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MOUND

Environmental
Restoration
Program

POTENTIAL RELEASE SITE PACKAGES

Reading and Understanding

VOLUME I

(PRELIMINARY)

August 7, 1996

POTENTIAL RELEASE SITE PACKAGES

READING AND UNDERSTANDING

VOLUME I

(PRELIMINARY)

AUGUST 8, 1996

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INTRODUCTION

The clean-up of the Mound Site was originally to be accomplished under the CERCLA mandated procedures for regulating Superfund Sites using the operable unit (OU) system to define and characterize clean-up areas. As the clean-up effort went forward, it became apparent that the Mound Site did not fit the profile for a clean-up strategy based on operable units. The Department of Energy (DOE), the United States Environmental Protection Agency (USEPA), and the Ohio Environmental Protection Agency (OEPA) designed a new decision making process for the clean-up of Mound. The new process is known formally as a "removal site evaluation process" and informally as the "Mound 2000 process". The Mound 2000 process system divided Mound into 19 Release Blocks containing over 400 Potential Release Sites (PRSs) with approximately 200 concerned with potentially contaminated soils, and the balance with potential contamination in buildings.

A PRS Package is prepared for each PRS with potentially contaminated soils as part of the Mound 2000 process.

This manual discusses the PRS Package and explains its role in the Mound 2000 process.

This manual consists of two volumes. Volume I contains the explanation of the PRS Package elements and a sample PRS. Volume II contains appendices with information and/or guidance related to specific topics.

Public comments are invited and desired for any or all of the individual PRSs. See Appendix E for submittal information.

1. Purpose

The purpose of this manual is to provide the reader of a Potential Release Site (PRS) Package an explanation of the elements of a PRS Package so that the reader can quickly and efficiently gain a basic understanding of the PRS. It also provides the reader with guidance related to specific issues so that he/she can gain the depth of knowledge needed to understand and comment on the document.

2. What is a Potential Release Site (PRS)?

A PRS is an area where knowledge of historic or current use indicates that the site may have had releases of radioactive and/or hazardous materials.

3. What is a PRS Package?

A PRS Package is a document which provides the information needed to evaluate a PRS and properly place it in one of three decision categories [NO FURTHER ASSESSMENT (NFA), FURTHER ASSESSMENT (FA), OR RESPONSE ACTION (RA)]. The category reflects the decision concerning future actions associated with a PRS. The PRS Package compiles and consolidates relevant data from existing investigations and studies in brief statements which allow a more straightforward decision process.

4. What are the elements of a PRS Package?

The elements of a PRS Package are the Cover, Maps and Photographs, PRS History, Contamination Section, Reading Room References, Other References, Recommendation with signatures, and the Reference Material. Descriptions of these elements follow.

4.1. Cover

The covers of some of the earlier PRS Packages may be different from this format.

More than one PRS may be combined into a single PRS Package if it is appropriate from

The PRS Cover shows the PRS number(s), an aerial photograph of the Mound Site, the Mound Environmental Restoration Program logo, and the Mound 2000 logo. Refer to Page 9 for an example PRS Cover.

a standpoint of location, clean-up parameters, and cost.

The maps and photograph(s) are presented as a series with increasing scale progressing from an area map showing the general location of the PRS through a map showing the general location within a Release Block to a detail map and photograph of the PRS.

4.2. Maps and Photographs

The maps and photographs show the location of the PRS in relation to the Mound Site. Refer to Pages 10, 11, 12, and 13 of this manual for examples of PRS maps and photographs used to clearly locate an area designated as a PRS.

4.3. PRS History

The History gives the general location of the PRS, identifies any processes or incidents relevant to the site being declared a PRS and identifies the site's current status.

Examples which cause a site to be declared a PRS are:

- The redrumming of thorium is a process which could have produced a PRS due to radioactive contamination. Leaks in the waste transfer lines from the Special Metallurgical (SM) Area to the Waste Disposal (WD) Building are examples of incidents which have produced PRSs due to radioactive contamination.

- The leaking fuel oil tank at the powerhouse, which was replaced in 1966, is an example of an incident which produced a chemical contamination based PRS.

- A sample, taken during one of the plant survey efforts, which was contaminated above the plant guideline criteria would also cause an area to become a PRS.

- Someone remembered a historical process or incident which may have left residual contamination in the area.

4.4. Contamination Section

A brief description of sampling and analysis methods for determining PRS contamination information are in Appendix C of this manual.

The Contamination Section identifies and describes any contamination found at the PRS location. This Section also provides a comparison of existing PRS contaminant levels to the applicable guideline criteria

and applicable Mound background levels. This is information needed to decide if the PRS contains contaminants which may lead to human and environmental health concerns.

The use of guideline criteria for data comparison is explained in Appendix D of this manual. Guideline criteria is a phrase used in the PRS Recommendations. They are "standards" against which the PRS data are evaluated to reach a recommendation. They consist of Mound risk-based guideline values, regulatory limits, Mound ALARA goals, and protective soil screening levels. Guideline values have been established based on identified scenarios.

These guideline criteria may have been developed as local, state, or national standards by the governmental agencies responsible for protecting human health and the environment, or they may have been developed specifically for the Mound Site to assure that any contamination on the Mound Site will be remediated to a level which adequately protects human health and the environment.

Some of the earlier PRS Packages may be slightly different from this overall format; some changes were made in the presentation of information to make the PRS Package(s) more useable.

For several contaminants, comparisons may be done in a table which lists the contaminants, their concentrations, and the guideline criteria concentrations, or as a statement containing the same comparisons, or as a combination of these methods. For brevity, comparisons may also be given only for those contaminants whose concentrations exceed the guideline criteria in conjunction with a statement that no other contaminants exceed the guideline criteria.

Four factors are required for evaluating human and environmental health risks. They are:

- contamination (physical form, chemical form, toxicity, and concentration)
- a way(s) to release the contamination
- a current or future exposure pathway(s)
- a receptor(s) for the exposure

Contamination levels are usually examined first; if there is no contamination, there is no concern. When contamination is proven to be present, the other factors are necessary to determine the risk to human health and the environment.

The Residual Risk Evaluation (RRE) examines the cumulative impact of residual contamination remaining after all the PRSs in a Release Block have reached the

The Mound 2000 process evaluates the human and environmental health risks associated with levels of contamination that remain within a Release Block when all removal actions have been completed and all the PRSs in the Release Block have been designated as NO FURTHER ASSESSMENT (NFA). A Residual Risk Evaluation (RRE) is conducted for the Release Block

NFA condition. The RRE ensures that the cumulative impact is an acceptable risk.

prior to the transfer of the Release Block from DOE to another party to ensure that future users of the land will not be exposed to contaminant levels that would pose unacceptable risks.

4.5. References

Each PRS Package will typically have two categories of references as described below. References containing information relating to statements in the PRS Package are identified by superscripts at the appropriate places. These references are listed following the Contamination Section of the PRS Package.

4.5.1. Reading Room References

These references are documents which are available in the Mound CERCLA Public Reading Room located in the Miamisburg Senior Adult Center, 305 Central Avenue, Miamisburg, Ohio 45342.

4.5.2. Other References

These references, whose pertinent parts are included in the PRS Package, are those which are not available in the Mound CERCLA Public Reading Room. These references could be letters which provide information pertinent to the PRS, unclassified excerpts from classified documents, or other non-CERCLA documents which contain information pertinent to a particular PRS.

4.6. Recommendation

The recommendation page has three areas as described below:

The "Recommendation" relates the contaminant(s), the magnitude of the contamination (maximum concentration, extent, probable and possible

Recommendation: A concise statement of the pertinent facts of the PRS in support of the recommendation which has been deemed appropriate for the PRS. PRSs given recommendations of either NO FURTHER ASSESSMENT

pathways/receptors, and process history information), and ends with a "THEREFORE" summary statement.

(NFA) or RESPONSE ACTION (RA) go to the public. PRSs given a recommendation of FURTHER ASSESSMENT (FA) undergo additional analysis. When further assessment is sufficient, the PRS will receive either a NO FURTHER ASSESSMENT (NFA) or a RESPONSE ACTION (RA) recommendation. The PRS will then go to the public for comment. A core team comprised of Department of Energy (DOE), United States Environmental Protection Agency (USEPA), and Ohio Environmental Protection Agency (OEPA) representatives make the recommendation. The recommendation reflects mutual agreement.

Concurrence: Signatures are provided by the project managers for the Department of Energy (DOE), the United States Environmental Protection Agency (USEPA) and the Ohio Environmental Protection Agency (OEPA) signifying their concurrence with the recommendation.

Summary of Comments and Responses: Recommendation page area indicating the comment period, whether or not comments were received, and the responses to the comments.

4.7. Reference Material Section

When putting together a PRS Package one performs a reference material search. Reports related to a PRS which provide data or data explanation are copied and

included in the PRS Package in the Reference Material Section.

5. *Supplemental Information to Reading and Understanding a PRS*

The appendices for this manual are located in Volume II. They provide information which may be helpful in reading and understanding a PRS Package. Also, they provide information about the data relevant to a PRS and the use of that data in the evaluation process.

Appendix A contains a list of acronyms and abbreviations.

Appendix B contains a glossary of PRS terms.

