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Department of Energy

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JUL 30 1998

DOE-1046-98

Mr. James A. Saric, Remedial Project Manager
U.S. Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL: FINAL SITEWIDE EXCAVATION PLAN, CHANGE PAGES TO AREA 1, PHASE I CERTIFICATION REPORT, FINAL AREA 2, PHASE I INTEGRATED REMEDIAL DESIGN PACKAGE, AND DRAFT CERTIFICATION REPORT FOR AREA 8, PHASE I

The purpose of this letter is to transmit, for your review and approval, the following Soils Remediation documents and reports:

- Final Sitewide Excavation Plan
- Change Pages finalizing the Area 1, Phase I Certification Report
- Final Area 2, Phase I Integrated Remedial Design Package including a draft comment response package addressing comments received on the characterization addendum (final construction drawings will be submitted by August 14, 1998).
- Draft Certification Report for Area 8, Phase I

Recycled and Recyclable

If you should have any questions or comments, please contact Robert Janke at (513) 648-3124.

Sincerely,

Johnny Reising

FEMP:R.J. Janke

Johnny W. Reising
Fernald Remedial Action
Project Manager

Enclosure: As Stated

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AREA 1 PHASE I CERTIFICATION REPORT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

INFORMATION
ONLY

JULY 1998

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

20701-RP-0002
REVISION 1, PCN 1

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AREA 1 PHASE I CERTIFICATION REPORT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JULY 1998

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

REVISION 1
PCN 1

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REVISION SUMMARY

Revision	Date	Description of Revision
Rev. 0	6-97	Original Document
Rev. 1	5-98	Incorporated Additional Data and U.S. EPA and OEPA Comments
PCN 1	7-31-98	Incorporated Change Pages 1-2, 1-4, 2-9, 2-11, 4-6, Table 4-1, Appendix A and B Introductory Pages, B-i, and B-ii from U.S. EPA Comments

To support soil remediation activities, two types of documents were prepared to describe and guide planned activities in A1PI:

- A1PI Remedial Action Work Plan (RAWP);
- Project Specific Plans (PSPs)

The development of these documents established the constituents of concern (COCs) relative to A1PI remediation activities. Available characterization data from the OU5 RI Report were used to estimate the limits of required excavation in A1PI to attain the FRLs defined in the OU5 ROD for the individual COCs. Excavation activities were completed based upon this initial estimate. In general, a six-inch layer of soil was excavated from 59 acres of A1PI, these areas are depicted in Figure 1-2. The large, non-impacted forested area west of the North Access Road, north of the former production area, was not excavated; whereas the area east of the production area was excavated. Soil samples were collected from randomly selected locations within segmented areas, Certification Units, that encompassed the entire A1PI area. These samples, termed certification samples, were analyzed to determine the concentration of area-specific COCs remaining in the individual CUs.

The results of these analyses were statistically evaluated on an individual CU basis to determine if the FRLs were attained. When the statistical tests identified that the FRLs were not attained, additional corrective actions were taken. These actions included additional excavation of affected areas or collecting additional samples to increase the statistical confidence. Corrective actions continued until the post-excavation sampling results indicated that all areas in A1PI attained the FRLs. This report documents the sampling and analysis performed, the statistical evaluation conducted, applicable corrective actions, and the decisions reached regarding the attainment of the FRLs in A1PI.

1.3 SCOPE

The scope of this Certification Report includes the presentation and discussion of the certification results of the approximately 123 acres in A1PI. This area in the northeast portion of the site includes the location of the initial two OSDF cells, the northern portion of the existing North Access Road (NAR), the 63 acres of open field and wooded areas between the existing NAR and the old NAR, the Pump Station, and the OSDF Sediment Basin. This area was originally divided into 82 CUs, and 2 CUs were added as a result of corrective actions. As discussed with the regulatory agencies, the scope of this report includes these 84 CUs only. Section 2.0 provides further detail regarding the CUs

- Present certification sampling results for the original 42 radiological, 30 metal, and 7 PCB CUs, plus two additional CUs created for corrective action following CU failure;
- Determine whether the CU had passed or failed certification criteria;
- Describe corrective actions for failed CUs; and
- Describe access controls implemented to prevent recontamination.

1.5 REPORT FORMAT

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

Section 1.0	Introduction: Purpose, Background, Scope, and Objectives of the report
Section 2.0	Certification Approach: The approach to sampling and analysis used for A1PI certification
Section 3.0	Overview of Field Activities: Area preparation, excavation, changes to work scope, and stockpile volumes and contents
Section 4.0	Analytical Methods, Data Validation Processes and Data Reduction
Section 5.0	Certification Results and Conclusions
Section 6.0	Access to Certified Areas
Appendix A	CU Maps and Statistics Tables
Appendix B	Certification Data Summary Tables
Attachment A	Certified and Characterized for Re-Use Areas
Attachment B	Response to US EPA and OEPA Comments on A1PI Certification Report
Attachment C	Memoranda Concerning Technetium-99 Volatility

