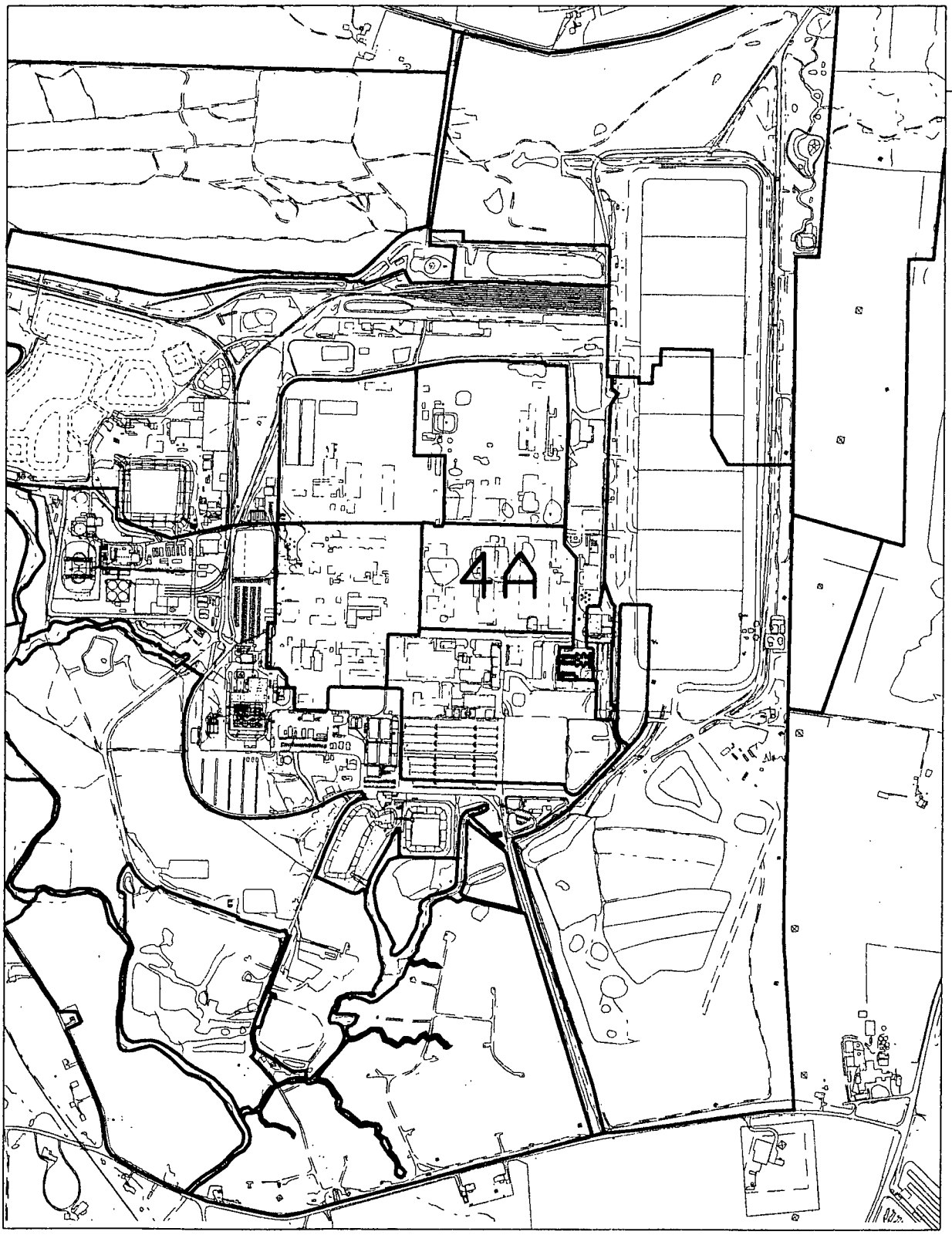

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FIGURE 1-1. AREA 4A LOCATION MAP

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STATE PLANAR COORDINATE SYSTEM 1983
31-MAR-2005

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STATE PLANAR COORDINATE SYSTEM 1983

31-MAR-2005

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AREA TO BE CERTIFIED

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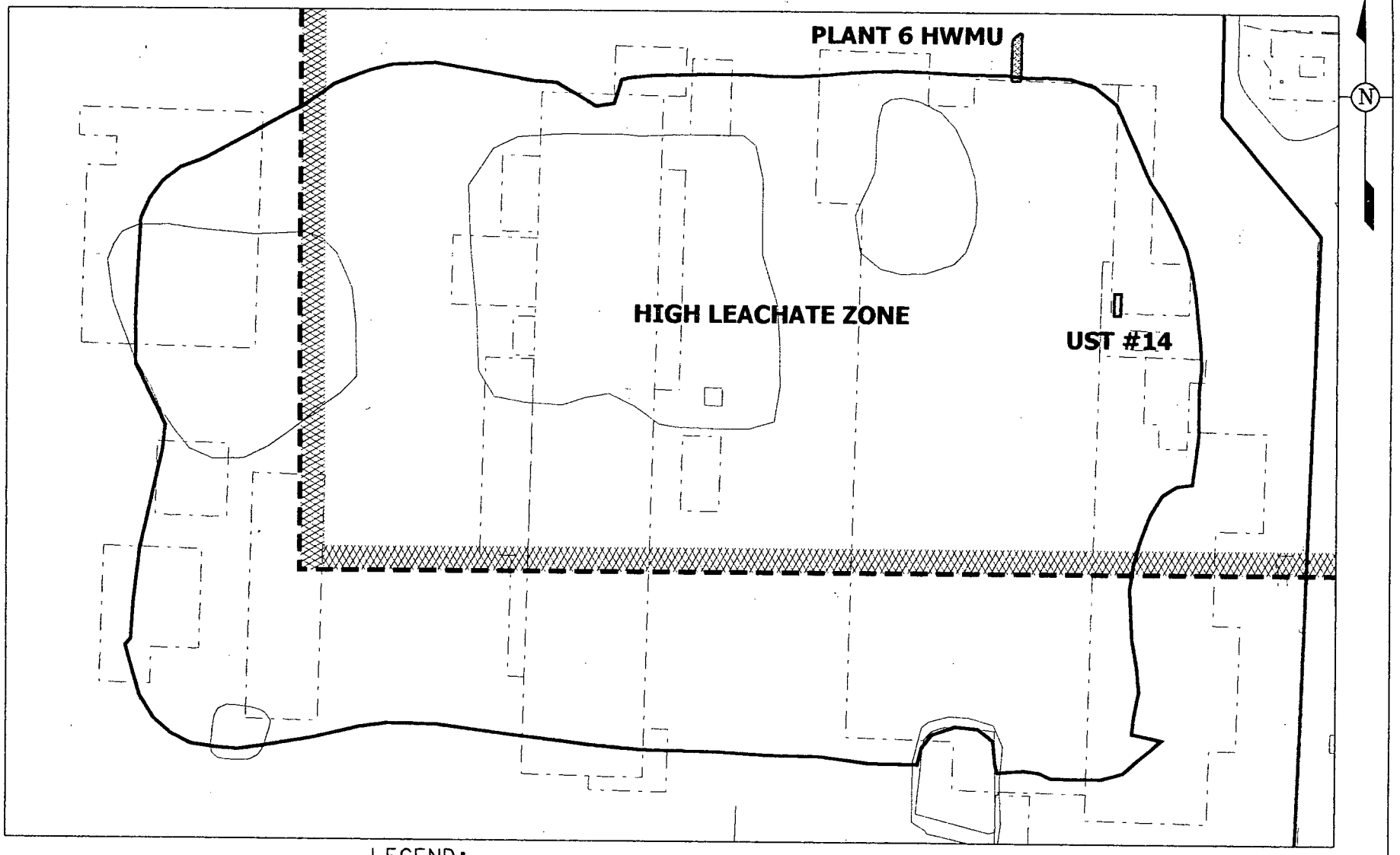
FIGURE 1-2. AREA 4A CERTIFICATION AREA BOUNDARY



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AREA BOUNDARY

HIGH LEACHATE BOUNDARY

SCALE

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STATE PLANAR COORDINATE SYSTEM 1983

FIGURE 1-3. AREA 4A HISTORICAL FEATURES

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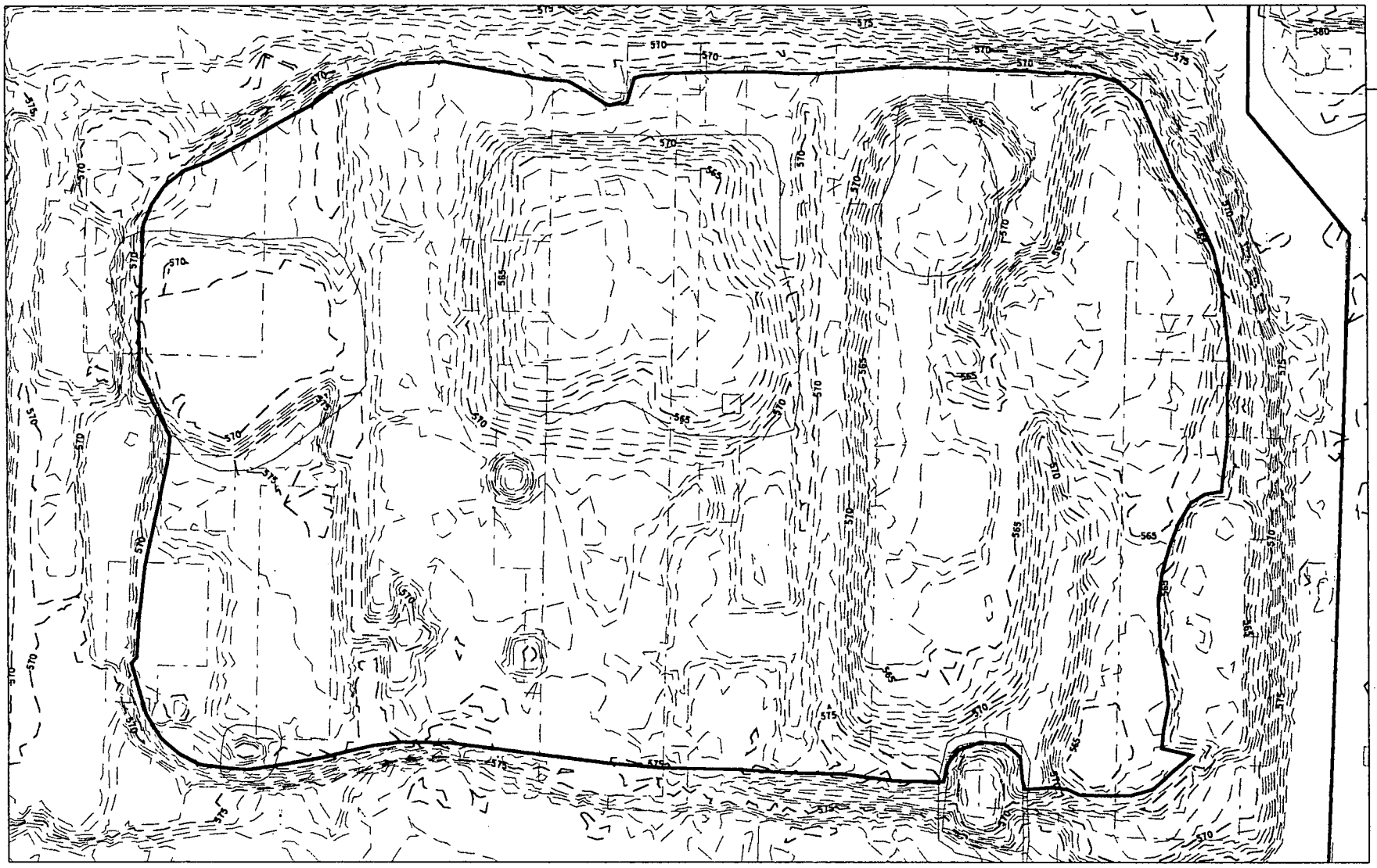

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STATE PLANAR COORDINATE SYSTEM 1983

FIGURE 1-4. AREA 4A TOPOGRAPHY

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2.0 HISTORICAL AND PRECERTIFICATION DATA

In accordance with the SEP, prior to conducting precertification and certification activities, all soil demonstrated to contain contamination above the associated FRLs or other applicable action levels must be evaluated for remedial actions.

In addition to the Predesign Investigations, the Remedial Investigation Reports (RI, DOE 1995a and 1995b), and Feasibility Study Reports (FS, DOE 1995c and 1995d) for Operable Units (OU) 3 and 5 were used for remedial design of Area 4A. Final grade excavation monitoring/sampling and real-time scanning/sampling data have been collected pursuant to the RI/FS and remedial activities.

Before initiating the certification process, all historical soil data within the Area 4A certification area was pulled from the Sitewide Environmental Database (SED), and is summarized in Section 2.1.

Based on the results of sampling and scanning activities summarized below, it has been determined that no further remedial actions are necessary to remove above-FRL or above-waste acceptance criteria (WAC) soil.

2.1 AREA 4A

2.1.1 Area 4A Historical, Predesign and Excavation Control

All historical data for Area 4A is presented in the Implementation Plan for 3A/4A (DOE 2001). This includes data collected during the RI/FS and during two separate predesign investigations; Project Specific Plan (PSP) for Area 3A/4A Surface Predesign Investigation (DOE 1999a) and PSP for Area 3A/4A Subsurface Predesign Investigation (DOE 1999b). Data were also collected during the remediation/excavation activities for excavation control and following the remediation/excavation activities for precertification per the PSP for Area 3A/4A Excavation Characterization and Precertification (DOE 2002).

Below is a brief discussion of the remediation/excavation activities in Area 4A that follow this order: above-WAC areas, UST area, and breaching the sand lens of the Great Miami Aquifer (GMA).

There were four designed above-WAC areas in Area 4A; each was located within Plant 6. East Plant 6 was above-WAC for tetrachloroethene, technetium-99, and uranium. North Central Plant 6, South Plant 6,

and Northeast Plant 6 were above-WAC for technetium-99 and uranium. All of the above-WAC material was removed during the remediation/excavation activities in Area 4A. During remediation/excavation activities in Area 4A the above-WAC area in Plant 6 was expanded laterally and vertically due to the presence of visible product material. Additional excavation was performed until all of the product material was removed. Once all of the above-WAC material was removed from these areas, the excavation proceeded to remove the remaining above-FRL material.