Appendix C includes a basic explanation of the sampling methods, sample analysis methods, and terminology.

Appendix D includes a reference list of documents which provide the guideline criteria and/or explain how they were calculated or obtained. The development of these guideline criteria is complex. Refer to the Appendix D Attachments for applicable guideline criteria tables and supporting documentation that were used during PRS Package preparation.

Appendix E provides information on when and where one can submit his/her PRS comments.

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EXAMPLE PRS

Example PRS

MOUND

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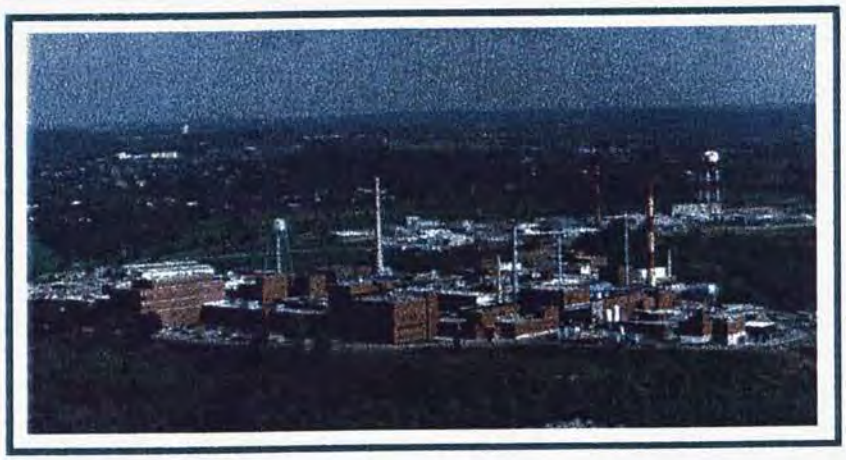
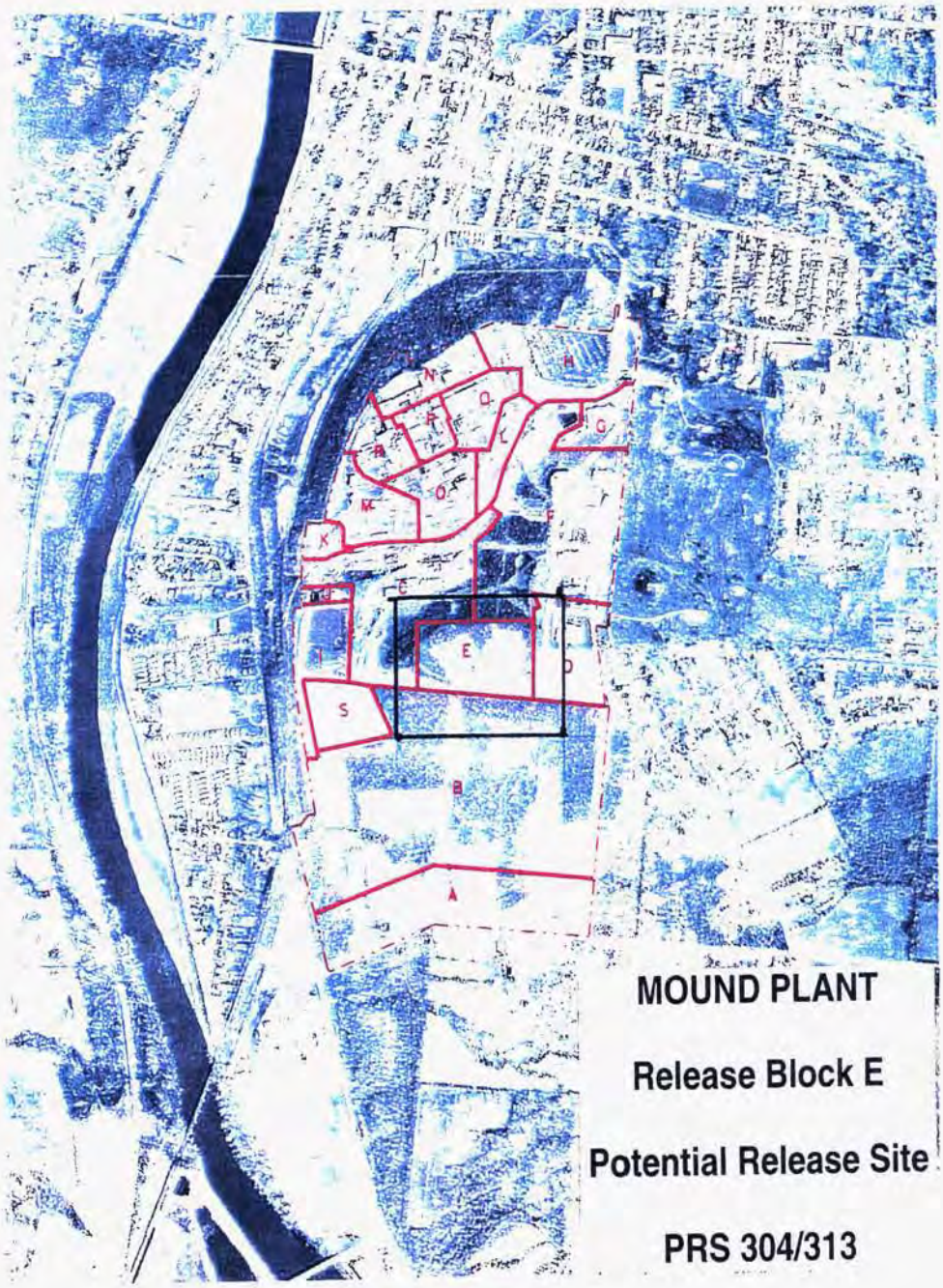
MOUND PLANT
Potential Release Site Package
PRS # 304/313