α = *probability of a Type I Error* = 0.05
$Z_{(1-0.05)} = Z_{0.95} = 1.645$
β = *probability of a Type II Error* = 0.20
$Z_{(1-0.20)} = Z_{0.80} = 0.842$
RG = *the Remedial Goal, FRL* = 1.5 *pCi/g*
$\bar{x}_{target}$ = *target clean-up level mean*
= 75% *of the FRL* = 1.125 *pCi/g*
S_{r_A} = *standard deviation estimated non-impacted areas* = 0.503 ***(from Table 2-6)***

gives

$$n = \frac{(1.645 + 0.842)^2}{\left(\frac{1.5 - 1.125}{0.503}\right)^2} = 11.128$$

To ensure that the alpha and beta error rates are satisfied under the given assumptions, the calculated number was rounded up to the next highest integer. In this case, the calculated value of 11.128 was rounded up to 12. Therefore, under the given assumptions, a minimum of 12 samples per CU was required for thorium-232 analysis in order to establish the appropriate confidence level to certify the CU.

2.5 SAMPLE DESIGN

A sampling plan strategy was designed after the minimum number of samples for certification was determined. In A1PI, the CUs for primary and secondary ASCOCs are not necessarily the same CUs. If the CU was not the same for both primary and secondary ASCOCs, the sample locations were generated independently. During the initial stages of A1PI, the sample locations were generated independently, even if the primary and secondary CUs were coexistent. Later, to improve efficiency, the primary and secondary samples were drawn from the same location if the primary and secondary CUs were coexistent.

A systematic random sampling plan was used to maintain the assumptions of random sampling for the certification determination analysis. In general, each CU was subdivided into 16 sub-CUs. The layout of the sub-CUs was arbitrary; the only stipulation was that each sub-CU represents approximately one sixteenth of the total area for the CU. The "one-sixteenth" stipulation was included in order to drop the

NOTE: A list of 50 - 150 sets of three random numbers were generated. The first number was the easting coordinate within the box. The second was the northing coordinate within the box. The third was a random number, used to randomly prioritize which locations would be used. An index was then applied in descending order from 1 to N, where N is the number of sets generated. The entire list was plotted on the sub-CU map, with each location labeled with the index value. The location with the smallest index was selected, and the others were discarded. This method was identical to the one-point-at-a-time-method and generated random and unbiased locations.

C. Sub-CUs were chosen for sampling for the 12 primary ASCOCs or the 9 secondary ASCOCs. A random number was assigned to each of the 16 sub-CUs, with the 12 or 9 sub-CUs with the lowest assigned numbers selected. The remaining four primary sub-CUs were generally designated primary archive samples, with three of the four as secondary archive samples. When the primary and secondary CUs did not co-exist, the 12 primary and 9 secondary samples were chosen independently.

2.6 CERTIFICATION UNIT ANALYSIS

Certification sampling consisted of systematically sampling each CU for the known contaminants at the predetermined sample density. The certification of a CU within A1PI required the average soil concentration of COCs within the CU to be below the FRLs, with a minimum statistical confidence of 95% for primary COCs, and at least 90% for secondary COCs.

Statistical analysis, specifically hypothesis testing, was performed on the analytical results of the certification samples. The statistical analysis determined whether the average ASCOC levels in a given CU met their respective FRL; i.e., were less than the respective FRL, at the desired level of confidence. Consistent with the conservative approach used to assess COC levels, the null hypothesis for this analyte was defined to presume the average level of a specific ASCOC in a CU is greater than or equal to the FRL. The determination was made by applying the following equation:

$$t = \frac{RG - \bar{x}_i}{\sqrt{S^2 / n}}$$

Where:

RG = remedial goal (i.e., FRL)

$\bar{x}_I$ = mean of samples from the ith CU.

4.2.1 Results of the Data Validation Process

The qualification of all data for this project is summarized in Table 4-1, Evaluation of Data Qualifiers, which includes the total number of data points, the number qualified as Rejected (R), and the number qualified as Estimated (J or UJ). In general, the data validation process did not result in a significant amount of the data being qualified estimated or unusable. In every CU an adequate number of data points was available for statistical analysis. Table 4-2 summarizes the reasons for qualification of the inorganics, and Table 4-3 summarizes the reasons for the qualification of radiological ASCOCs.

4.3 DATA REDUCTION

The data set for A1PI Certification ASCOCs can be found in Appendix B. Each sample used to support the A1PI 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.
- Sample Collection Date - Date the sample was collected in the field
- 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 inorganic and organic data these qualifiers are consistent with the CLP Qualifiers. 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.