UST #14, located in eastern Plant 6, was approved abandoned (closed) in place in March 1995, as stated in Table 2-2 of the SEP as well as the Closeout Report for UST #14 (DOE 1995e). During excavation activities within Area 4A, UST #14 was removed. Additional information about UST #14 can be found in Section 2 of the SEP and Section 4 of this CDL. Additional information about the constituents of concern (COCs) for the closure of the discovered UST is discussed in Section 3.

During removal of hydraulic casings in Plant 5, two excavation locations came within 5 feet of the sands and gravels of the GMA. Excavation in east Plant 6 as well as the Plant 6 sump also came within 5 feet of the sands and gravels of the GMA. While excavating a hotspot that was discovered during precertification activities, one additional location in Plant 6 came within 5 feet of the sands and gravels of the GMA (see Section 2.1.2 for further discussion of precertification activities). Prior to backfilling the areas that came within 5 feet of the sands and gravels of the GMA, sampling was performed per the PSP for Area 3A/4A Excavation Characterization and Precertification. Further discussion on sampling of these areas is located in Section 4.1.3 of this CDL.

The final above-WAC soil volume removed from Area 4A was 37,004 (bank) cubic yards (yd^3). The final above-FRL soil and concrete volume removed from Area 4A was 188,726 (bank) yd^3. Figure 2-1 shows a color gradient map of Area 4A that compares the final excavation grade to that of the design grade. This figure demonstrates that all planned soil excavation has been performed within the scaled down certification area of Area 4A.

2.1.2 Area 4A Precertification Data

According to guidelines established in Section 3.3.3 of the SEP, precertification activities were conducted to evaluate residual radiological contamination patterns as specified in the Area 3A/4A Excavation Characterization and Precertification PSP. Prior to conducting a precertification real-time scan, Area 4A was scanned with a magnetometer to determine if residual debris remained following excavation activities.

Minor occurrences of metallic objects were located and were either excavated or hand picked from the area.

During Phase 1 of precertification, four total uranium hotspots were detected that were greater than three times the FRL (20 mg/kg) in the east portion of Area 4A (Figure A-4). The hotspots were delineated (Figure A-8) and the areas were excavated. Following excavation of the areas, Phase III measurements were performed to confirm that the excavation removed the contamination, but there were three locations that still exceeded greater than three times the FRL. Again, the areas were delineated (Figure A-9) and excavated. Following the second excavation, Phase 3 measurements were performed again and one location, to the north, still exceeded greater than three times the FRL. The area was delineated (Figure A-10) and excavated for a third time. Physical samples were also collected from another hotspot location where the excavation came within 5 feet of the sands and gravels of the GMA. Following the third excavation, Phase 3 measurements were performed and again, the location exceeded greater than three times the FRL. The area was delineated (Figure A-11) and excavated for a fourth time. Following the fourth excavation, Phase 3 measurements were performed and the area passed the precertification requirements (Figure A-12).

With the successful removal of the hot spot, all areas in Area 4A passed the requirements of precertification. The results of the precertification scans are presented on data maps in Appendix A.

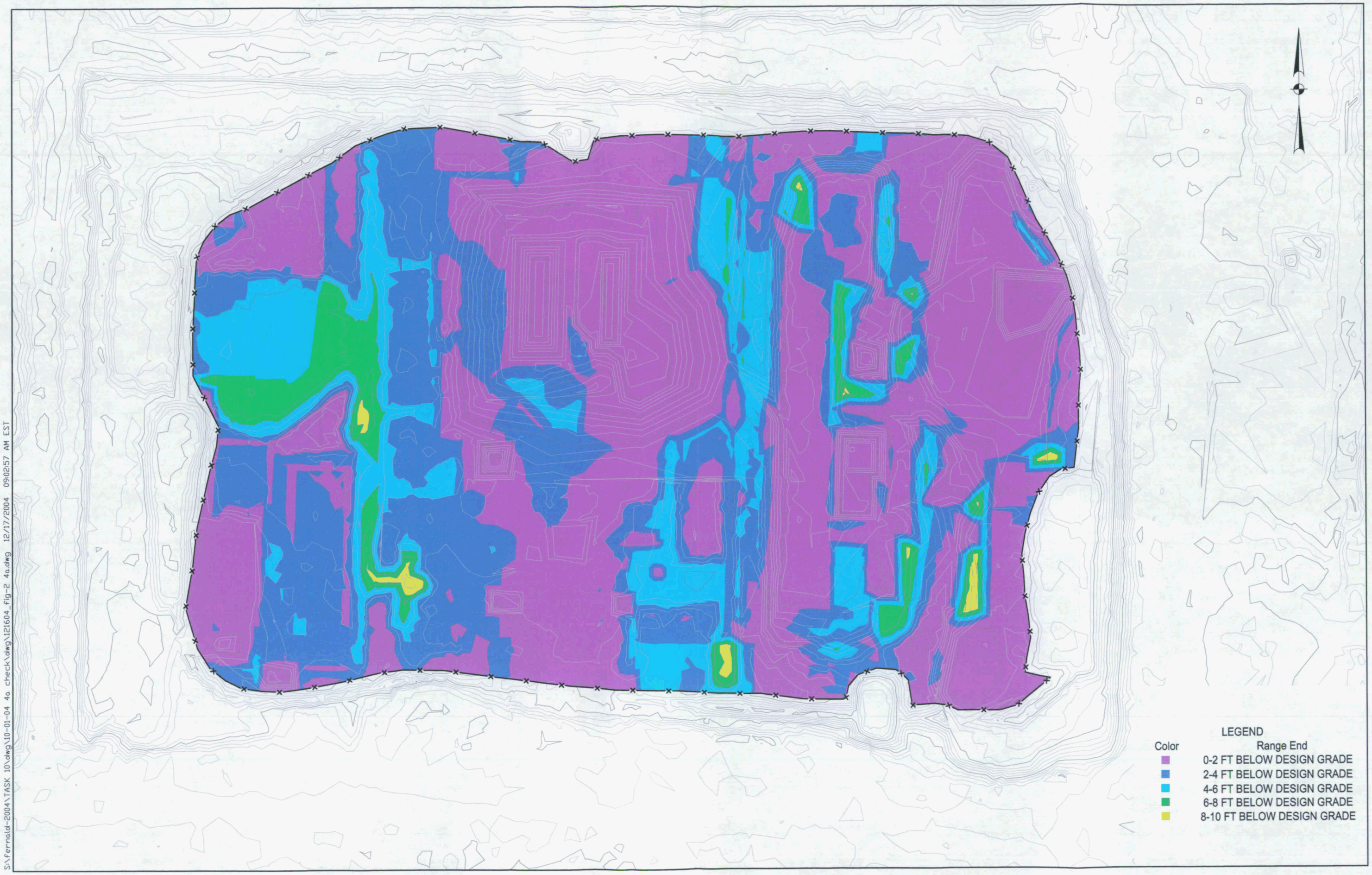

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Figure 2-1 Area 4A Final Grade Contours

3.0 AREA-SPECIFIC CONSTITUENTS OF CONCERN

In the OU5 Record of Decision (ROD, DOE 1996), there are 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 this contaminant. In spite of the conservative nature of this COC retention process, 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, the FRLs were initially screened against site data presented on spatial maps to establish a picture of potential remediation areas.

By reviewing existing RI/FS data presented on spatial distribution maps, the sitewide list of soil COCs in the OU5 ROD was reduced from 80 to 30. This reduction was possible because the majority of the COCs with FRLs listed in the OU5 ROD have no detections 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. When planning certification for a remediation area, additional selection criteria are used to derive a subset of these 30 COCs. This subset of COCs is passed along to the certification process.

3.1 SELECTION CRITERIA

The selection process for retaining ASCOCs for a remediation area is driven by applying a set of decision criteria. A soil contaminant will be retained as an ASCOC if:

- 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;
- It is listed as a COC for a HWMU or UST that lies within the certification area boundary;
- It can be traced to site use in the remediation area of interest, either through process knowledge or known release of the constituent to the environment;
- Analytical results indicate that a contaminant is present above its FRL, and the above-FRL concentrations are not attributable to false positives or elevated CRDLs;
- 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; or

- The contaminant is one of the sitewide primary COCs (total uranium, radium-226, radium-228, thorium-238, and thorium-232).

Using the above process, the ASCOCs were refined to those listed in Table 2-7 of the SEP. The list of ASCOCs is also presented in Table 3-1 with their respective FRLs.

3.1.1 Area 4A ASCOC Selection

Each COC on the Remediation Area 4 ASCOC list (Table 3-1) was evaluated for its relevance to Area 4A. Table 3-2 presents the reasoning for either retaining or eliminating the ASCOC. In addition to the assigned COCs for Remediation Area 4, additional COCs with above-FRL concentrations include 1,1-dichloroethene and 1,2-dichloroethene, both which will be retained for certification. Table 2-2 of the SEP listed methanol as the COC for UST #14, therefore, methanol will also be retained for samples collected in support of UST #14 closure.

TABLE 3-1
AREA 4 ASCOC LIST[a]

ASCOC	FRL/(*BTV*)[b]
Radionuclides	
Total Uranium	82 mg/kg
Total Uranium[c]	20 mg/kg
Radium-226	1.7 pCi/g
Radium-228	1.8 pCi/g
Thorium-228	1.7 pCi/g
Thorium-232	1.5 pCi/g
Cesium-137	1.4 pCi/g
Plutonium-238	78 pCi/g
Strontium-90	14 pCi/g
Technetium-99	30.0 pCi/g
Thorium-230	280 pCi/g
Chemical	
Aroclor-1254	0.13 mg/kg
Aroclor-1260	013 mg/kg
Benzo(a)pyrene	20. mg/kg
Bromodichloromethane	4 mg/kg
Dieldrin	0.015 mg/kg
Fluoride	78,000 mg/kg
Tetrachloroethene	3.6 mg/kg
Methanol[d]	31.3 mg/kg[d]
Metals	
Arsenic	12.0 mg/kg
Beryllium	1.5 mg/kg
Lead	400 mg/kg
Ecological	
Antimony	96 mg/kg/(*10 mg/kg*)

[a]As listed in Table 2-7 of the SEP.
[b]Benchmark toxicity value (BTV) applies to Ecological COCs.
[c]The total uranium FRL is lower in the defined high leachability zones.
[d]Methanol does not have an associated soil FRL. 31.3 mg/kg is listed on Table 1 of the June 2004 *Closure Plan Review Guidance for RCRA Facilities*, written by the Ohio Environmental Protection Agency (OEPA) Division of Hazardous Waste Management (OEPA 2004).

pCi/g – picoCuries per gram

TABLE 3-2
ASCOC LIST FOR AREA 4A

ASCOC	Retained as ASCOC?	Justification	CU(s)
Radionuclides			
Total Uranium	Yes	Primary Radionuclide	All[a]
Radium-226	Yes	Primary Radionuclide	All
Radium-228	Yes	Primary Radionuclide	All
Thorium-228	Yes	Primary Radionuclide	All
Thorium-232	Yes	Primary Radionuclide	All
Cesium-137	No	Not detected at concentrations above the FRL	None
Plutonium-238	No	Only one above-FRL concentration at 5 to 5.5 feet but captured during above-WAC excavation	None
Strontium-90	No	Only one above-FRL concentration at 1.5 to 2 feet but captured during above-WAC excavation	None
Technetium-99	Yes	Above-FRL and above-WAC concentrations within Area 4A	All
Thorium-230	No	Not detected at concentrations above the FRL	None
Chemical			
Aroclor-1254	No	Not detected at concentrations above the FRL	None
Aroclor-1260	No	Not detected at concentrations above the FRL	None
Benzo(a)pyrene[b]	No	Not detected at concentrations above the FRL	None
Bromodichloromehtane	No	Not detected at concentrations above the FRL	None
Dieldrin	No	Not detected at concentrations above the FRL	None
Fluoride	Yes	Not previously sampled in Area 4A and process knowledge indicates use in Area 4A	1-8
Tetrachloroethene	Yes	Above-FRL concentrations within Area 4A	6
1,1-dichloroethene	Yes	Above-FRL concentrations within Area 4A	6
1,2-dichloroethene	Yes	Above-FRL concentrations within Area 4A	6
Methanol	Yes	UST #14 specific COC	9-UST14
Metals			
Arsenic	Yes	Above-FRL concentrations within Area 4A	5
Beryllium	Yes	Above-FRL concentrations within Area 4A	7
Lead	No	Not detected at concentrations above the FRL	None
Ecological			
Antimony	No	Not an ECOC in Area 4A per Appendix C of the SEP	None

[a]CUs 2 through 6 and 9-UST14 fall in the high leachability zones where the uranium FRL = 20 mg/kg

ECOC – ecological constituent of concern

4.0 CERTIFICATION APPROACH

4.1 CERTIFICATION DESIGN

The certification design for Area 4A follows the general approach outlined in Section 3.4 of the SEP. The design for Area 4A is depicted on Figure 4-1 and the sample locations are depicted in Figure 4-2. As discussed in Section 3.0 of this document, the five primary ASCOCs (total uranium, radium-226, radium-228, thorium-228, and thorium-232) will be retained in each CU. Additional secondary COCs are identified for specific CUs within the certification area as well as unique COCs for the UST.

Many factors were taken into consideration when determining the boundaries for each CU within Area 4A. These factors include: areas defined as high leachability zones, historical land use, proximity to other areas of the site, residual COC data, and previous existence of USTs and HWMUs. Additionally, since Area 4A falls within the FPA, it is considered to be an impacted area, and will therefore be comprised of Group 1 CUs to allow for more concentrated sampling and ensure excavation activities had no effect on the soil.

4.1.1 Area 4A Certification Unit Design

Area 4A consists of nine CUs. Eight CUs are Group 1 CUs that were designed around the high-leachability area. As shown of Figure 4-1, CUs 1, 7, and 8 are outside of the high leachability area while CUs 2 through 6 are entirely within the high leachability area.

Due to the presence of UST #14 in Area 4A, the certification effort must include demonstration of soil FRL attainment and UST closure. Per Section 2.2.6 of the SEP:

- Each UST footprint will form a distinct CU.
- At least eight samples will be collected from the excavated base and sidewalls for each UST.
- Samples will be analyzed for the COCs identified for each particular UST in Table 2-2 of the SEP.

A ninth CU has been established for the footprint of UST #14. This CU also falls within the boundary of the high leachability area. The COC for UST #14 is methanol, which does not have an associated soil FRL. However, eight samples will be collected for methanol analysis and the Residential Generic Cleanup Number (31.3 mg/kg) will be used in place of a FRL. This number is listed on the Closure Plan Review Guidance for Resource Conservation and Recovery Act (RCRA) Facilities (OEPA 2004), written by the OEPA Division of Hazardous Waste Management. The Residential Generic Cleanup Number will be used

for statistical analysis if any residual methanol is detected in the samples collected for methanol. In addition to the samples collected for methanol analysis, eight samples will also be collected for analysis of the primary radiological COCs (total uranium, radium-226, radium-228, thorium-228, and thorium-232) as well as technetium-99. The eight sample locations for UST #14 are shown on Figure 4-3.