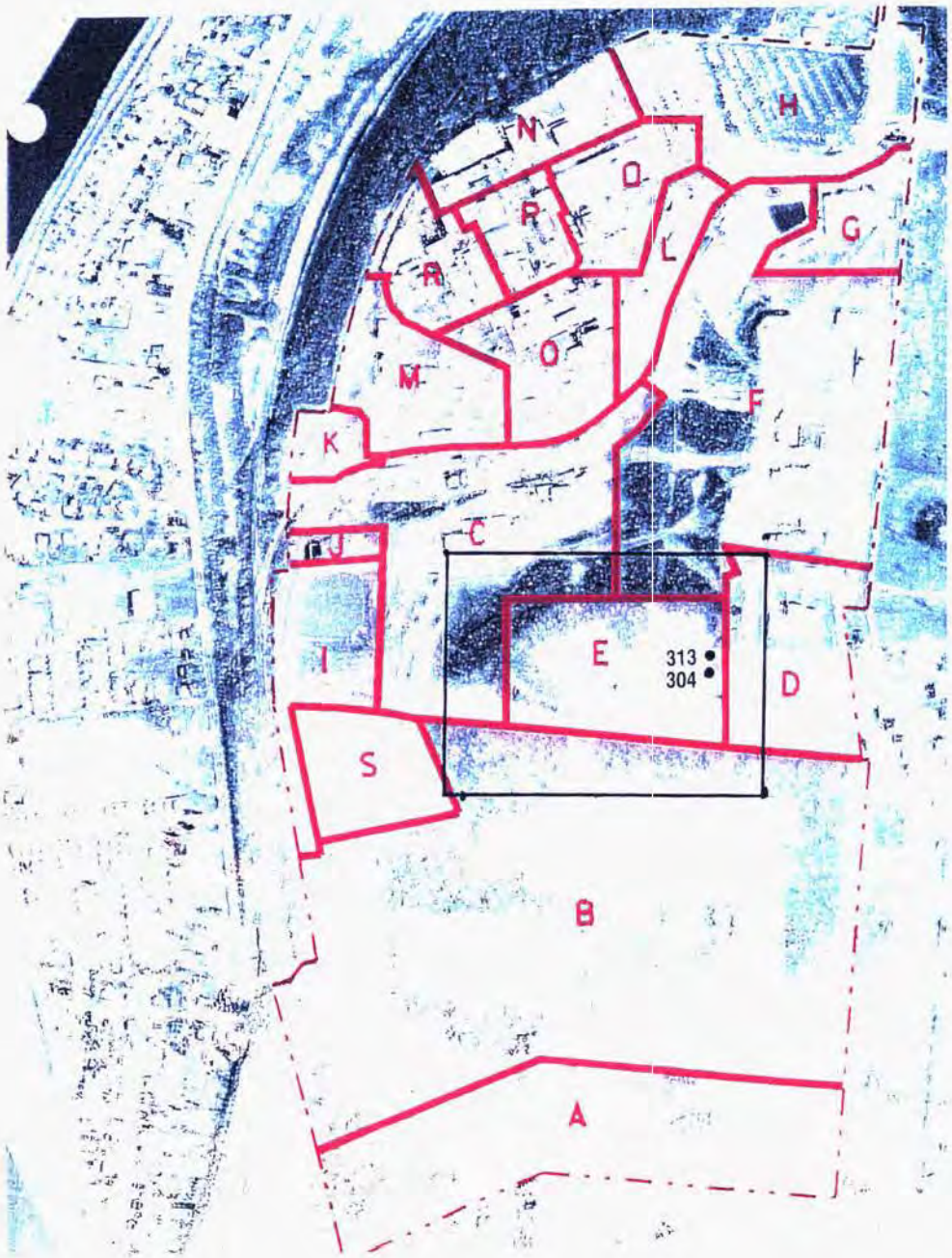
PRS Cover

Example PRS



Mound Site with Release Block

Example PRS



Mound Site with PRS Location

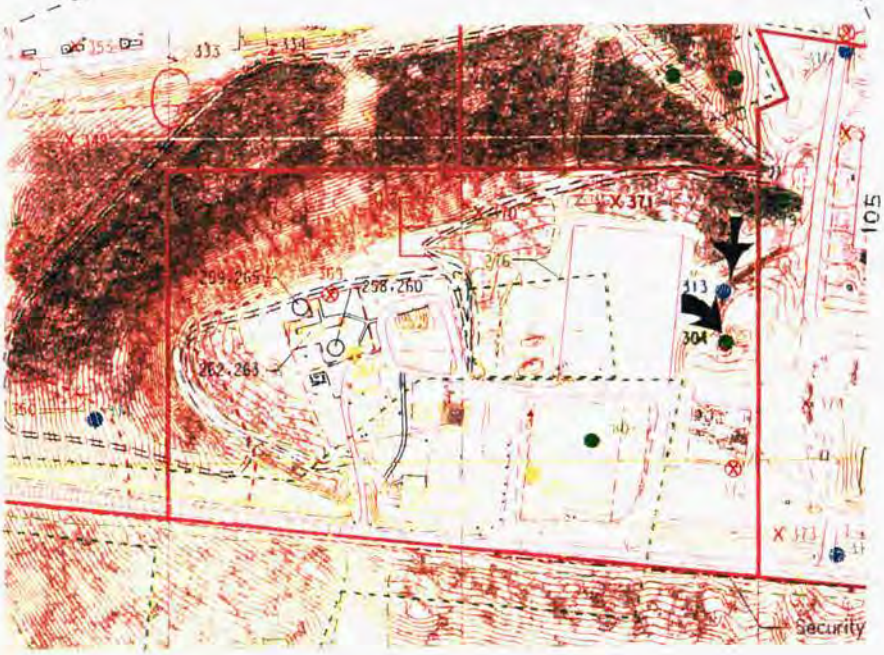
Example PRS

MOUND PLANT

Release Block E

Potential Release Site

PRS 304/313



Enlarged Map of PRS Location

Example PRS

Photograph of PRS Location

Example PRS

PRS 304 and PRS 313 are neighboring soil areas. The two PRSs were combined due to their proximity (see PRS manual pages 12 and 13), the nature of contamination (thorium-232), and similarities in land use (overburden soil at levels less than 5 pCi/g Th-232, from the Decontamination and Decommissioning of the Waste Transfer Line (PRS 300) and Area 12 (PRS 273), were placed in both areas).

Thorium-232 Results: There is only one Th-232 result (15 pCi/g) available for PRS 313. It is a surface sample taken in 1984. It was directly compared with the regulatory surface soil criterion for thorium-232 in soil (5 pCi/g).

Fifty-two soil samples were taken in 1984 at PRS location 304. All of these data are found in the OU9, Site Scoping Report: Volume 3 - Radiological Site Survey, Final, June 1993 and are included in the PRS 304/313 Reference Material Section. Only the maximum thorium-232 concentration was reported in the Contamination Section results table. It was a subsurface soil sample and therefore the subsurface soil criterion for thorium-232 in soil (15 pCi/g) was applicable. However, this result is below both the surface and subsurface criterion for thorium-232 in soil. Therefore one can conclude that all the other soil samples from the sampling set are below the thorium-232 soil criteria.

The 1994 OU5, Operational Area Phase I Investigation Non-AOC Field Investigations included surface soil sampling in the area that is now known as the PRS 304/313 area. These samples were analyzed at the Mound soil screening laboratory. The soil screening data results are found in the OU5, Operable Area Phase I Investigation Non-AOC Field Report, June 1995 and are included in the PRS 304/313 Reference Material Section (see PRS Manual page 31). Results indicated no thorium-232 was present at concentrations above the thorium soil guideline criteria of

PRS 304/313

PRS HISTORY:

PRS 304 and PRS 313 are neighboring soils PRSs located approximately 300 feet southwest of Building 105. The PRS 304 soils area (also known as the Excavated Materials Disposal Area and as Raider's Hill) was created due to the dumping of low level thorium soils (less than 5 pCi/g). PRS 313 was created due to a thorium hot spot identified during the Radiological Site Survey Project.

The PRS 304/313 soils area contains the overburden soils excavated from the decommission and decontamination (D&D) of the Waste Transfer Line (PRS 300) and from Area 12 (PRS 273). Soils from these areas were segregated according to thorium contamination concentration. Soils with thorium concentrations greater than 5 pCi/g (5 pCi/g is the guideline criteria for surface thorium removal) were boxed and shipped for off-site disposal; those soils with less than 5 pCi/g of thorium were dumped in the area of PRS 304/313.

CONTAMINATION:

(1) In 1984, the Radiological Site Survey Project took one surface sample at the location of PRS 313. Thorium was detected at 15 pCi/g (the guideline value for thorium-232 is 5 pCi/g).[1, 2, 7] Plutonium-238 was detected at 0.43 pCi/g (the ALARA guideline value for plutonium-238 is 25 pCi/g).[1, 2]

(2) In 1984, approximately 52 soil samples (15 boring locations) were collected from the area of PRS 304 and analyzed by the Mound Plant soil screening facility.[2] Results indicate:

Contaminant	Maximum Concentration Detected	Guideline Criteria
Plutonium-238	34.4 pCi/g [ref 2] (in soil @ 12.5 feet)	25 pCi/g (Mound ALARA in soil)
Thorium-232	1.2 pCi/g [ref 2] (in subsurface soil)	15 pCi/g [ref 4] (in subsurface soil)

NOTE: ***pCi = picocuries, g = grams, ALARA = As low as reasonably achievable***

(3) In 1994, the OU5, Operational Area Phase I Investigation Non-AOC Field Investigations[5] included the PRS 304/313 area. This investigation included a field instrument for detection of low-energy radiation (FIDLER) survey; surface soil sampling and analysis using the Mound Plant soil screening facility; and a PETREX passive soil gas survey to detect volatile and semi-volatile organic compounds. The survey was conducted over a 100-foot grid system. The results of the PETREX passive soil gas survey indicated moderately elevated detections of total semi-volatile hydrocarbons relative to surrounding PETREX sampling location [3]. No relatively elevated detections of halogenated, aromatic, or petroleum hydrocarbons were found [3]. The PETREX soil gas methods generally indicate the relative presence of a substance, but do not yield a quantitative concentration of that substance.

Marginal Notes Continued

5 pCi/g (surface soil) and 15 pCi/g (subsurface soil).

Plutonium-238 results: The plutonium-238 result (0.43 pCi/g) from the one data point available for the PRS 313 location, taken in 1984, was reported to be far below the Mound soil plutonium-238 ALARA goal (25 pCi/g).

As with the thorium-232 results taken in 1984 at PRS location 304, only the maximum plutonium-238 concentration (34.4 pCi/g) out of the 52 soil samples was reported in the Contamination Section of the PRS 304/313 Package. The maximum plutonium-238 concentrate (34.4 pCi/g) was close to the Mound soil plutonium-238 ALARA goal (25 pCi/g).

The OU5, Operable Area Phase I Investigation Non-AOC Field Report Mound soil screening laboratory results applicable to PRS 304/313 indicated no plutonium-238 was present at concentrations above the Mound soil plutonium-238 ALARA goal (25 pCi/g). These data are not presented in the Contamination Section of the PRS 304/313 Package, but are included in the PRS 304/313 Reference Material Section.

Radiological Survey Results (FIDLER Survey): Actual FIDLER data were not presented nor were guideline criteria presented in the PRS 304/313 Package Contamination Section. Gross FIDLER counts applicable to PRS 304/313 from the 1984 FIDLER survey are presented in Reference 2, the OU9, Site Scoping Report: Volume 3 - Radiological Site Survey, Final, June 1993 and in the PRS Reference Material Section. Gross FIDLER counts applicable to PRS 304/313 from the 1994 FIDLER survey are presented in the PRS Reference Material Section also. These data were obtained from Reference 3, the OU5, Operable Area Phase I Investigation Non-AOC Field Report, June 1995. Gross FIDLER counts applicable to PRS 304/313 from the 1995 FIDLER survey are presented in the PRS Reference Material Section. These data were obtained from Reference 4, the Other Soils Characterization Report, Draft, January 1996. Generally, areas where the FIDLER survey indicates elevated activity may correlate with elevated concentrations of low-energy gamma or low-energy x-ray emitting radionuclides.

PETREX Passive Soil Gas Survey: In 1994, a PETREX passive soil gas survey was performed as part of the OU5, Operational Area Phase I Investigation Non-AOC Field Investigations at PRS 304/313. The PETREX passive soil gas survey was performed to detect the relative presence of volatile and semivolatile organic compounds. Data applicable to PRS 304/313 are found in PRS Reference 3, the OU5, Operable Area Phase I Investigation Non-AOC Field Report, June 1995 and are included in the PRS Reference Material Section. Applicable guideline criteria are found in Attachment D3. Data were compared, point by point, to the applicable guideline criteria. It was concluded that these are moderately elevated detections of total semi-volatile hydrocarbons relative to the surrounding PETREX sampling area. No relatively elevated detections of halogenated, aromatic, or petroleum hydrocarbons were found.