TABLE 4-1
EVALUATION OF DATA QUALIFIERS

Analyte	Method	Total Number of Points[a]	Number Qualified "R"	Number Qualified "J" or "UJ"
Total Uranium	calculation/gamma	653	4	196
Thorium-232	alpha	660	4	202
Thorium-228	alpha	660	4	231
Radium-226	gamma	668	4	74
Radium-228	gamma	659	4	46
Cesium-137	gamma	43	0	0
Thorium-230	alpha	43	0	8
Arsenic	ILMO3.1 or ILMO4.1	409	3	124
Beryllium	ILMO3.1 or ILMO4.1	406	3	3
Aluminum	ILMO3.1 or ILMO4.1	485	0	40
Manganese	ILMO3.1 or ILMO4.1	495	16	228
Molybdenum	ILMO3.1 or ILMO4.1	485	0	116
Aroclor-1260	SW-846 8080	77	4	14

[a] If a sample was re-analyzed, both the original result and the re-analysis are included in this total.

APPENDIX B - DATA SUMMARY TABLES
A1PI CERTIFICATION REPORT
KEY AND EXAMPLE CALCULATION

This Appendix contains all the data used to support the statistics presented in Appendix A. The following is a key and brief description of the fields presented in this Appendix.

CU Name	The name of the certification unit as described in Section 2.0 There are 81 Cus including Q18-A and Q18-40B. The Appendix is sorted by CU name.
Parameter	This field lists the COC. The COCs presented in this Appendix include aroclor-1260, arsenic, beryllium, cesium-137, total uranium, radium-226, radium-228, thorium-228, thorium-230, and thorium-232.
CU Type	This field lists the type of CU, and where these data are presented in Appendix A. For example, A1PIST-1 arsenic results are presented in the A1PIST-1 metals CU, while A1PIST-1 radium-226 results are presented in the radiological CU.
Sample ID	The unique number assigned to each discrete sample point in the field.
Suffix	For some results, multiple analytical runs were performed in accordance with the analytical requirements. For example, if the original run of the sample shows a matrix problem, the sample is re-run. Both the original analysis and the re-run are reported and presented in Appendix B. In the case noted above, the original run would have a suffix of "None," while the reanalysis would have a suffix of "RE." During the validation process, the best sample result is determined and a validation qualifier is added to both sets of data to cue the user which result to use. One result is either rejected (R) or marked as "Z."
Northing	The northing coordinate, which allows the user to map the data with the easting coordinate.
Easting	The easting coordinate, which allows the user to map the data with the northing coordinate.
Sample Date	The date the sample was collected in the field.
Lab Result	The actual analytical value reported by the laboratory.
Lab TPU	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.)

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Qualifier	The qualifier reported from the lab. For inorganic and organic data, these qualifiers are consistent with the CLP Qualifiers. For radiological parameters, non-detect values are assigned a U qualifier.
Lab Units	The units in which the Laboratory Result is reported.
Valid. Result	The result based on the validation process. During the validation process, sample results may be adjusted. For example, if the laboratory result isless than the associated Minimum Detectable Concentration (MDC), the validation result becomes the MDC value.
Lab TPU	Validation TPU - The TPU based on the validation process.
Qualifier	Validation Qualifier - The qualifier assigned as a result of the data validation process. The following qualifiers may be assigned to the data:

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

J Positive result is estimated or imprecise, data point is useable 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; useable for decision-making purposes.

UJ Undetected result; detection limit is considered estimated or imprecise. Useable for decision-making purposes.

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 useable result.

Units	The units corresponding to the validation result.
Duplicate of	The sample number of which this result is a duplicate of. These are field duplicate results.

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APPENDIX A
Certification Unit Maps and Statistics Tables

This Appendix contains the certification statistics and map of sample locations for each Certification Unit (CU). The CUs are listed in the following order:

Red Tabs are the Radiological CUs: A1P1ST-1, N19, NAR 1 thru NAR 6, O18, O19, O20, OSB-1 thru OSB-5, P17-22, P17-31, P17-32, P17-33, P17-40, P18, P18-11, P18-12, P18-20, P18-40, P19, P19-20, P19-23, P19-40, P20-30, PUMP-1, Q16-33, Q16-34, Q17-10, Q17-30, Q18-10, Q18-30, Q18-40, Q18-40 A & B, Q19-10, Q19-20, Q19-30, Q19-40, Q20-10, Q20-20, Q20-30, Q20-40

Blue Tabs are the Metals CUs: A1P1ST-1, N19, NAR-1 thru NAR-6, O18, O19, O20, OSB-1 thru OSB-5, P17-22, P17-31, P17-32, P17-33, P17-40, P18, P18-11, P18-12, P18-13, P18-14, P18-31, P18-32, P19, P20, PUMP-1, Q17, Q18, Q19, Q20

Yellow Tabs are the PCB CUs: NAR1, O18, P17-31, P17-33, P18-11, P18-13, PUMP-1

APPENDIX B-1
Non-Certification Data

This section provides all the gamma spectroscopy data for the thorium-228 and thorium-232. As discussed in Section 4.1.2 this data was not used the certification statitical evaluations, but is presented here for information purposes. Also included is the uranium-238 value used to calculate the total uranium value.