4.1.2 Sample Location Design for Area 4A

For the eight Group 1 CUs, the selection of certification sampling locations was conducted according to 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 criteria for the CU. If the minimum distance criteria were not met, an alternative random location was selected for that sub-CU, and all the locations were re-tested. This process continued, until all 16 random locations met the minimum distance criteria. The sub-CUs and planned certification sampling locations are shown on Figure 4-2. Four of the 16 sample locations (one location from each quadrant of the CU) are designated with a "V," indicating archive sample locations. One sample location in the CU is designated with a "D," indicating a field duplicate sample collection location. Samples will be collected for analysis from 0 to 6 inches at 12 of the 16 locations in each CU. The four samples designated as "archive" will not be collected unless they are needed for additional analysis.

The selection of sampling locations for the UST #14 CU was also conducted according to Section 3.4.2 of the SEP however, there are only eight sample locations and no archive or duplicate sample locations are designated. Samples will be collected for analysis from 0 to 6 inches at all eight locations as shown on Figure 4-3.

As discussed in Section 2.0, several breaches of the GMA occurred in Area 4A. During the excavation and backfill process, samples were collected from either the exposed sand/soil or the clay plugs in accordance with Section 3.5 of the Implementation Plan for Area 3A/4A. These samples were analyzed and validated consistent with the certification protocols. Each location may be considered with its respective CU during statistical analysis. For the breaches in Plant 5, CU 2 contains previously collected samples 4ARP5SM-1 and 4ARP5SM-2. For the breaches in Plant 6, CU 3 contains previously collected samples from borings 4A-P6-C1, 4A-P6-C2, and 4A-P6-C3; CU 4 contains previously collected samples from borings 4A-P6-C4, 4A-P6-C5, 4A-P6-C6, 4A-P6-C7, and 4A-P6-C8. These locations are identified on Figure 4-4.

Prior to commencement of certification sampling field activities, all certification sample locations will be surveyed and field verified to make sure no surface obstacles will prevent collection at the planned location. Locations may be moved if a subsurface obstacle prevents collection. Requirements for moving a certification sample location will be discussed in the PSP for Area 4A Certification Sampling (DOE 2005).

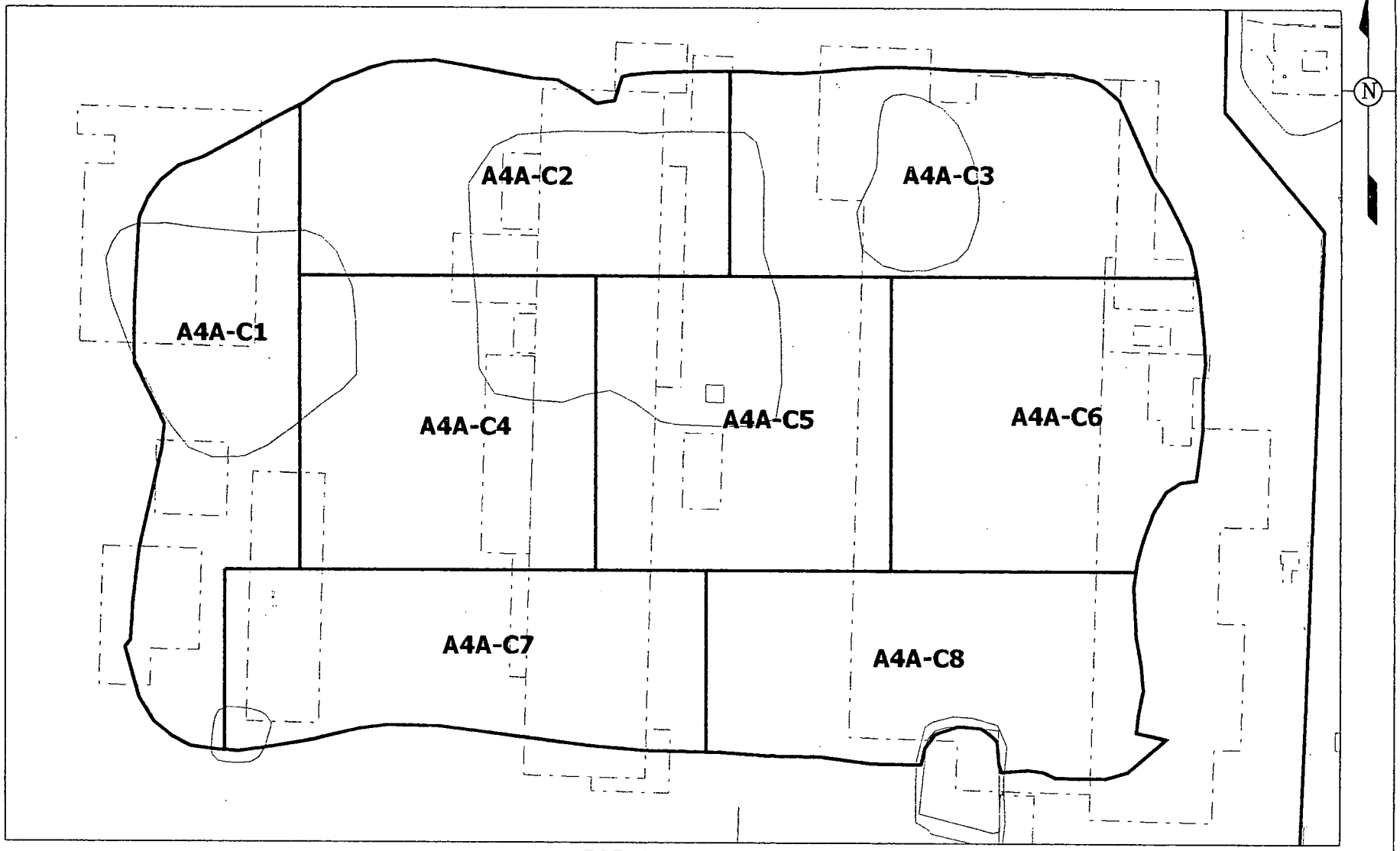
4.2 ANALYTICAL METHODOLOGY AND STATISTICAL ANALYSIS

Laboratory analysis of certification samples will be conducted using an approved analytical method, as discussed in Appendix H of the SEP. Analyses will be conducted to Analytical Support Level (ASL) D or E, where all requirements for ASL E are the same as ASL D except the minimum detection level for the selected analytical method must be at least 10 percent of the FRL. A minimum of 10 percent of the laboratory data will be validated to Validation Support Level (VSL) D with the remainder validated to VSL B. Samples rejected during validation will be re-analyzed, or an archive sample will be submitted for analysis. Once data are validated, results will be entered into the SED and a statistical analysis will be performed to evaluate the pass/fail criteria for each CU. The statistical approach is discussed in Section 3.4.3 and Appendix G of the SEP, and will be the same for Area 4A as has been for previous certification efforts.

Two criteria must be met for the CU to pass certification. If the data distribution is normal or lognormal, the first criterion compares the 95 percent Upper Confidence Limit (UCL) on the mean of each primary ASCOC to its FRL. On an individual CU basis, any ASCOC with the 95 percent UCL above the FRL results in that CU failing certification. If the data distribution is not normal or lognormal, the appropriate nonparametric approach discussed in Appendix G of the SEP will be used to evaluate the second criterion. The second criterion is related to individual samples. An individual sample cannot be greater than two times the FRL or three times the FRL, based on the area size (see Section 3.4.6 and Figure 3-11 of the SEP for further details). When the given UCL on the mean for each ASCOC is less than its FRL, and the hot spot criterion is met, the CU has met both criteria and will be considered certified.

There are three conditions that could result in a CU failing certification: 1) high variability in the data set, 2) localized contamination, and 3) widespread contamination. Details on the evaluation and responses to these possible outcomes are provided in Section 3.4.5 of the SEP. When all CUs within the scope of this CDL have passed certification, a certification report will be issued. The certification report will be submitted to the U.S. Environmental Protection Agency (EPA) and OEPA to receive acknowledgement

that the pertinent OU remedial actions were completed and the individual CUs are certified and ready to be released for interim or final land use. Section 7.4 of the SEP provides additional details and describes the required content of the Certification Report.



LEGEND:

CU BOUNDARY

SCALE

120 60 0 120 FEET

v:#2fm12#dgn#4a_005.dgn
STATE PLANAR COORDINATE SYSTEM 1983

FIGURE 4-1. AREA 4A CU BOUNDARY MAP

09-MAR-2005

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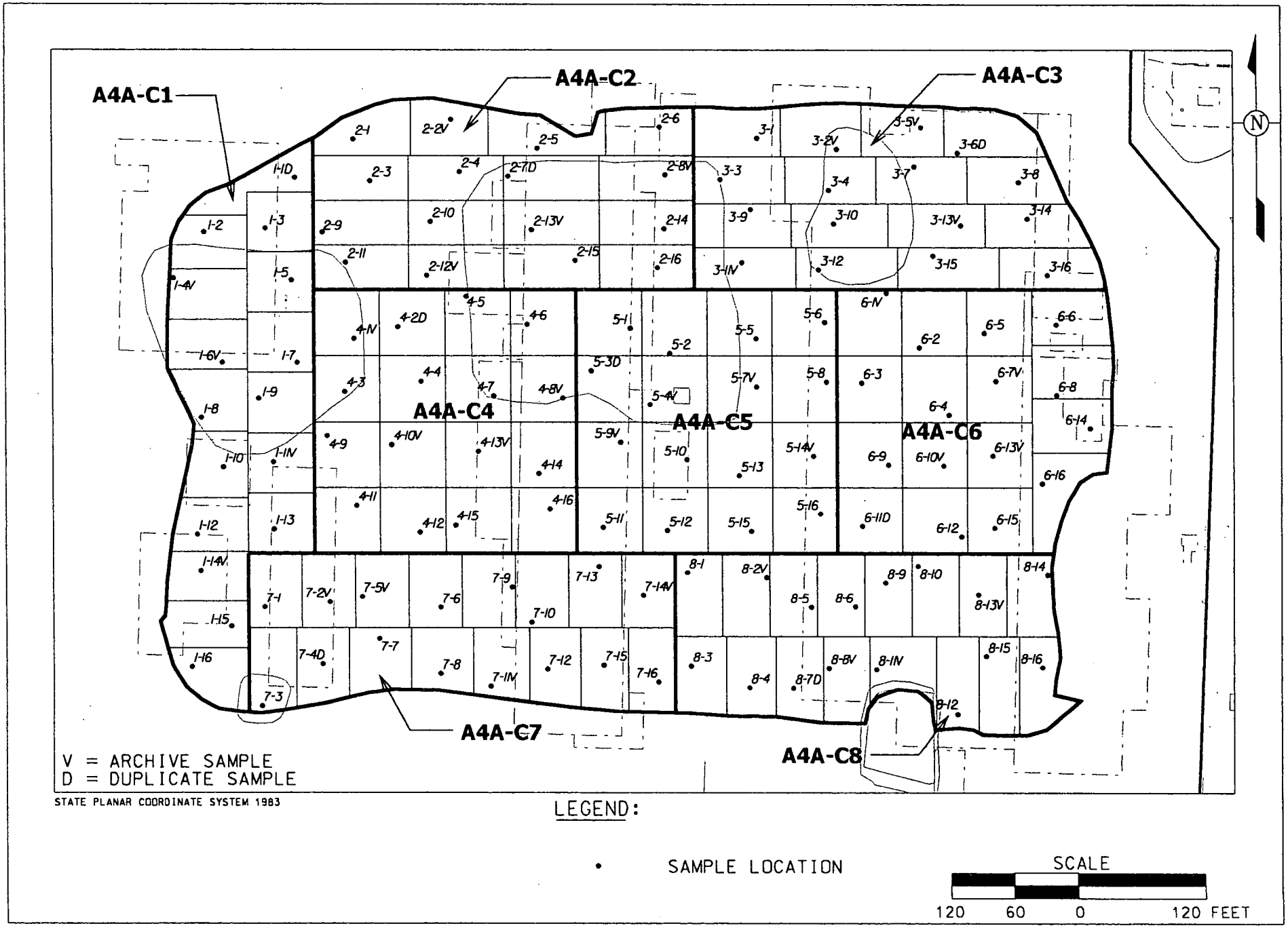