Organics: In 1995, the Other Soils Characterization project was conducted. Some sampling locations coincided with the PRS 313 location. Data applicable to PRS 304/313 are found in PRS References 4 and 5 (Other Soils Characterization Report, Draft, January 1996 and Other Soils Characterization Report Volume II - Appendices, January 1996) and are included in the PRS Reference Material Section. Data were compared against background data (see Attachment D3). No organics were detected above background levels.

Metals: As part of the Other Soils Characterization project that was conducted in 1995, some soil samples collected in PRS 313 location were analyzed with an X-ray fluoroscope for metals. Data applicable to PRS 304/313 are found in PRS References 4 and 5 (Other Soils Characterization Report, Draft, January 1996 and Other Soils Characterization Report Volume II - Appendices, January 1996) and are included in the PRS Reference Material Section. Data were compared against the Risk Based Guideline Values, Mound Plant,

(Revision 3), December 1995. No metal contamination was detected above the 10^{-6} risk based Guideline Values.

Just because contamination or residual contamination is present at a site does not necessarily mean there is a problem. The amount or the concentration of the contaminant along with other factors must be examined to determine any associated potential health risks.

As discussed in Appendix D, for PRS evaluations, guideline values (GVs) were used as a risk-based screening tool to identify potential contaminants of concern, determine the need for further evaluation or to confirm that a site is a likely candidate for "NO FURTHER ASSESSMENT." With regulator (CORE Team) approval, sites that have no contaminant concentrations exceeding the GVs may be considered for "NO FURTHER ASSESSMENT." For any decision, the quality of the data (i.e., acceptable error terms, acceptable laboratory quality assurance, etc.), the type of data (screening versus characterization), and past land use (i.e., status of history of spills, releases, or waste storage at the site) must also be considered.

The number of data points that exceed a guideline criterion must also be considered in the PRS decision making process. For example, if only one data point exceeds a guideline criterion, then other like data in the surrounding area, if available, (data points within a half-acre diameter) are examined and the data are averaged. The maximum concentration is also compared to the applicable guideline criterion and background (if available).

Results of soil samples analyzed by the Mound soil screening facility found no plutonium-238 or thorium-232 occurs in concentrations above the guideline criteria (25 pCi/g for plutonium and 5 pCi/g [surface to 15 cm in depth] for thorium).[3,7]

(4) In 1995, the Other Soils Characterization project sampled the location of PRS 313 and four surrounding locations approximately 10 feet from PRS 313. Soil samples were analyzed for organics (by organic vapor and/or organic vapor meter), metals (by X-ray fluoroscope) and radionuclides (field detection by FIDLER and lab analysis by Mound soil screening).[4] Sample depth was from 0 to 3 feet.[5] The sampling analysis found:

- No radioactive contamination was detected in excess of guideline criteria.[4,5,6,7]
- No organics were detected above background levels.[4,5]
- No metal contamination was detected above the 10^{-6} Risk Based Guideline Values.[4,5,6]

READING ROOM REFERENCES:

1) OU9, Site Scoping Report: Volume 12 - Site Summary Report, Final, December 1994. (pages 6-8)
2) OU9, Site Scoping Report: Volume 3 - Radiological Site Survey, Final, June 1993. (pages 9-16)
3) OU5, Operational Area Phase I Investigation Non-AOC Field Report, June 1995. (pages 17-23)

OTHER REFERENCES:

4) Other Soils Characterization Report, Draft, January 1996. (pages 24-30)
5) Other Soils Characterization Report Volume II - Appendices, January 1996. (pages 31-33)
6) Risk Based Guideline Values, Mound Plant, Final, (Revision 3), December 1995. (pages 34-36)
7) Code of Federal Regulations, 40 CFR 192.12 and 40 CFR 192.41.

PREPARED BY:

Eric Horstman, Member of EG&G Technical Staff
John Nichols, Member of EG&G Technical Staff

PRS 304/313

Example PRS

A Core Team, comprised of members from DOE, USEPA, and OEPA, will evaluate this PRS Package and make a recommendation. The Core Team must come to a mutual agreement. Their recommendation will fall into one of the following decision categories: "NO FURTHER ASSESSMENT (NFA)," "FURTHER ASSESSMENT (FA)," or "RESPONSE ACTION (RA)."

PRSs given a recommendation of either NO FURTHER ASSESSMENT (NFA) or RESPONSE ACTION (RA) go to the public. PRSs given a recommendation of FURTHER ASSESSMENT (FA) undergo further analysis. When further assessment is sufficient, the PRS will receive either a NO FURTHER ASSESSMENT (NFA) or a RESPONSE ACTION (RA) recommendation. The PRS will then go to the public for comment.

There will be a thirty-day comment period open to the public after the recommendation is made. Once the comment period is over, the dates covering the comment period, and whether or not there were any comments received, will be noted on the Recommendation Page.

MOUND PLANT
PRS 304/313

RECOMMENDATION:

CONCURRENCE:

DOE/MB _____

Arthur W. Kleinrth, Remedial Project Manager (date)

USEPA: _____

Timothy J. Fischer, Remedial Project Manager (date)

OEPA: _____

Brian K. Nickel, Project Manger (date)

SUMMARY OF COMMENTS AND RESPONSES:

Comment period from _____ to _____

☐ No comments were received during the comment period.

☐ Comment responses can be found on page ____ of this package.

PRS 304/313

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REFERENCE MATERIAL
PRS 304/313

Example PRS

Document Control No. _____

Environmental Restoration Program

OPERABLE UNIT 9 SITE SCOPING REPORT: VOLUME 12 – SITE SUMMARY REPORT

MOUND PLANT
MIAMISBURG, OHIO

December 1994

Final

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

Page 6

No.	Site Name	Location	Status	Operational Jurisdiction: Regulated Units	Operational Jurisdiction: Regulatory Authority	Operational Jurisdiction: Spill Response	SWMU	Historic Activities: Evidence Of Release	Historic Activities: Response Authority	Further Action Recommended	FFA OU
299	Building 38 Diesel Fuel Storage Tank (Tank 121)	G-9	In Service		BUSTR	BUSTR		No	BUSTR	OM	
300	Area 19, Underground Waste Transfer Line	G-6 G-7 G-8 G-9	Historical		NA		SWMU	Yes	AEA	Yes	6
301	Building 38 In-Line Incinerator	G-9	Historical		NA		SWMU	No	AEA	No	
302	Area D, Acid Leach Field	H-8 H-9 G-8 G-9	Historical		AEA		SWMU	No	AEA	Yes	6
303	Warehouse 14 (AKA Pad 14)	G-9	Grounds		AEA			No	AEA	No	
304	Excavated Materials Disposal Area (AKA Rader's Hill)	I-8	Grounds	runoff to overflow pond	AEA			No	CERCLA	Yes	5
305	SM Stack	G-9	Surplus		NA			No	AEA	Yes	6
306	SM/PP Hill Seep 0609	L-9	NA		AEA			No	CERCLA	Yes	5
307	Site Survey Project Potential Hot Spots Location C0007	E-9	Grounds		AEA			Yes	AEA	Yes	6
308	Site Survey Project Potential Hot Spots Location C0028	F-10	Grounds		AEA			Yes	AEA	Yes	6
309	Site Survey Project Potential Hot Spot Location S0307	F-9	Grounds		AEA			Yes	AEA	Yes	6
310	Site Survey Project Potential Hot Spot Location S0647	H-9	Grounds		AEA			Yes	AEA	Yes	6
311	Site Survey Project Potential Hot Spot Location S0706	I-6	Grounds		AEA			Yes	CERCLA	Yes	5
312	Site Survey Project Potential Hot Spot Location S0971	J-9	Grounds		AEA			Yes	CERCLA	Yes	5
313	Site Survey Project Potential Hot Spot Location S0982	I-8	Grounds		AEA			Yes	CERCLA	Yes	6
[illegible]	[illegible]	[illegible]	[illegible]		AEA		SWMU	No	CERCLA	No	5

A.2-17

1 - Soil Gas Survey - Freon 11, Freon 113, Trans-1,2-Dichloroethylene, Cis-1,2-Dichloroethylene, 1,1,1-Trichloroethane, Perchloroethylene, Trichloroethylene, Toluene
2 - Gamma Spectroscopy - Thorium-228, -230, Cobalt-60, Cesium-137, Radium-224, -226, -228, Americium-241, Actinium-227, Bismuth-207, Bismuth-210m, Potassium-40
3 - Target Analyte List
4 - Target Compound List (VOC)
5 - Target Compound List (SVOC)
6 - Target Compound List (Pesticides/Polychlorinated Biphenyl)
7 - Dioxins/Furans
8 - Extractable Petroleum Hydrocarbons (EPH)/Total Petroleum Hydrocarbons (TPH)
9 - Lithium
10 - Nitrate/Nitrite
11 - Chloride
12 - Explosives
13 - Plutonium-238
14 - Plutonium-238, Thorium-232
15 - Cobalt-60, Cesium-137, Radium-226, Americium-241
16 - Tritium