v:\2fm12\dgn\4a_006.dgn

FIGURE 4-2. AREA 4A SUB-CU BOUNDARY AND CERTIFICATION SAMPLING LOCATIONS

09-MAR-2005

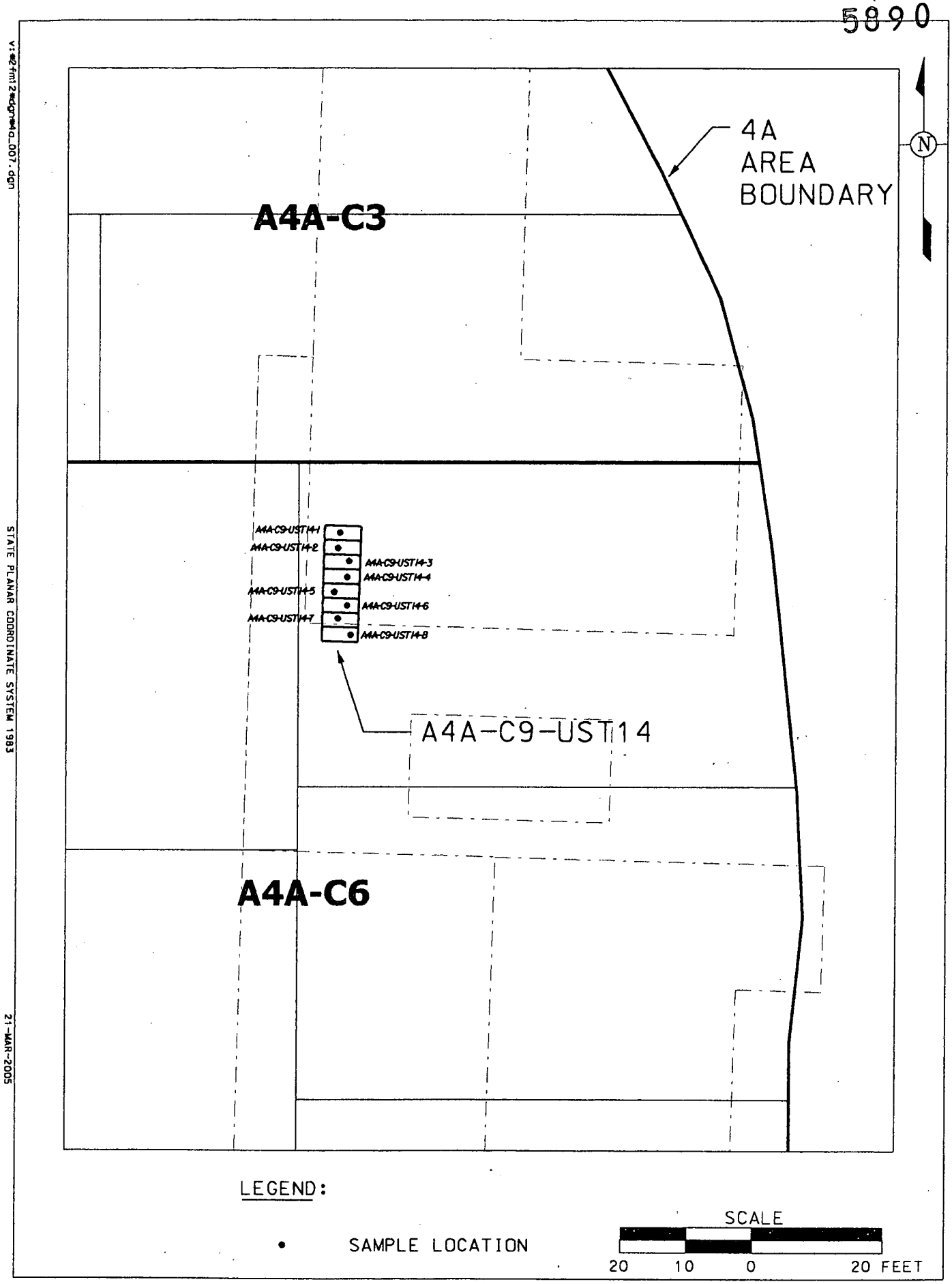
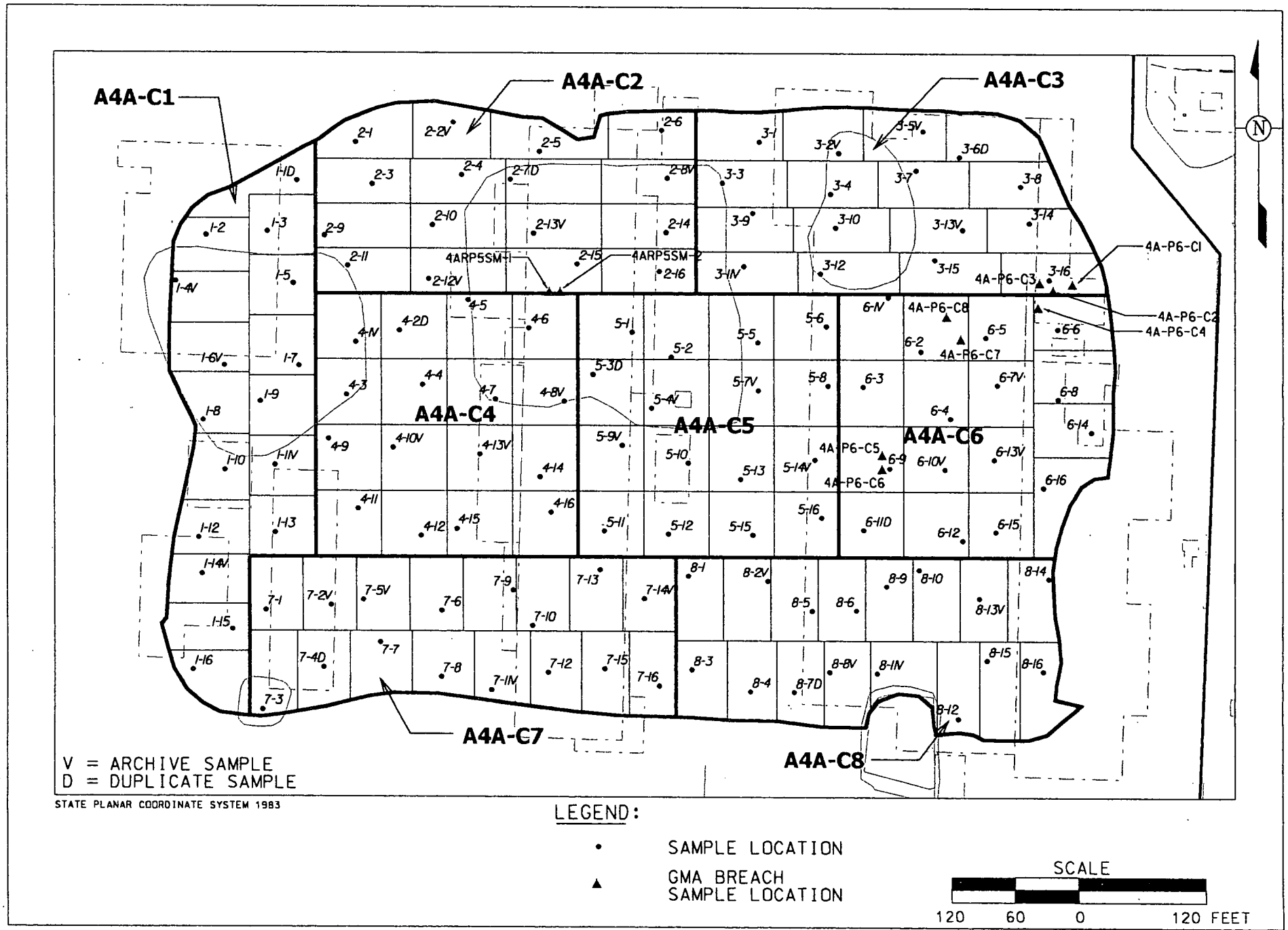


FIGURE 4-3. AREA 4A UST #14 FOOTPRINT SAMPLING LOCATIONS

v:\02fm12\dgn\4a_007.dgn
STATE PLANAR COORDINATE SYSTEM 1983
21-MAR-2005



v:\2fm12\dgn\4a_008.dgn

FIGURE 4-4. AREA 4A GMA BREACH SAMPLE LOCATIONS

09-MAR-2005

5.0 SCHEDULE

The following draft schedule shows key activities for the completion of the work within the scope of this CDL. Implementation of this schedule is pending funding availability. If necessary, an extension will be requested.

Activity	Target Date
Submittal of Certification Design Letter	December 27, 2004 [a]
Start of Certification Sampling	February 7, 2005
Complete Field Work	February 16, 2005
Complete Analytical Work	March 18, 2005
Complete Data Validation and Statistical Analysis	March 31, 2005
Submit Certification Report	April 15, 2005[a]

[a]The date for submittal of the Certification Design Letter and Certification Report are commitments to EPA and OEPA. Other dates are internal target completion dates.

REFERENCES

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U.S. Department of Energy, 1995b "Remedial Investigation Report for Operable Unit 5," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

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U.S. Department of Energy, 1995d "Feasibility Study Report for Operable Unit 5," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

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

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U.S. Department of Energy, 1999a, "Project Specific Plan for Area 3A/4A Surface Predesign Investigation," Revision 0, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

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U.S. Department of Energy, 2001, "Implementation Plan for Area 3A/4A," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 2002, "Project Specific Plan for Area 3A/4A Excavation Characterization and Precertification," Revision 0, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U.S. Department of Energy, 2005, "Project Specific Plan for Area 4A Certification Sampling," Revision 0, Fernald Closure Project, DOE, Fernald Area Office, Cincinnati, Ohio.

APPENDIX A

PRECERTIFICATION REAL-TIME SCAN DATA FOR AREA 4A

TABLE A-1
AREA 4A PHASE 2 - HPGe RESULTS DETECTOR HEIGHT 31 cm

Location ID	Measurement Date	Northing	Easting	Detector Height (cm)	Ra-226 (pCi/g)	Th-232 (pCi/g)	Total U (ppm)
A4A-P2-HPG-1140	04Oct04	480122	1350207	31	1.448	0.716	48.6
A4A-P2-HPG-1167	04Oct04	480282	1349457	31	1.495	1.09	7.63E-02
A4A-P2-HPG-1168	04Oct04	480147	1349534	31	1.17	0.795	0
A4A-P2-HPG-1168-D	04Oct04	480147	1349534	31	1.179	0.781	6.23E-02
A4A-P2-HPG-1169	04Oct04	480271	1349704	31	1.074	0.667	12.1
A4A-P2-HPG-1173	07Oct04	480173	1349403	31	2.627	1.08	6.04E-02
A4A-P2-HPG-1173-D	07Oct04	480173	1349403	31	2.648	1.11	0
A4A-P2-HPG-1312	29Nov04	480132	1350004	31	1.026	0.791	31.6
A4A-P2-HPG-1313	29Nov04	480132	1349965	31	1.318	0.775	19.9
A4A-P2-HPG-1313-D	29Nov04	480132	1349965	31	1.35	0.908	21.6
A4A-P2-1320	17Dec0	480138	1349840	31	1.164	0.726	34.7
A4A-P2-1320-D	17Dec04	480138	1349840	31	1.236	0.79	31.8
A4A-P2-1321	17Dec04	480187	1349819	31	1.286	0.85	19
A4A-P2-HL-HPG-1123	04Oct04	480498	1350109	31	1.568	0.769	296
A4A-P2-HL-HPG-1123-D	04Oct04	480498	1350109	31	1.692	0.79	298
A4A-P2-HL-HPG-1125	04Oct04	480476	1350080	31	1.431	0.766	25.6
A4A-P2-HL-HPG-1125-D	04Oct04	480476	1350080	31	1.465	0.693	25.4
A4A-P2-HL-HPG-1124	04Oct04	480460	1350064	31	1.603	0.92	351
A4A-P2-HL-HPG-1122	04Oct04	480283	1350153	31	1.331	0.734	21.3
A4A-P2-HL-HPG-1156	05Oct04	480505	1349772	31	2.013	0.93	16.1
A4A-P2-HL-HPG-1157	05Oct04	480534	1349771	31	2.192	0.915	12.5
A4A-P2-HL-HPG-1158	05Oct04	480541	1349765	31	2.284	0.855	12.3
A4A-P2-HL-HPG-1159	05Oct04	480532	1349741	31	2.324	0.92	13.5
A4A-P2-HL-HPG-1159-D	05Oct04	480532	1349741	31	2.424	0.883	14.4
A4A-P2-HL-HPG-1160	05Oct04	480476	1350073	31	2.212	0.846	27
A4A-P2-HL-HPG-1161	05Oct04	480364	1350150	31	2.173	0.795	105
A4A-P2-HL-HPG-1166	05Oct04	480385	1350143	31	1.267	0.713	56.7
A4A-P2-HL-HPG-1170	06Oct04	480383	1349587	31	1.364	0.838	30.6
A4A-P2-HL-HPG-1171	06Oct04	480380	1349577	31	1.227	0.828	14.5
A4A-P2-HL-HPG-1172	06Oct04	480544	1349611	31	1.006	0.625	18.9
A4A-P2-HL-HPG-1174	07Oct04	480606	1350098	31	1.987	0.644	201
A4A-P2-HL-HPG-1182	08Oct04	480335	1349982	31	1.968	0.806	5.09E-02
A4A-P2-HL-HPG-1183	08Oct04	480282	1349914	31	1.568	0.63	15.8
A4A-P2-HL-HPG-1184	08Oct04	480354	1349699	31	1.874	0.826	9.26
A4A-P2-HL-HPG-1185	08Oct04	480362	1349685	31	1.586	0.867	6.95E-02
A4A-P2-HL-HPG-1186	08Oct04	480294	1350026	31	1.674	0.725	10.6
A4A-P2-HL-HPG-1314	29Nov04	480280	1350140	31	1.234	0.763	28.9
A4A-P2-HL-HPG-1315	29Nov04	480627	1350126	31	1.122	0.647	17.8

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TABLE A-1
AREA 4A PHASE 2 - HPGe RESULTS DETECTOR HEIGHT 31 cm

Location ID	Measurement Date	Northing	Easting	Detector Height (cm)	Ra-226 (pCi/g)	Th-232 (pCi/g)	Total U (ppm)
A4A-P2-HL-HPG-1316	29Nov04	480490	1350050	31	1.304	0.737	27.1
A4A-P2-HL-HPG-1317	29Nov04	480662	1350040	31	1.207	0.703	10.3
A4A-P2-HL-HPG-1318	29Nov04	480388	1349971	31	1.389	0.751	8.40E-02
A4A-P2-HL-HPG-1319	29Nov04	480283	1349967	31	1.134	0.783	15.1
A4A-P2-HL-1322	17Dec04	480417	1349617	31	1.297	0.852	18.7
A4A-P2-HL-1323	17Dec04	480471	1349609	31	1.332	0.819	42.1
A4A-P2-HL-1324	17Dec04	480406	1350082	31	1.424	0.758	13.7