Reference List

1. DOE 1986 "Phase I: Installation Assessment Mound (DRAFT)."
2. DOE 1992a "Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan (Final)."
3. DOE 1992c "Mound Plant Underground Storage Tank Program Plan & Regulatory Status Review (Final)."
4. DOE 1993e "Site Scoping Report: Vol. 7 - Waste Management (FINAL)."
5. EPA 1988a "Preliminary Review/Visual Site Inspection for RCRA Facility Assessment of Mound Plant"
6. DOE 1993d "Operable Unit 9, Site Scping Report: Vol. 3 - Radiological Site Survey (FINAL)."
7. DOE 1993c "Operable Unit 3, Misc. Sites Limited Field Investigation Report."
8. DOE 1992d "Reconnaissance Sampling Report Decontamination & Decommissioning Areas, OU6, (FINAL)."
9. Fentiman 1990 "Characterization of Mound's Hazardous, Radioactive and Mixed Wastes."
10. DOE 1992f "Operable Unit 9, Site Scpoing Report: Vol. 9 - Spills and Response Actions (FINAL)."
11. Styron and Meyer 1981"Potable Water Standards Project: Final Report."
12. DOE 1993b "Reconnaissance Sampling Report - Soil Gas Survey & Geophysical Investigations, Mound Plant Main Hill and SM/PP Hill (FINAL)."
13. DOE 1993d "Operable Unit 9, Site Scoping Report: Vol. 3 - Radiological Site Survey (FINAL)."
14. DOE 1991b "Main Hill Seeps, Operable Unit 2, On-Scene Coordinator Report for CERCLA Section 104 Remedial Action, West Powerhouse PCB Site."
15. Halford 1990 "Results of South Pond Sampling."
16. DOE 1993e "Operable Unit 4, Special Canal Sampling Report, Miami Erie Canal."
17. DOE 1990 "Preliminary Results of Reconnaissance Magnetic Survey of Mound Plant Areas 2, 6, 7, and C."
18. DOE 1992e "Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan (FINAL)."
19. Rogers 1975 "Mound Laboratory Environmental Plutonium Study, 1974."
20. DOE 1992h "Ground Water and Seep Water Quality Data Report Through First Quarter, FY92."
21. Dames and Moore 1976a, b "Potable Water Standards Project Mound Laboratory" and "Evaluation of the Buried Valley Aquifer Adjacent to Mound Laboratory."
22. DOE 1992l "Closure Report, Building 34 - Aviation Fuel Storage Tank."
23. DOE 1992j "Closure Report, Building 51 - Waste Storage Tank."
24. DOE 1994 "Operable Unit 1, Remedial Investigation Report."
25. EG&G 1994 "Active Underground Storage Tank Plan."

Example PRS

ENVIRONMENTAL RESTORATION PROGRAM

OPERABLE UNIT 9, SITE SCOPING REPORT: VOLUME 3 - RADIOLOGICAL SITE SURVEY

MOUND PLANT
MIAMISBURG, OHIO

June 1993

DEPARTMENT OF ENERGY
ALBUQUERQUE FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

FINAL

Example PRS

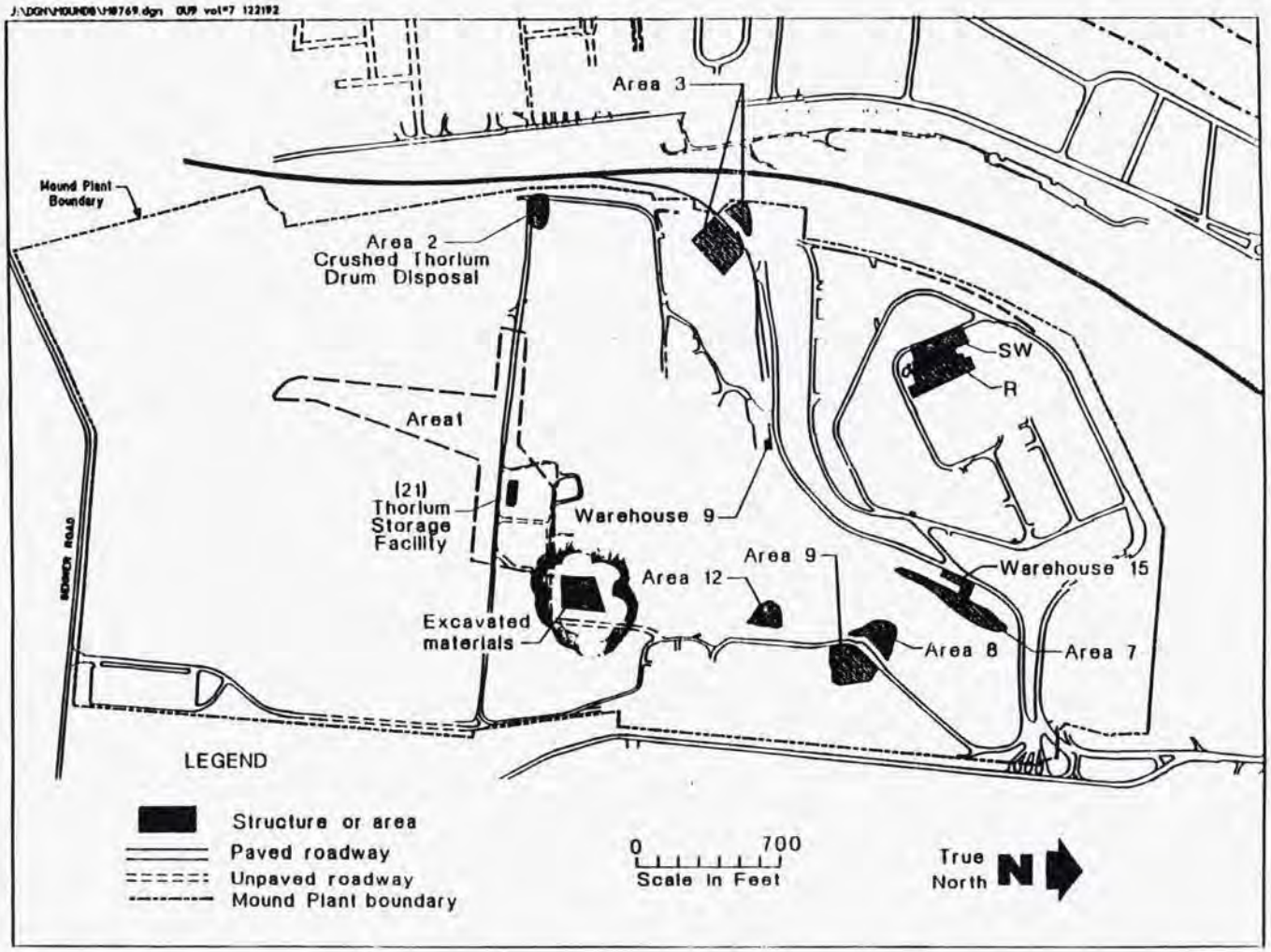


Figure 5.1. Thorium ore processing areas.

Sample locations S0472 and S1092, shown on Plate 1 as possible hot spots, are probably not associated with the thorium project, as S1092 is largely thorium-230 and is associated with Area 23, described in a companion section of this report.

5.10. EXCAVATED MATERIALS DISPOSAL AREA

The excavated materials disposal area is located on the SM/PP Hill adjacent to Area 1 and south of the water tower (Figure 5.1). The area is colloquially known as Rader's Hill. The area contains the overburden soils excavated during the D&D of the waste transfer line on the west slope of the SM/PP Hill. The excavation is known as Area 19. The excavation overlapped the southern margin of Area 12, known to be contaminated with thorium. During excavation, soils that had thorium concentrations were staged and later segregated depending on the thorium concentrations. Soil with thorium concentration greater than 5 pCi/g were boxed for offsite disposal and those with less were moved to the excavated materials disposal area (Draper 1985). About 52 samples were collected from the disposal area in 1984 and analyzed in the Mound soils screening facility. Results indicate total thorium levels around 1 pCi/g; the highest was 1.2 pCi/g (MRC 1984). The data sheets are included in Appendix E.

5.11. RAILROAD SIDING

The railroad siding or spur that enters Mound Plant from the west has been used extensively for shipping and receiving radioactive materials and radioactively contaminated wastes. Through the 1950s and 1960s, the siding was used for unloading lead casks containing the bismuth/polonium mixtures used in the polonium processing. In the mid-1950s, the siding was the site of the unloading of thorium drums, as well as the decontamination of the boxcars in which the drums were shipped. The siding historically extended about 500 feet east of their current location. The eastern portions were removed or simply buried at an unknown date. The portion that would underlie the waste transfer line, known as Area 19 (Plate 1), is gone and may have been removed when the line was built in 1967 (DOE 1992g). Portions of the siding east of Area 19 (Plate 1) are known to be in place, but covered by a thin layer of soil.