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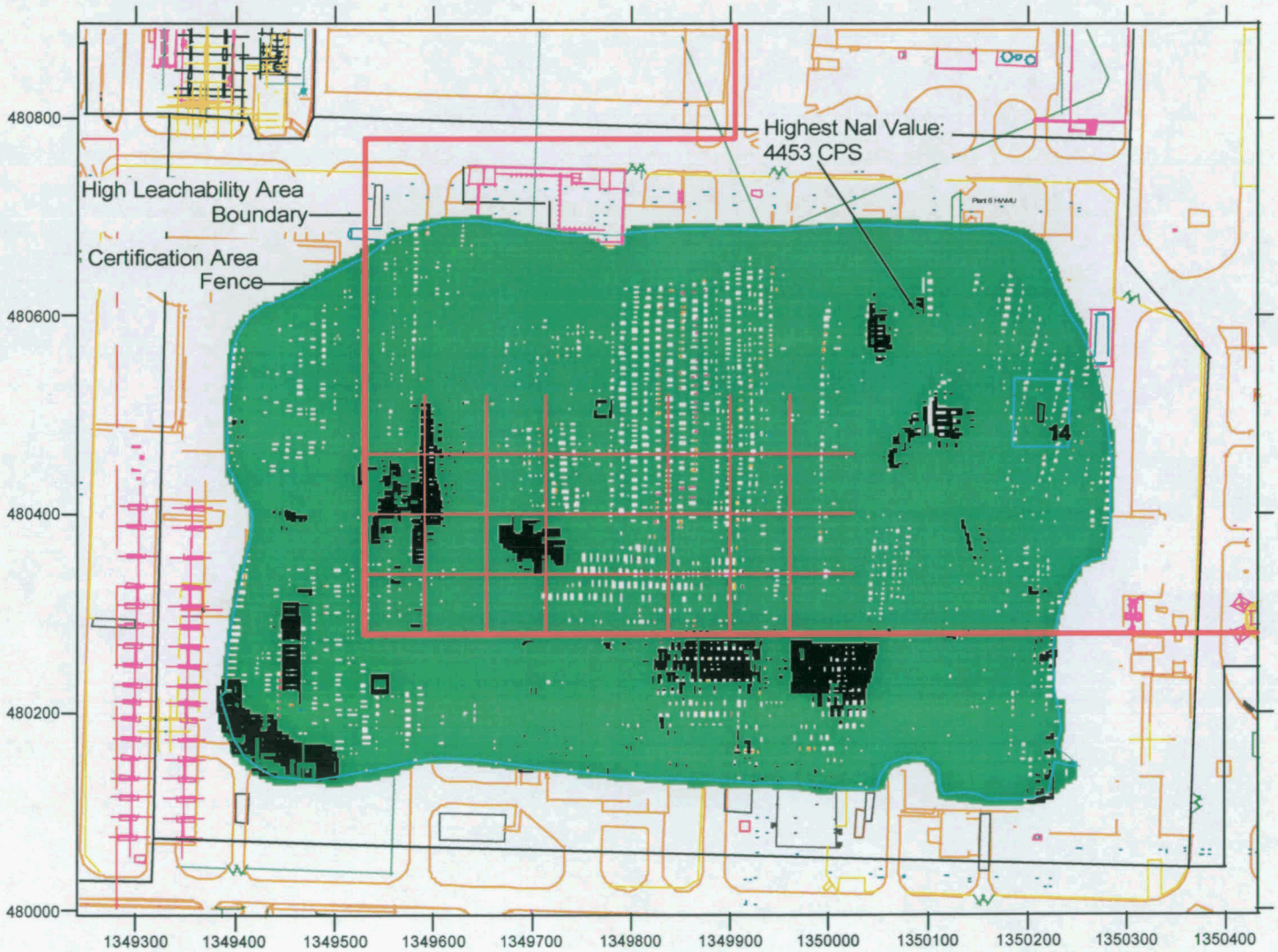
Figure A-1 Area 4A Phase 1
Total Gross Counts per Second

N

Field of View to Scale
NaI Batch#: RSS1-1381,1384,1390,1393,1399,1402,1436,1506; RSS3-565,633,635,638;
Gator-336,339,363,364
Measurement Date: 9/30/04 - 12/16/04



NaI
TCPS

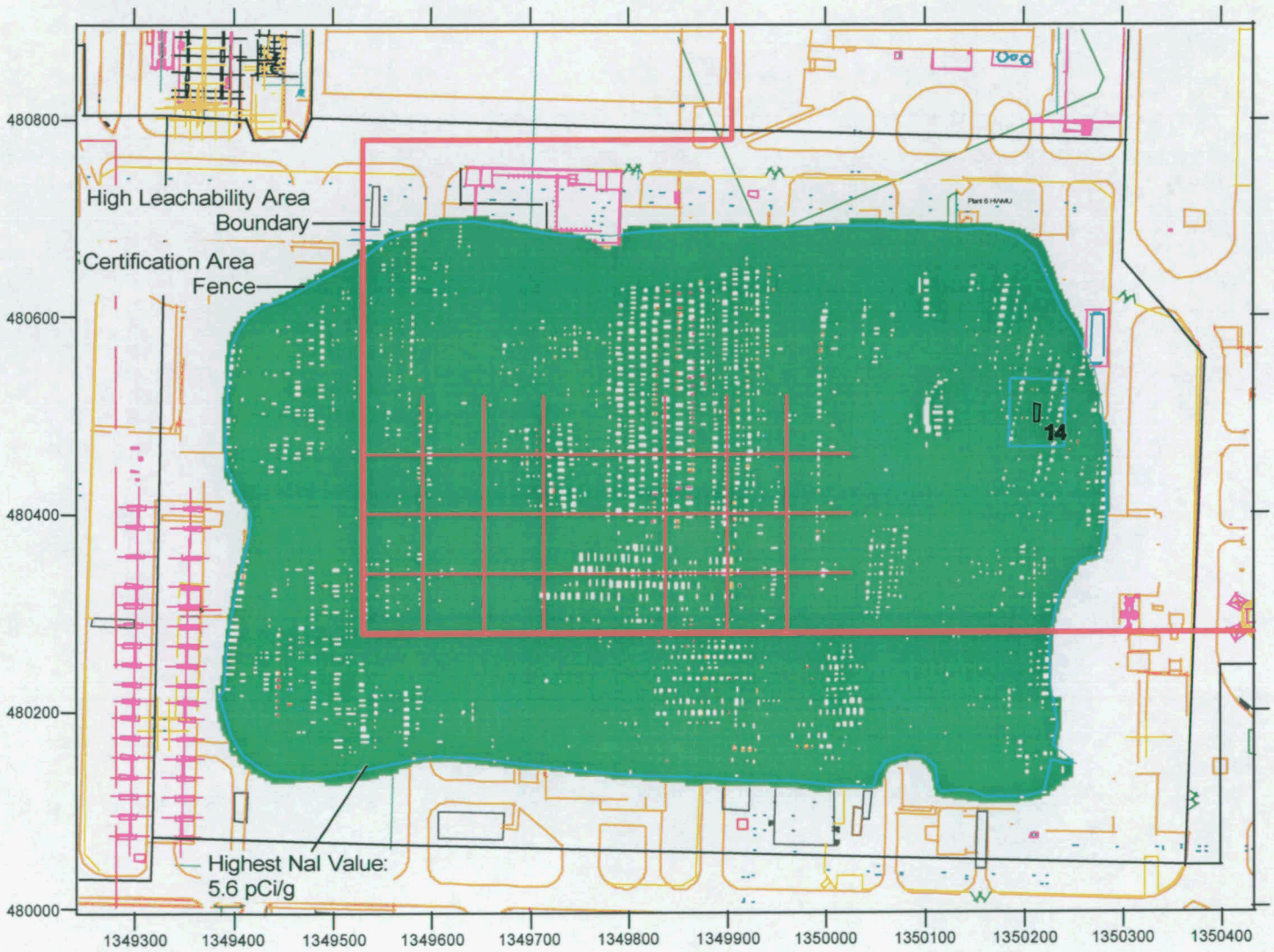
- 0 to 3000
- 3000 to 5000
- 5000 to 15000
- 15000 to 18000
- 18000 to 99999

RTIMP DWG Title: A4A_P1_TC.srf
Project Name: A3A/4A Exc. Char.
Project #: 20200-PSP-0009
Verified By: C. Baumann/78329
Date Verified: 12/16/04
Support Data: A4A_P1_HL_NaI.xls
A4A_P1_NaI.xls

Figure A-2 Area 4A Phase 1 Moisture Corrected Radium-226

N

Field of View to Scale
NaI Batch#: RSS1-1381,1384,1390,1393,1399,1402,1436,1506; RSS3-565,633,635,638; Gator-336,339,363,364
Measurement Date: 9/30/04 - 12/16/04



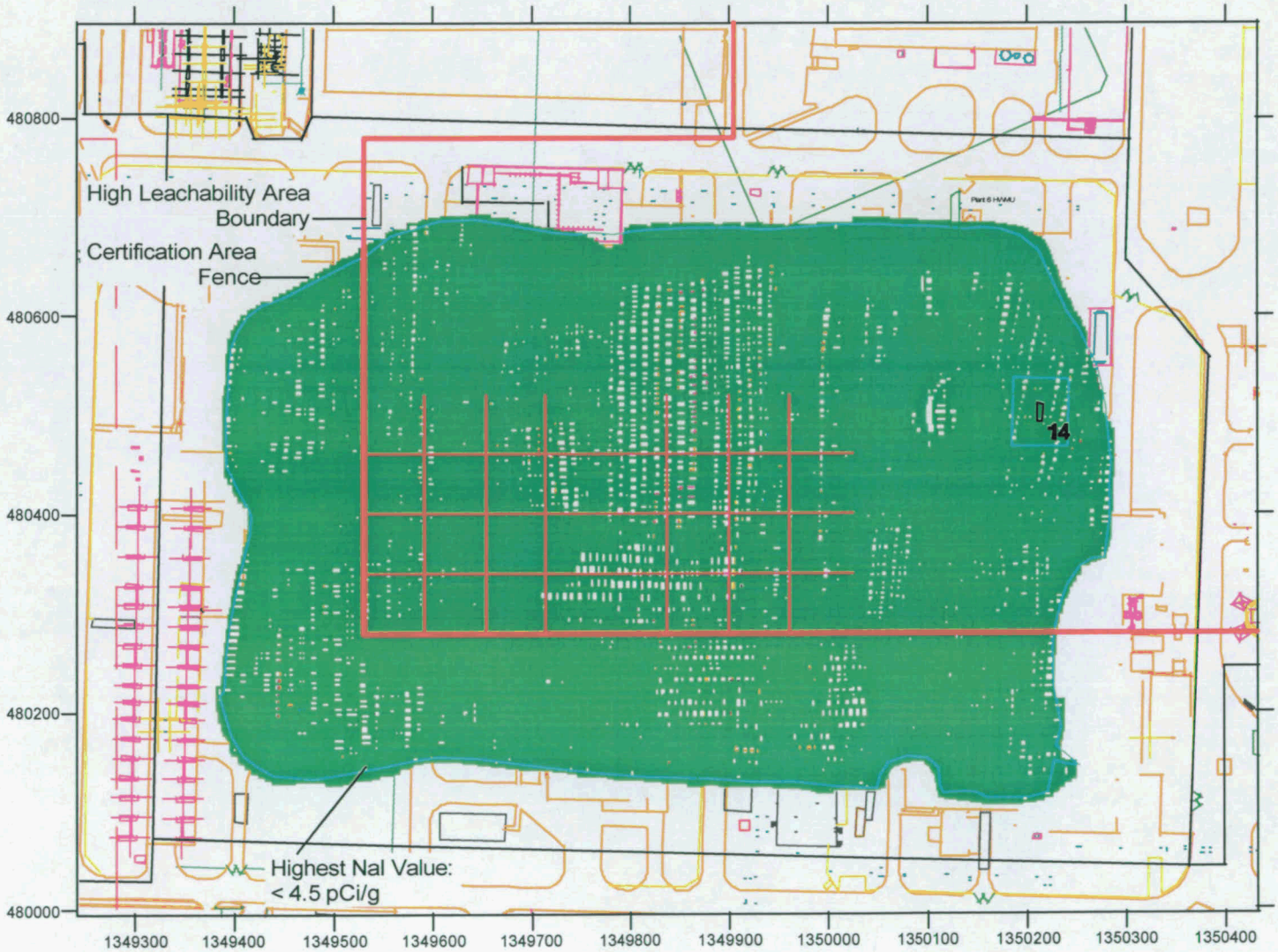
NaI Ra-226 (pCi/g)	
-9999 to 5.1	
5.1 to 9999	

RTIMP DWG Title: A4A_P1_RA.srf
Project Name: A3A/4A Exc. Char.
Project #: 20200-PSP-0009
Verified By: C. Baumann/78329
Date Verified: 12/16/04
Support Data: A4A_P1_HL_NaI.xls
A4A_P1_NaI.xls

Figure A-3 Area 4A Phase 1
Moisture Corrected Thorium-232

N

Field of View to Scale
NaI Batch#: RSS1-1381,1384,1390,1393,1399,1402,1436,1506; RSS3-565,633,635,638;
Gator-336,339,363,364
Measurement Date: 9/30/04 - 12/16/04



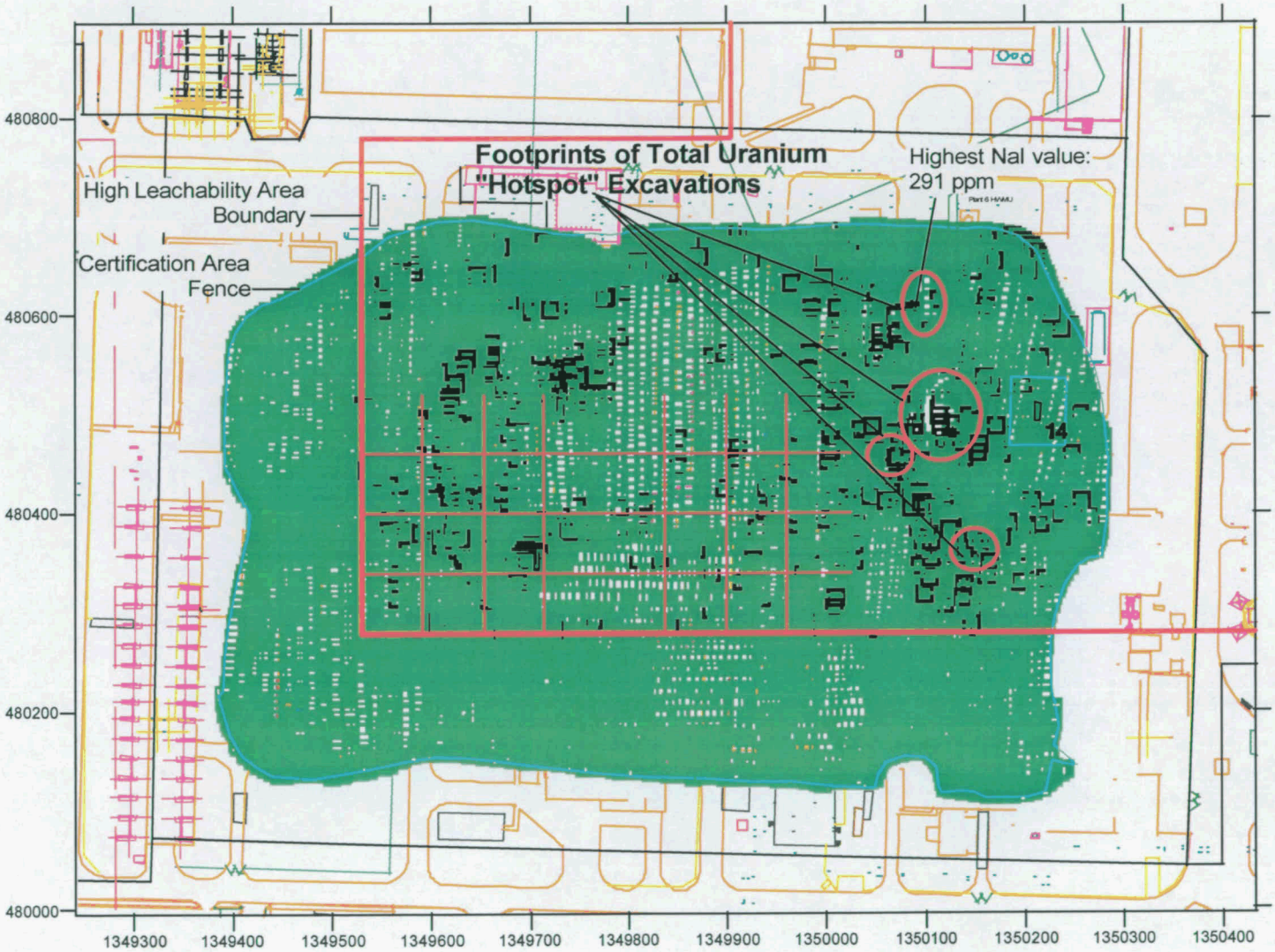
NaI
Th-232 (pCi/g)
-9999 to 4.5
4.5 to 9999

RTIMP DWG Title: A4A_P1_TH.srf
Project Name: A3A/4A Exc. Char.
Project #: 20200-PSP-0009
Verified By: C. Baumann/78329
Date Verified: 12/16/04
Support Data: A4A_P1_HL_NaI.xls
A4A_P1_NaI.xls

Figure A-4 Area 4A Phase 1 Moisture Corrected Total Uranium

N

Field of View to Scale
NaI Batch#: RSS1-1381,1384,1390,1393,1399,1402,1436,1506; RSS3-565,633,635,638; Gator-336,339,363,364
Measurement Date: 9/30/04 - 12/16/04



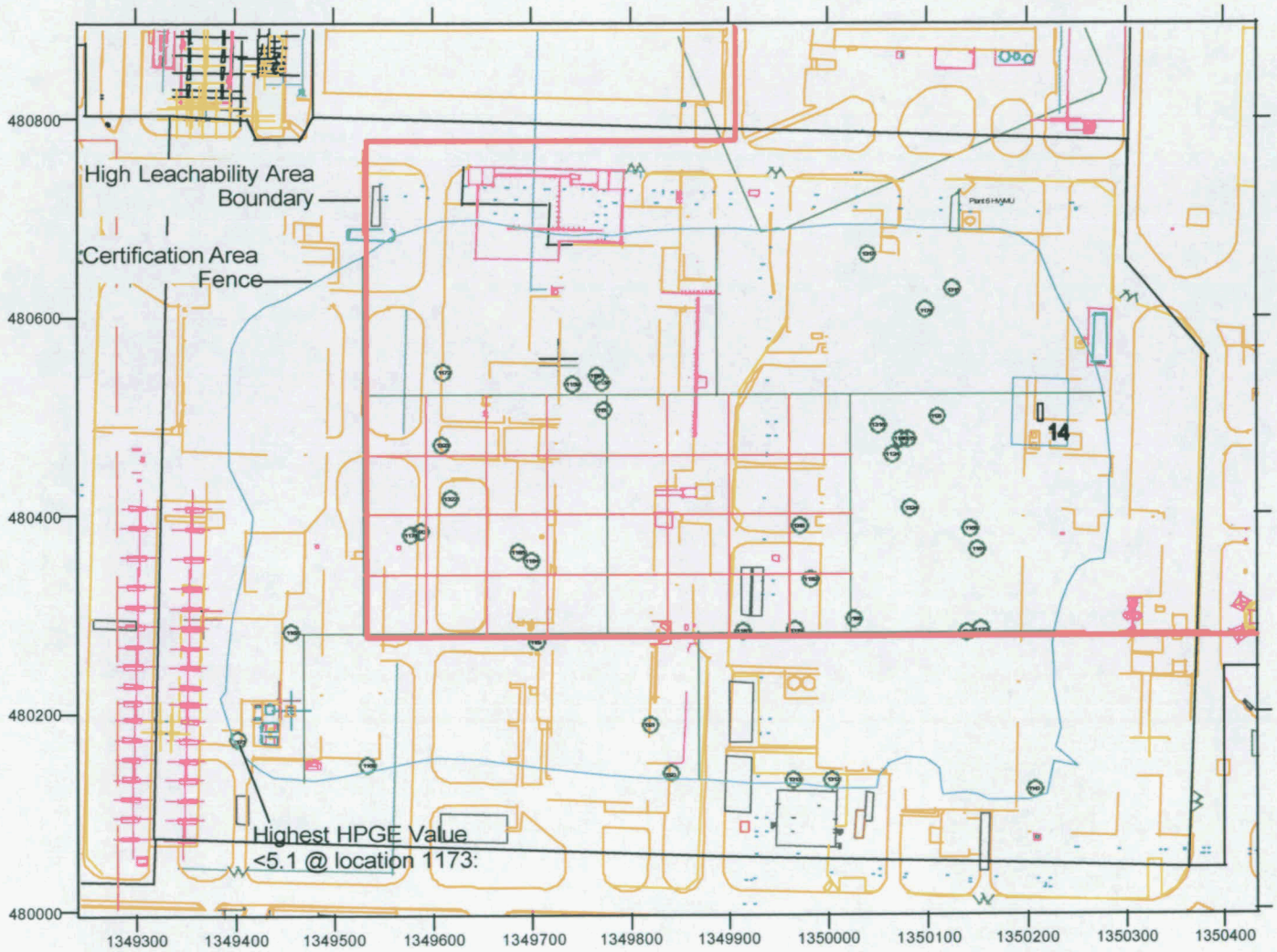
NaI Total U (ppm) FRL = 20	
	-194 to 60
	60 to 875
	875 to 9999

NaI Total U (ppm) FRL = 82	
	-251 to 246
	246 to 875
	875 to 9999

RTIMP DWG Title: A4A_P1_TU.srf
Project Name: A3A/4A Exc. Char.
Project #: 20200-PSP-0009
Verified By: C. Baumann/78329
Date Verified: 12/16/04
Support Data: A4A_P1_HL_NaI.xls
A4A_P1_NaI.xls

Figure A-5 Area 4A Phase 2 Moisture Corrected Radium-226

Field of View to Scale
HPGe DET#: 30699, 31204, 40293
Measurement Date: 10/01/04 - 12/17/04



HPGe @ 31 cm
Ra-226 (pCi/g)
- 0 to 5.1
- 5.1 to 9999

RTIMP DWG Title: A4A_CU1_P2_RA.srf
Project Name: A3A/4A Exc. Char. & PreCert
Project #: 20200-PSP-0009
Verified By: Curt Baumann/78329
Date Verified: 12/20/04
Support Data: A4A_P2_HPGe_31cm.xls
A4A_P2_HL_HPGe_31cm.xls

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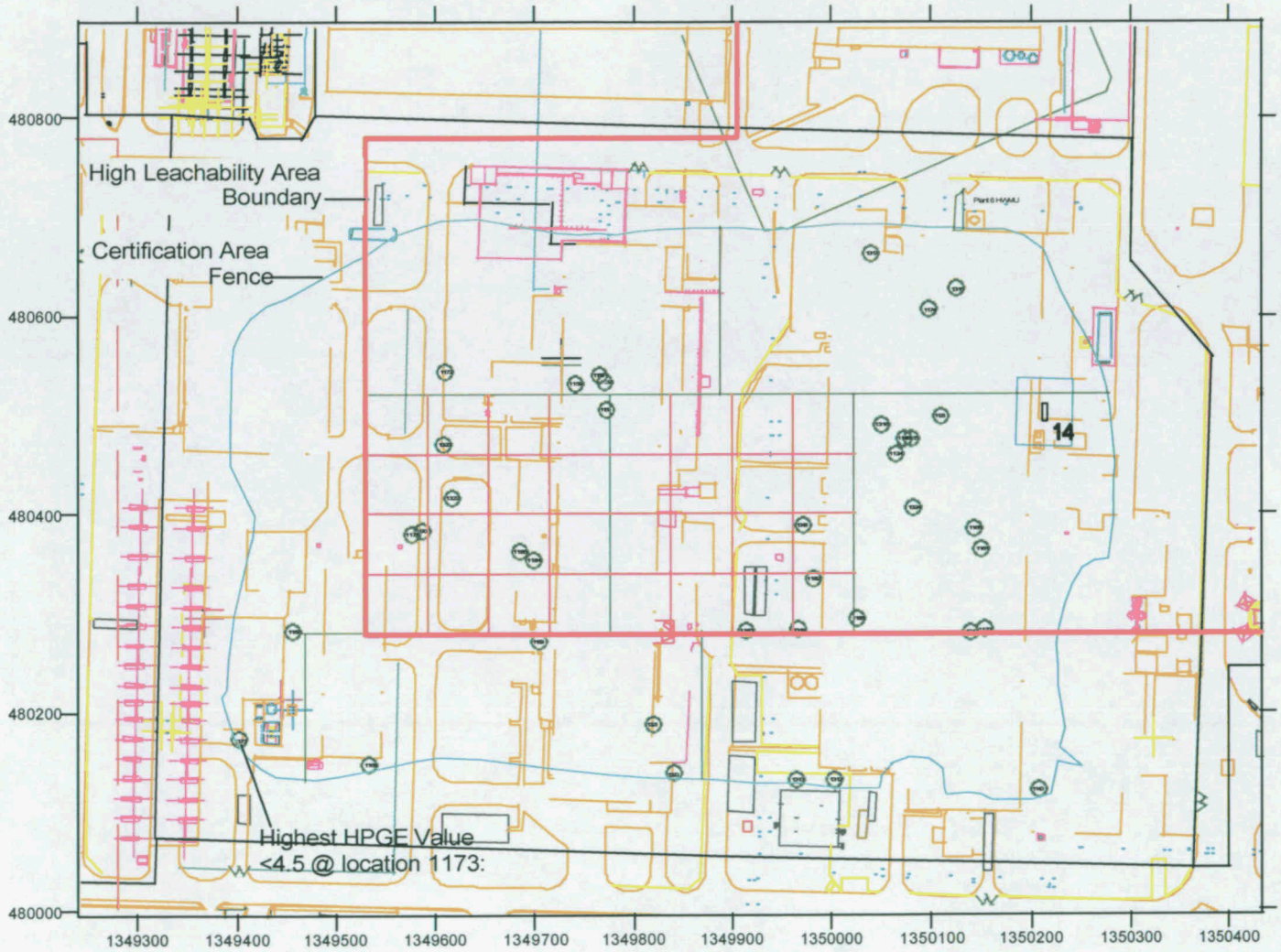
Figure A-6 Area 4A Phase 2 Moisture Corrected Thorium-232

N

Field of View to Scale
HPGe DET#: 30699, 31204, 40293
Measurement Date: 10/01/04 - 12/17/04

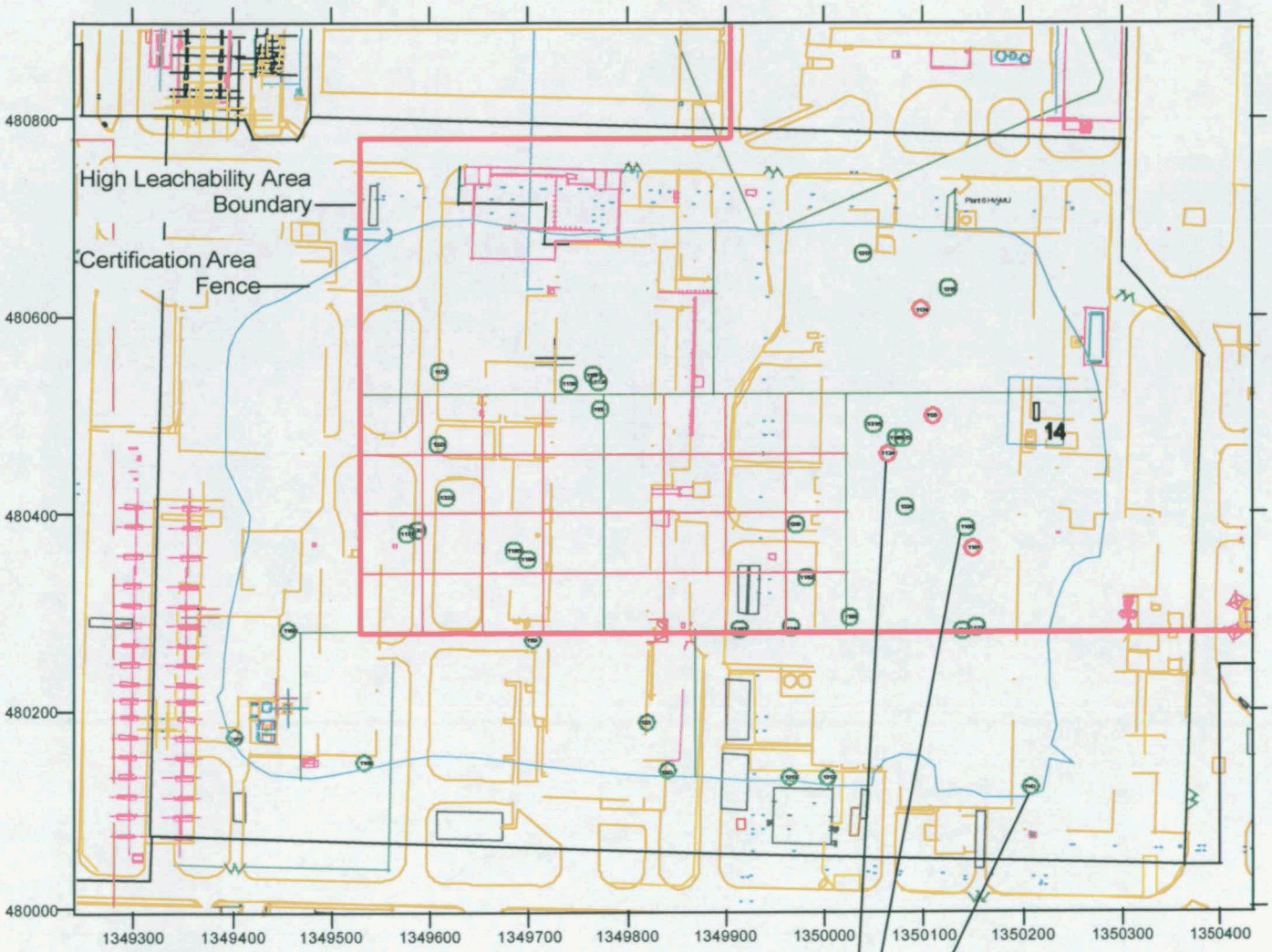


HPGe @ 31 cm
Th-232 (pCi/g)
0 to 4.5
4.5 to 9999

RTIMP DWG Title: A4A_P2_TH.srf
Project Name: A3A/4A Exc. Char. & PreCert
Project #: 20200-PSP-0009
Verified By: Curt Baumann/78329
Date Verified: 12/20/04
Support Data: A4A_P2_HPGe_31cm.xls
A4A_P2_HL_HPGe_31cm.xls