The siding itself was not a sampling target during the Site Survey Project (Stought et al. 1988); however, some limited sampling has been performed. Site Survey Project samples S0485 and S0491 (Appendix E) located near the siding (Plate 1) indicated levels of plutonium-238 below 5 pCi/g and less than 2 pCi/g of thorium. Subsequent sampling along the siding indicates that elevated thorium contamination may be very localized. Two samples collected in 1987 and analyzed by the Mound Plant

Example PRS

5.9. AREAS OF POSSIBLE ELEVATED THORIUM ACTIVITY

Evaluation of the Site Survey Project data indicates that both isolated and contiguous areas of elevated thorium activity, above the Mound Plant guidelines of 5 (surface) and 15 (subsurface) pCi/g, may exist beyond the areas with numerical indicators. Inspection of Plate 5 suggests that low-level thorium activity may be spread to the areas northwest of Areas 8 and 9 across Area 7. Considering that the thorium project actually involved redrumming operations in Areas 7 and 9, the mechanism of contaminant transport would have been fugitive dust emissions. This is largely consistent with the distribution of thorium depicted in Plate 5. Since this region of the upper valley of the plant has under gone considerable new construction and has been paved with asphalt since the redrumming operations, the isopleth concentrations depicted in Plate 5 may now be represented by spotty contamination in actual field conditions. Samples from locations C0007, C0028, S0307, S0425 are indicated as possible hot spots on Plate 1.

Indications of elevated levels of thorium adjacent to Area 8 (Plate 5) are substantiated by samples collected since the Site Survey Project. Sample were apparently collected north and west of the fenceline and south of Building 61 (Plate 1). Results reported from the Mound Plant Soil Screening Facility (MRC 1985) indicate thorium concentration that ranged from 1 to 28 pCi/g and plutonium-238 concentrations from 3 to 58 pCi/g. Approximately 24 samples were collected and analyzed, but the individual sample locations were not established for this report. The data sheets are included in Appendix E.

An area of possible elevated thorium activity is noted on Plate 1, west of Area 7. This area is located slightly uphill and to the southwest of Building 98. Table V.6 presents the results of the locations that have been included in this area. The maximum concentration of thorium reported, 37.69 pCi/g, was detected in the sample collected from core location C0011 at a depth of 18 inches. Thorium levels in excess of the Mound Plant cleanup levels (5 pCi/g for the first 15 cm of soil and 15 pCi/g for below 15 cm depth) were also measured in samples from core location C0010 and surface locations S0287 and S0288 (Table V.6).

Mound Plant drawings #FSE16472 (DOE 1992f) indicates the depth to bedrock in this area of Mound Plant is approximately 180 inches, or about 15 ft. The core locations in this area were sampled to at least 216 inches. Based on the Mound Plant drawing referenced above, it appears that the core locations in this area were sampled to bedrock, although boring logs are not available.

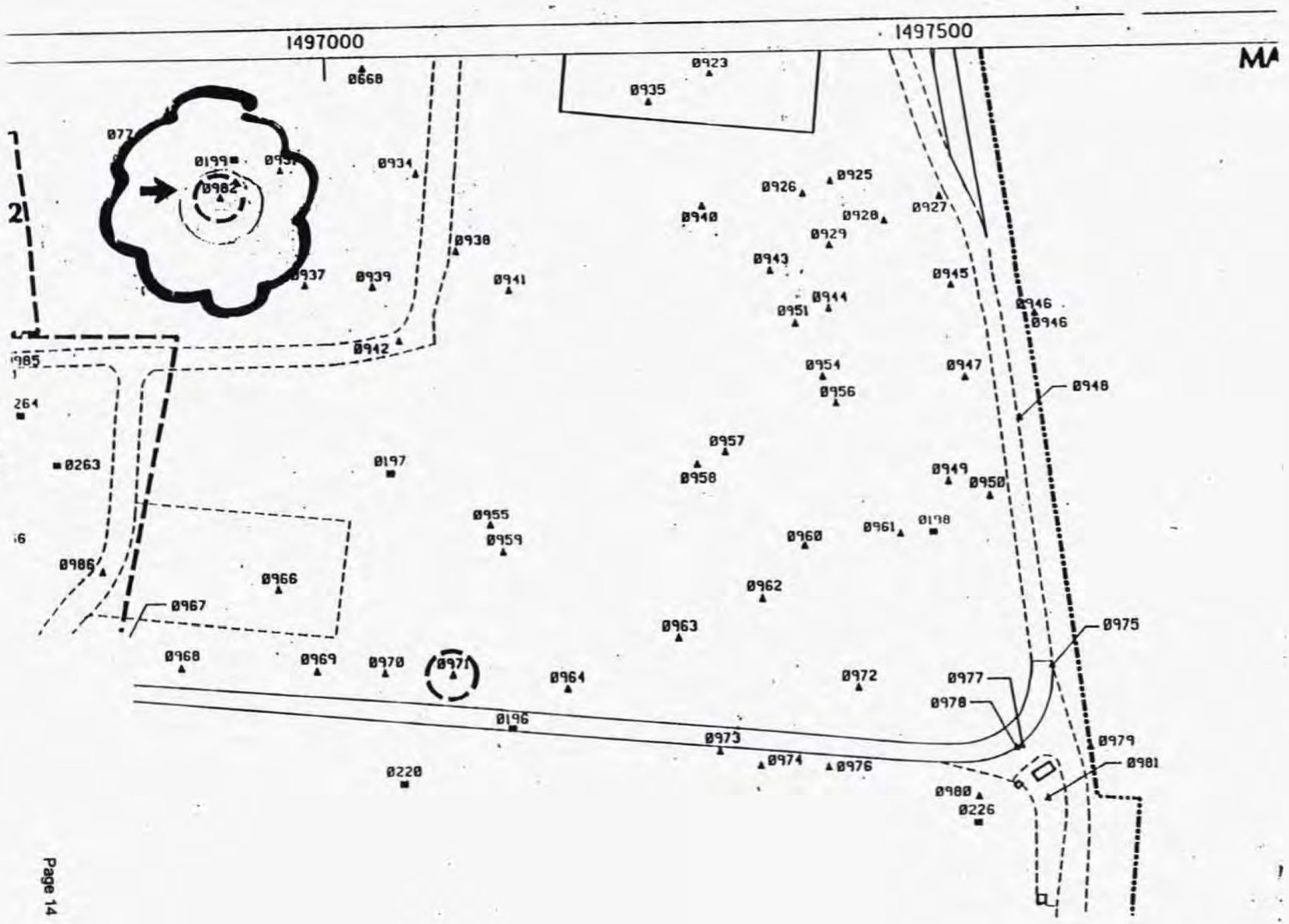
A second area of low-level but possibly wide-spread thorium contamination is indicated in Area 1 (Plates 1 and 5). This area was also involved with thorium storage and repackaging, but has experienced several cleanup activities, as previously described. Sample locations S0971 and S0982 (Table V.7), indicated as possible hot spots on Plate 1, may represent outlying areas of contamination associated with operations in Area 1.

Table V.7. (page 2 of 2)

Plate 1 Location[a]	Coordinates South	Coordinates West	MRC ID No.	Mo-Yr	Depth (inch)	Plutonium-238 (pCi/g)	Thorium[b] (pCi/g)	Tritium (pCi/mL)	Cobalt-60 (pCi/g)	Cesium-137 (pCi/g)	Radium-226 (pCi/g)	Americium-241 (pCi/g)
S0647[d]	3340	2610	2778	10-83	0	NR	NR		LDL	270	LDL	LDL
S0706	3325	4035	4021	07-84	0	28.90	b					
S0971	4075	3025	5958	07-84	0	0.15	5.02					
[redacted]												
S0982	3625	3025	5944	07-84	0	0.43	14.94					
[redacted]												
S1092	2185	3362	8413	12-84	e	0.31	323.5[f]					

[a]Map locations are given using a "C" to designate core locations and an "S" to designate surface locations.
[b]A "b" indicates that the total thorium concentration was less than the background level of 2 pCi/g, using FIDLER screening. Therefore, radiochemical analysis was not performed.
[c]The boring log for this location indicates that sampling was not performed to bedrock (Appendix B).
[d]Contaminated soil was excavated from this location in 1984. Post-cleanup soil concentrations of cesium-137 were less than 2 pCi/g (Draper 1984).
[e]The depth given for this sample was "SS." For mapping purposes (Plate 1), this is assumed to be a surface sample.
[f]Isotopic results are available for this sample and include 0.99 pCi/g of thorium-228; 321 pCi/g of thorium-230, and 1.5 pCi/g of thorium-232, for a total of 323.5 pCi/g of thorium.
FIDLER - field instrument for the detection of low energy radiation
LDL - The measured concentration was below the lower detection limit, estimated to be 0.5 pCi/g for cobalt-60, cesium-137, and americium-241; and 1 pCi/g for radium-226.
MRC ID - Monsanto Research Corporation Identification
NR - No result given
pCi/g - picocuries per gram
pCi/mL - picocuries per milliliter

Example PRS


1497000
1497500
0668
0923
0935
0199
0982
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0925
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0937
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0941
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0951
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0954
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0948
0263
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0970
0971
0964
0972
0977
0978
0196
0973
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0974
0976
0981
0220
0980
0226