Figure A-7 Area 4A Phase 2
Moisture Corrected Total Uranium

Field of View to Scale
HPGe DET#: 30699, 31204, 40293
Measurement Date: 10/01/04 - 12/17/04



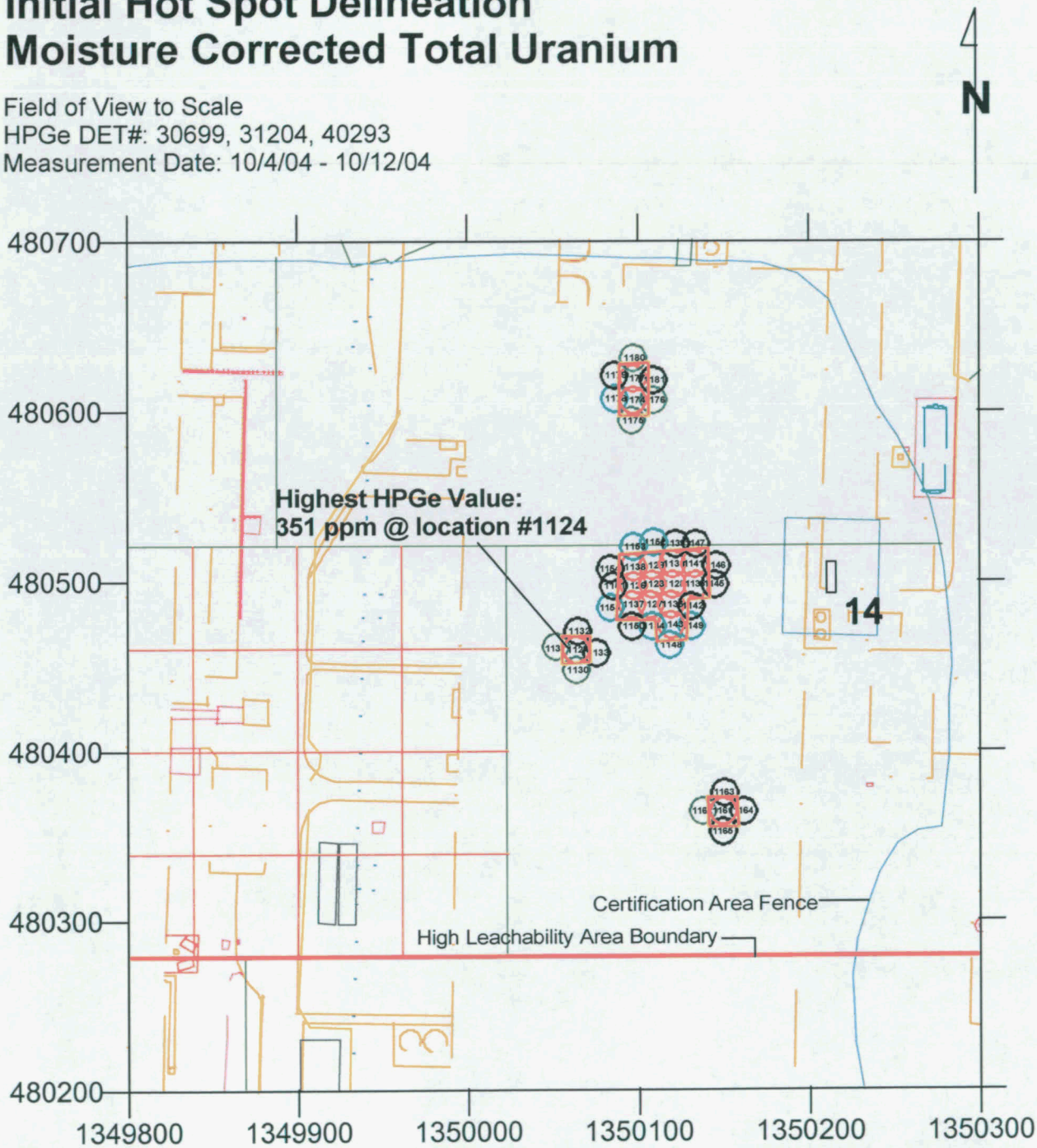
Highest HPGe Values:
HL Area Hot Spot (before excavation): 351 ppm @ location 1124
HL Area non-Hot Spot: <60 ppm @ location 1166
Non-HL Area: <246 ppm @ location 1140

HPGe @ 31 cm Total U (ppm) FRL=82	HPGe @ 31cm Total U (ppm) FRL = 20
0 to 246	0 to 60
246 to 928	60 to 928
928 to 9999	928 to 9999

RTIMP DWG Title: A4A_P2_TU.srf
Project Name: A3A/4A Exc. Char. & PreCert
Project #: 20200-PSP-0009
Verified By: Curt Baumann/78329
Date Verified: 12/20/04
Support Data: A4A_P2_HPGe_31cm.xls
A4A_P2_HL_HPGe_31cm.xls

Figure A-8 Area 4A
Initial Hot Spot Delineation
Moisture Corrected Total Uranium

Field of View to Scale
HPGe DET#: 30699, 31204, 40293
Measurement Date: 10/4/04 - 10/12/04



HPGe @ 31 cm
Total U (ppm)
FRL=20

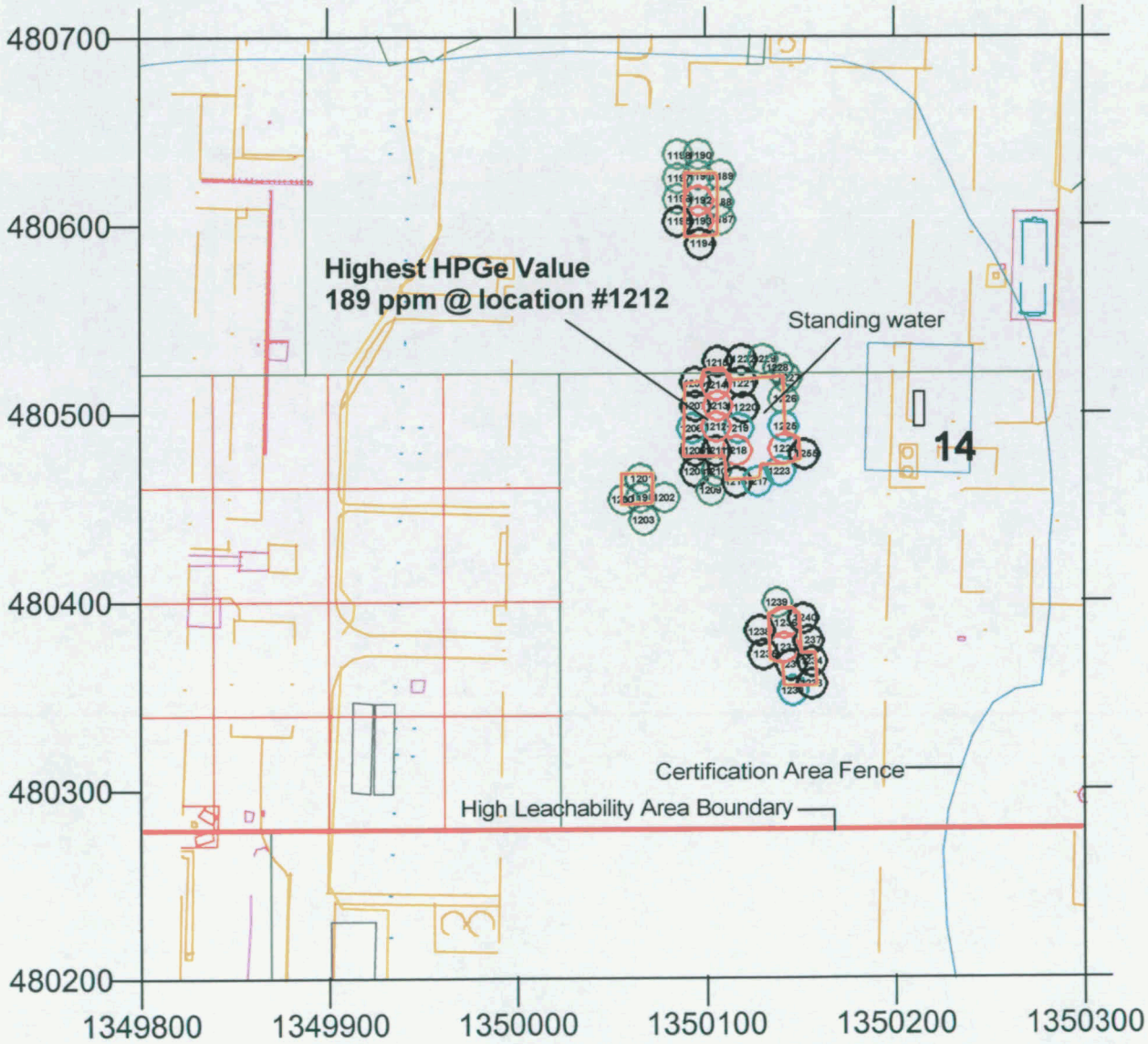
- 0 to 20
- 20 to 40
- 40 to 60
- 60 to 928
- 928 to 9999

RTIMP DWG Title: A4A_P2HS_TU_ZOOM.srf
Project Name: A3A/4A Exc. Char. & PreCert
Project #: 20200-PSP-0009
Verified By: Curt Baumann/78329
Date Verified: 10/15/04
Support Data: A4A_P2HS_HL_HPGe_31cm.xls
A4A_P2_HL_AFRL_HPGe_31cm.xls

Boundary within each hot spot zone of all areas >60 ppm Total Uranium as of measurement date.

Figure A-9 Area 4A Post-Excavation Hot Spot Delineation (1) Moisture Corrected Total Uranium

Field of View to Scale
HPGe DET#: 30699, 31204, 40293
Measurement Date: 10/12/04 - 10/25/04



HPGe @ 31 cm
Total U (ppm)
FRL=20

- 0 to 20
- 20 to 40
- 40 to 60
- 60 to 928
- 928 to 9999

RTIMP DWG Title: A4A_P3-1_TU_ZOOM.srf
Project Name: A3A/4A Exc. Char. & PreCert
Project #: 20200-PSP-0009
Verified By: Curt Baumann/78329
Date Verified: 11/01/04
Support Data: A4A_P3-1_HL_HPGe_31cm.xls

Boundary within each hot spot zone of all areas >60 ppm Total Uranium as of measurement date.

Figure A-10 Area 4A Post-Excavation Hot Spot Delineation (2) Moisture Corrected Total Uranium

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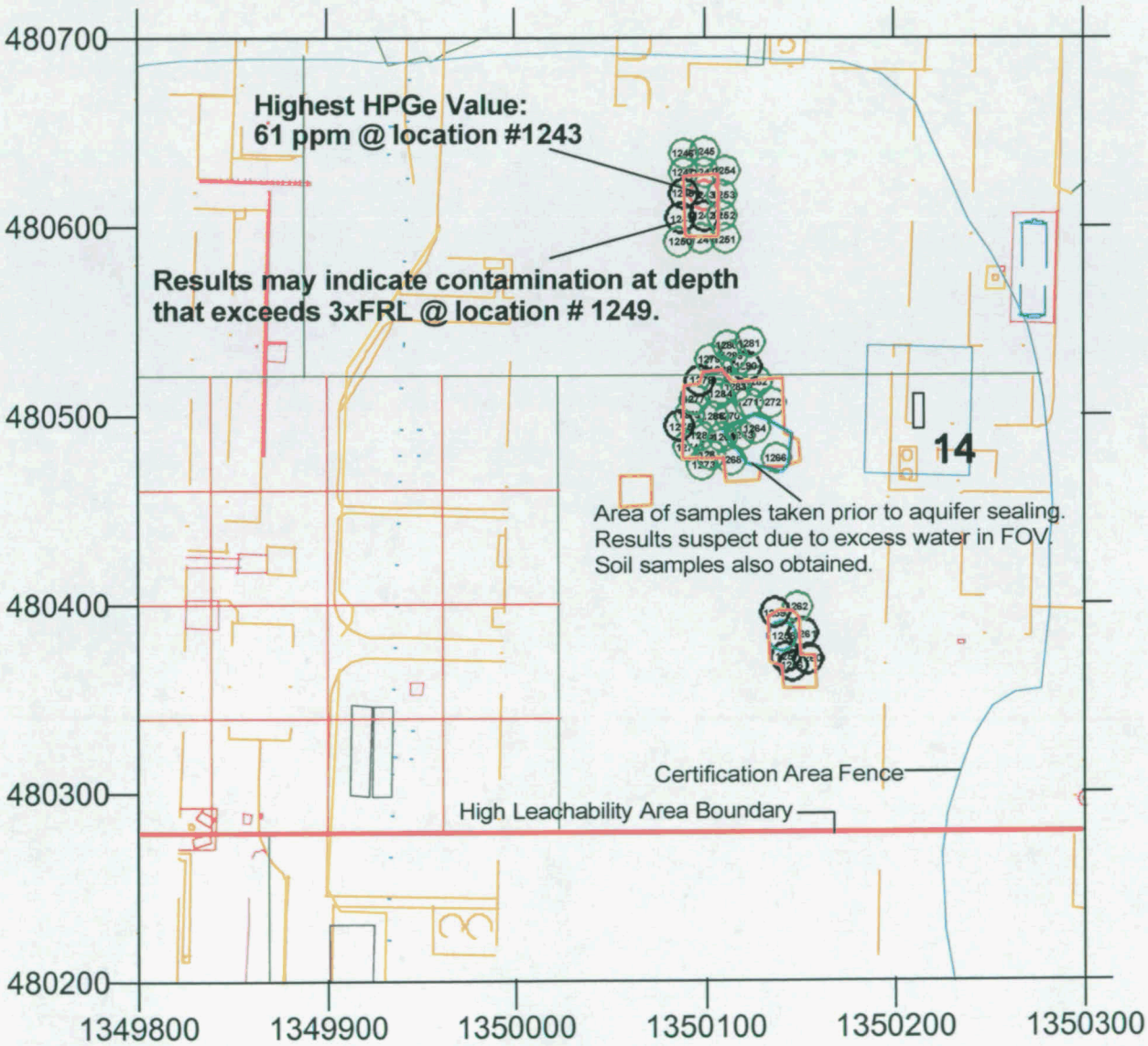
Field of View to Scale
HPGe DET#: 31204, 40227, 40293
Measurement Date: 10/25/04 - 10/28/04