Example PRS

S.S. SAMPLES RAN AT 400 SECONDS (WET) Rader's Hill 7-18-84

SAMPLE #	GROSS CNTS.	Pv	Pc/Pv	GROSS CNT/H	Tc/Tv	LOCATION		
5634	348	-1.6	449	.3	FLAG 335	SAMPLE	#1	1'-2.5'
5635	399	8.4	406	.2			#2	5'
5636	430	8.6	583	.6			#3	7½'
5637	409	7.5	498	.4			#4	10'
5638	544	24.4	369	.1	FLAG 335	SAMPLE	#5	12½'
5639	529	23.1	603	.6	FLAG 336	SAMPLE	#1	1'-2.5'
5640	442	1.2	709	.8			#2	3.5'-5'
5641	445	14.4	472	.4			#3	6'-7.5'
5642	363	2.5	396	.2			#4	8.5'-10'
5643	425	12.5	418	.2	FLAG 336	SAMPLE	#5	11'-12'
5644	441	6.7	717	.9	FLAG 337	SAMPLE	#1	1'-2.5'
5645	483	14.7	688	.8			#2	2'-5'
5646	458	11.9	636	.7	FLAG 337	SAMPLE	#3	6.5'
5647	433	12.7	459	.3	FLAG 338	SAMPLE	#1	1'-2.5'
5648	420	5.3	640	.7			#2	5'
5649	490	10.3	585	.6			#3	7.5'
5650	344	-4.0	506	.4	FLAG 338	SAMPLE	#4	10'
5651	398	5.6	497	.4	FLAG 339	SAMPLE	#1	2.5'
5652	410	1.9	696	.8			#2	5'
5653	435	9.1	596	.6			#3	7.5'
5654	421	6.4	606	.6	FLAG 339	SAMPLE	#4	9.5'
5655	507	19.1	681	.8	FLAG 340	SAMPLE	#1	2.5'
5656	417	1.2	765	.9			#2	5'
5657	423	11.1	457	.3	FLAG 340	SAMPLE	#3	6.5'
5658	377	-0.4	578	.6	FLAG 341	SAMPLE	#1	2.5'
5659	436	9.0	605	.6			#2	5'
5660	456	4.8	871	1.2			#3	7.5'
5661	399	7.9	423	[illegible]	FLAG 341	SAMPLE	#4	10'
5662	519	19.3	890	1.2	FLAG 342	SAMPLE	#1	2.5'
5663	433	11.5	502	.4			#2	5'
5664	387	-2.0	695	.8			#3	7'
5665	377	2.1	494	.4	FLAG 342	SAMPLE	#4	9.5'
5666	460	9.0	750	.9	FLAG 343	SAMPLE	#1	2.5'
5667	522	20.4	725	.9			#2	5'
5668	351	-0.8	441	.3	FLAG 343	SAMPLE	#3	7'
5669	439	9.2	617	.6	FLAG 344	SAMPLE	#1	2.5'
5670	417	8.8	500	.4				

Page 15

Example PRS

SS SAMPLES RAN @ 400 SECONDS (WET) 7-12-89

SAMPLE #	Pu GROSS CNTS	Pu Pci/G	Th GROSS CNTS	Th Pci/G	LOCATION			
5671	401	5.1	533	.5	FLAG 344	SAMPLE	#3	7.5'
5672	377	4.6	407	.2	FLAG 344	SAMPLE	#4	9.5'
5673	424	14.2	354	.1	FLAG 346	SAMPLE	#1	2.5'
5674	476	7.9	884	1.2			#2	5'
5675	345	1.2	331	[illegible]	FLAG 346	SAMPLE	#3	7'
5676	428	1.5	818	1.1	FLAG 347	SAMPLE	#1	2.5'
5677	468	10.8	736	.9			#2	5'
5678	425	5.2	671	.8	FLAG 347	SAMPLE	#3	6.5'
5679	486	14.7	708	.8	FLAG 348	SAMPLE	#1	5'
5680	421	8.7	528	.5			#2	7.5'
5681	404	6.4	504	.4	FLAG 348	SAMPLE	#3	7.5'
5682	428	7.5	609	.6	FLAG 349	SAMPLE	#1	2.5'
5683	237	-17.9	348	.1			#2	5'
5684	370	5.0	350	.1			#3	7.5'
5685	381	3.0	486	.4	FLAG 349	SAMPLE	#4	10'

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Example PRS

Environmental Restoration Program

OPERABLE UNIT 5
OPERATIONAL AREA PHASE I INVESTIGATION
NON-AOC FIELD REPORT

MOUND PLANT
MIAMISBURG, OHIO

VOLUME II - APPENDICES A-G

June 1995

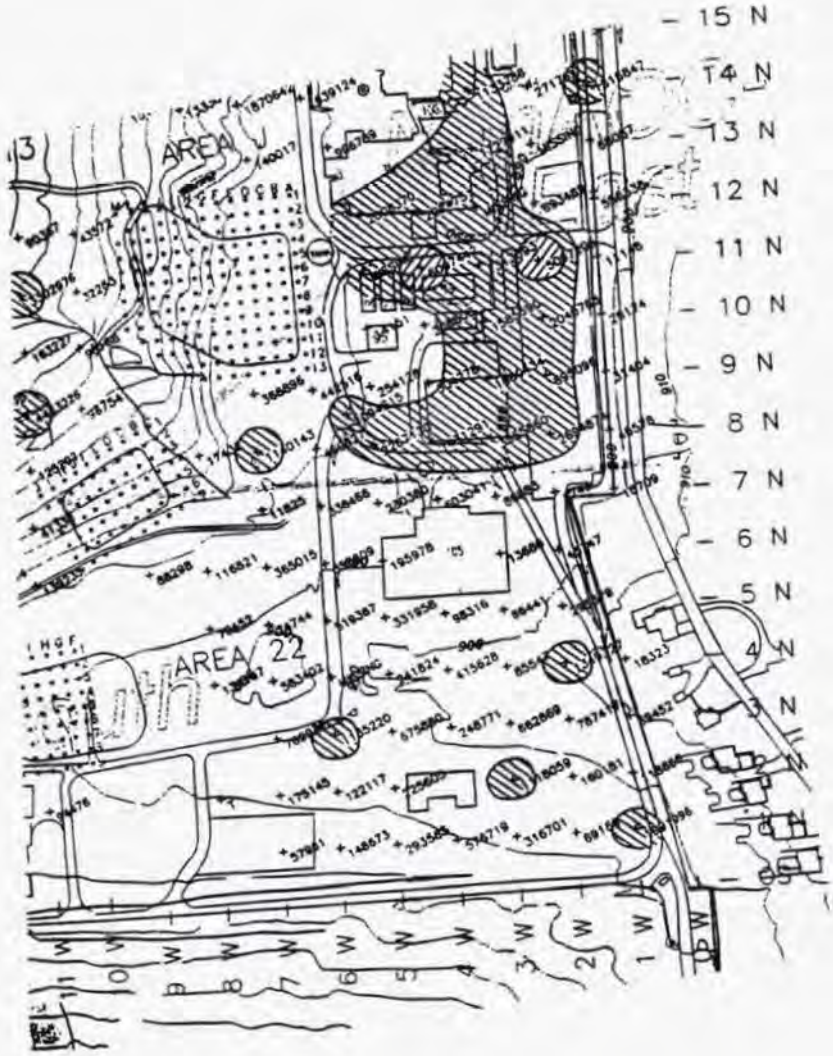
Final (Revision 0)

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

Page 17

Example PRS



Features:

+ PETREX Sample Location

ND Not Detected

T Denotes interference by terpenes; see text.