HPGe @ 31 cm
Total U (ppm)
FRL=20

- 0 to 20
- 20 to 40
- 40 to 60
- 60 to 928
- 928 to 9999

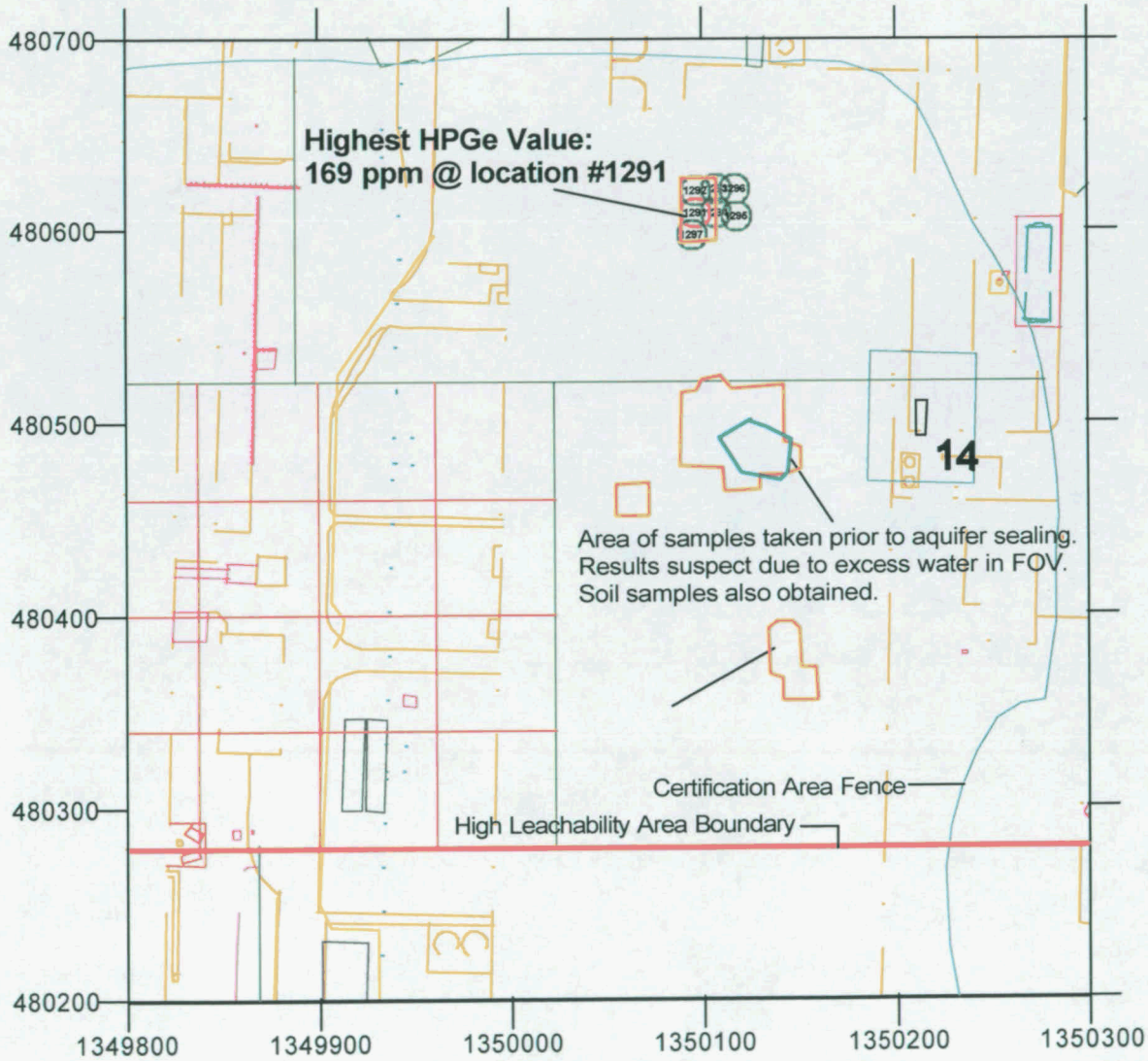
RTIMP DWG Title: A4A_P3-2_TU_ZOOM.srf
Project Name: A3A/4A Exc. Char. & PreCert
Project #: 20200-PSP-0009
Verified By: Curt Baumann/78329
Date Verified: 11/01/04
Support Data: A4A_P3-2_HL_HPGe_31cm_Summary.xls

Boundary within each hot spot zone of all areas >60 ppm Total Uranium as of measurement date.

589 0

Figure A-11 Area 4A Post-Excavation Hot Spot Delineation (3) Moisture Corrected Total Uranium

Field of View to Scale
HPGe DET#: 31204, 40293
Measurement Date: 10/28/04



HPGe @ 31 cm
Total U (ppm)
FRL=20

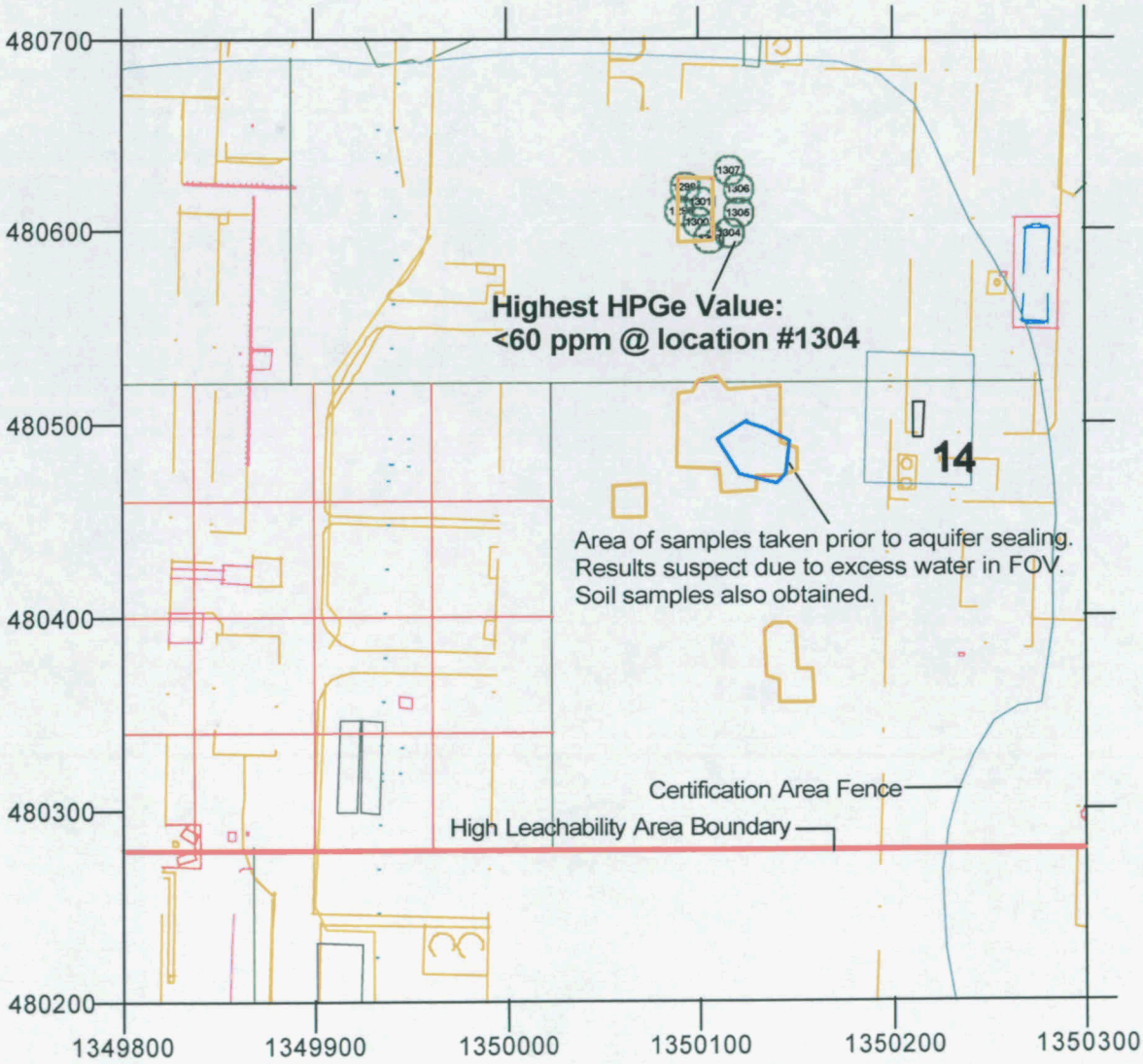
- 0 to 20
- 20 to 40
- 40 to 60
- 60 to 928
- 928 to 9999

RTIMP DWG Title: A4A_P3-3_TU_ZOOM.srf
Project Name: A3A/4A Exc. Char. & PreCert
Project #: 20200-PSP-0009
Verified By: Curt Baumann/78329
Date Verified: 11/01/04
Support Data: A4A_P3-3_HL_HPGe_31cm_Summary.xls

Boundary within each hot spot zone of all areas >60 ppm Total Uranium as of measurement date.

Figure A-12 Area 4A Post-Excavation Hot Spot Delineation (4) Moisture Corrected Total Uranium

Field of View to Scale
HPGe DET#: 31204
Measurement Date: 10/28/04



HPGe @ 31 cm
Total U (ppm)
FRL=20

- 0 to 20
- 20 to 40
- 40 to 60
- 60 to 928
- 928 to 9999

RTIMP DWG Title: A4A_P3-4_TU_ZOOM.srf
Project Name: A3A/4A Exc. Char. & PreCert
Project #: 20200-PSP-0009
Verified By: Curt Baumann/78329
Date Verified: 11/01/04
Support Data: A4A_P3-4_HL_HPGe_31cm_Summary.xls

Boundary within each hot spot zone of all areas >60 ppm Total Uranium as of measurement date.

5890

Figure A-13 Area 4A Post-Excavation Confirmation of Hot Spot Removal Moisture Corrected Total Uranium

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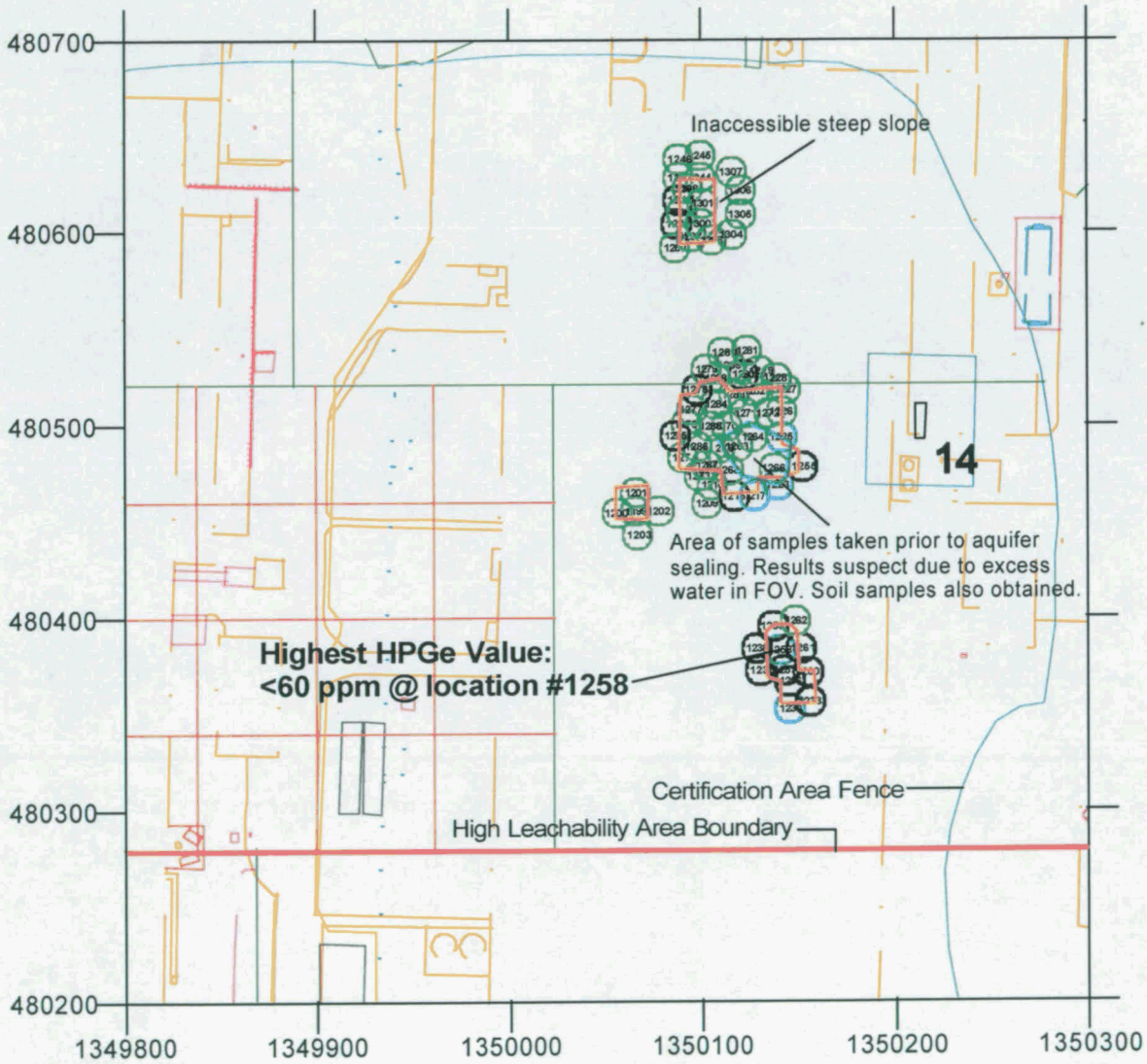
Field of View to Scale
HPGe DET#: 31204, 40227, 40293,
Measurement Date: 10/12/04 - 10/28/04



HPGe @ 31 cm
Total U (ppm)
FRL=20

- 0 to 20
- 20 to 40
- 40 to 60
- 60 to 928
- 928 to 9999

RTIMP DWG Title: A4A_P3-FG_TU_ZOOM.srf
Project Name: A3A/4A Exc. Char. & PreCert
Project #: 20200-PSP-0009
Verified By: Curt Baumann/78329
Date Verified: 11/01/04
Support Data: A4A_P3-FG_HL_HPGe_31cm_Summary.xls

Boundary within each hot spot zone of all areas >60 ppm Total Uranium as of measurement date.