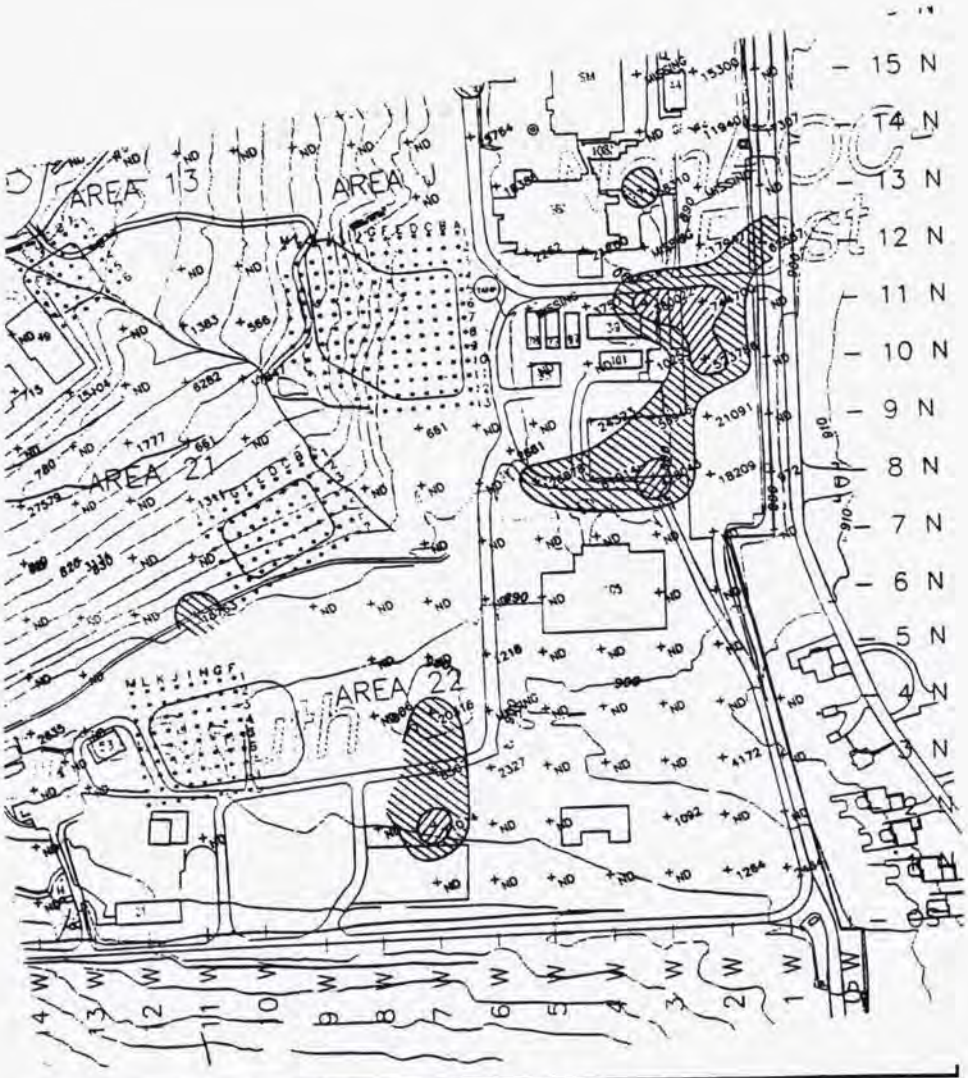
Relative Response

Total Aromatic Hydrocarbons

Plate 2

Page 18

Example PRS



Features:

+ PETREX Sample Location

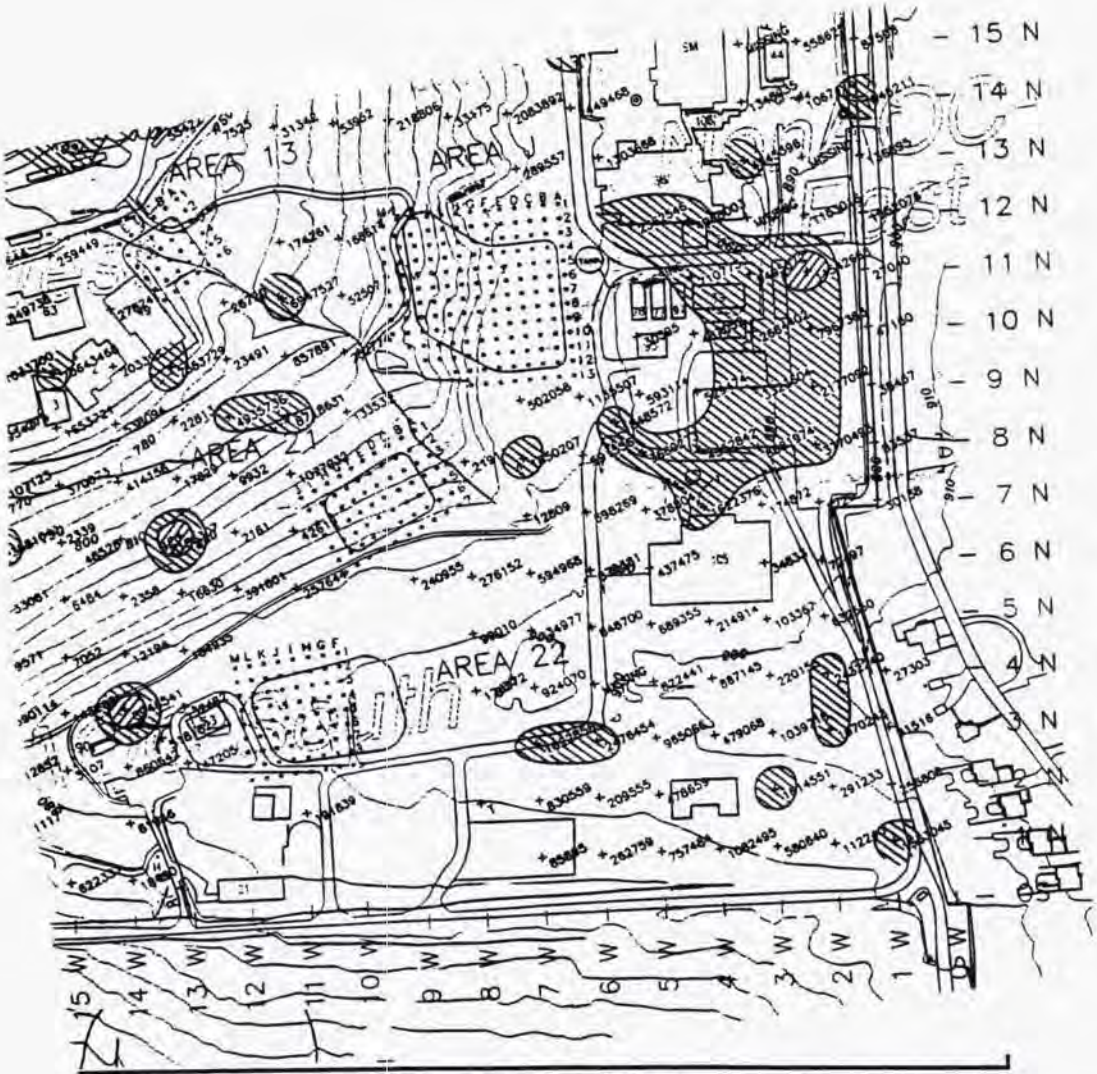
ND Not Detected

Relative Response

Total Semivolatile Hydrocarbons

Plate 3

Example PRS



Features:

+ PETREX Sample Location

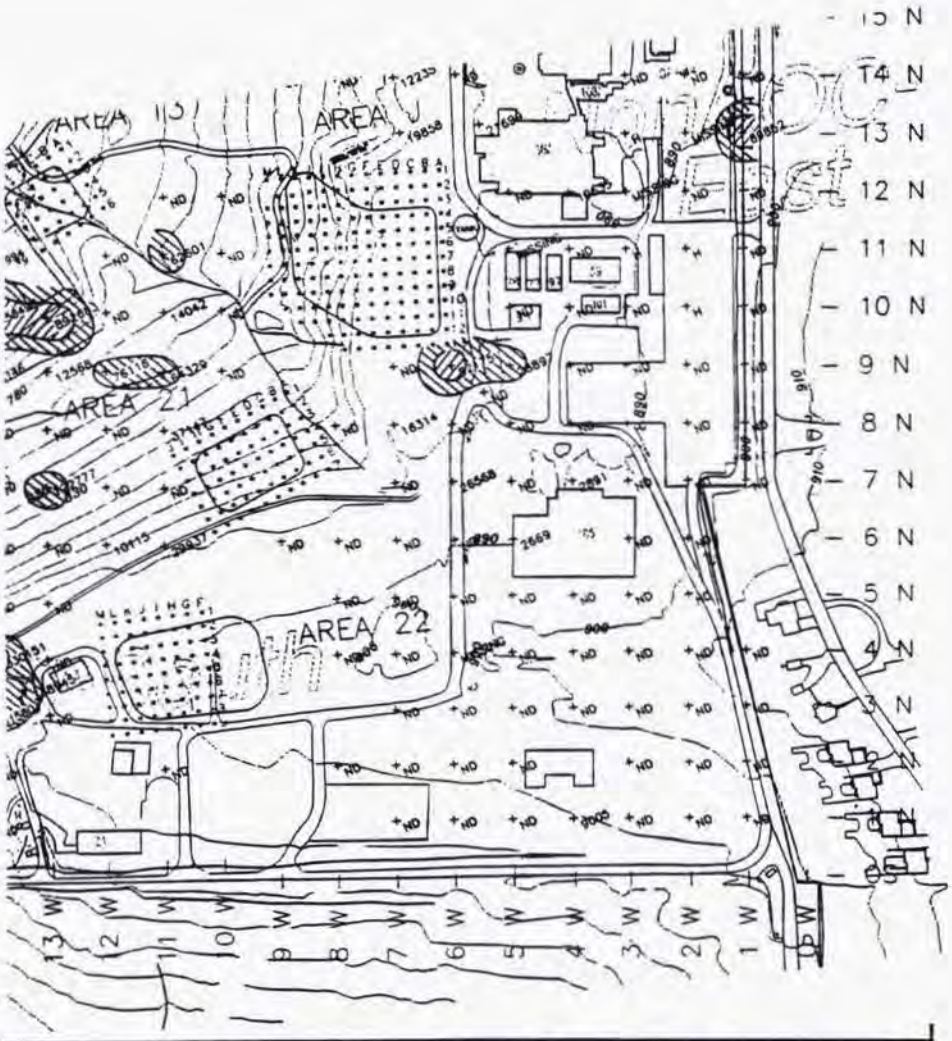
T Denotes interference by terpenes; see text.

Relative Response

Total C5–C11 Petroleum Hydrocarbons

Plate 4

Example PRS



Features:

+ PETREX Sample Location

ND Not Detected

H Denotes interference by petroleum hydrocarbons; see text.

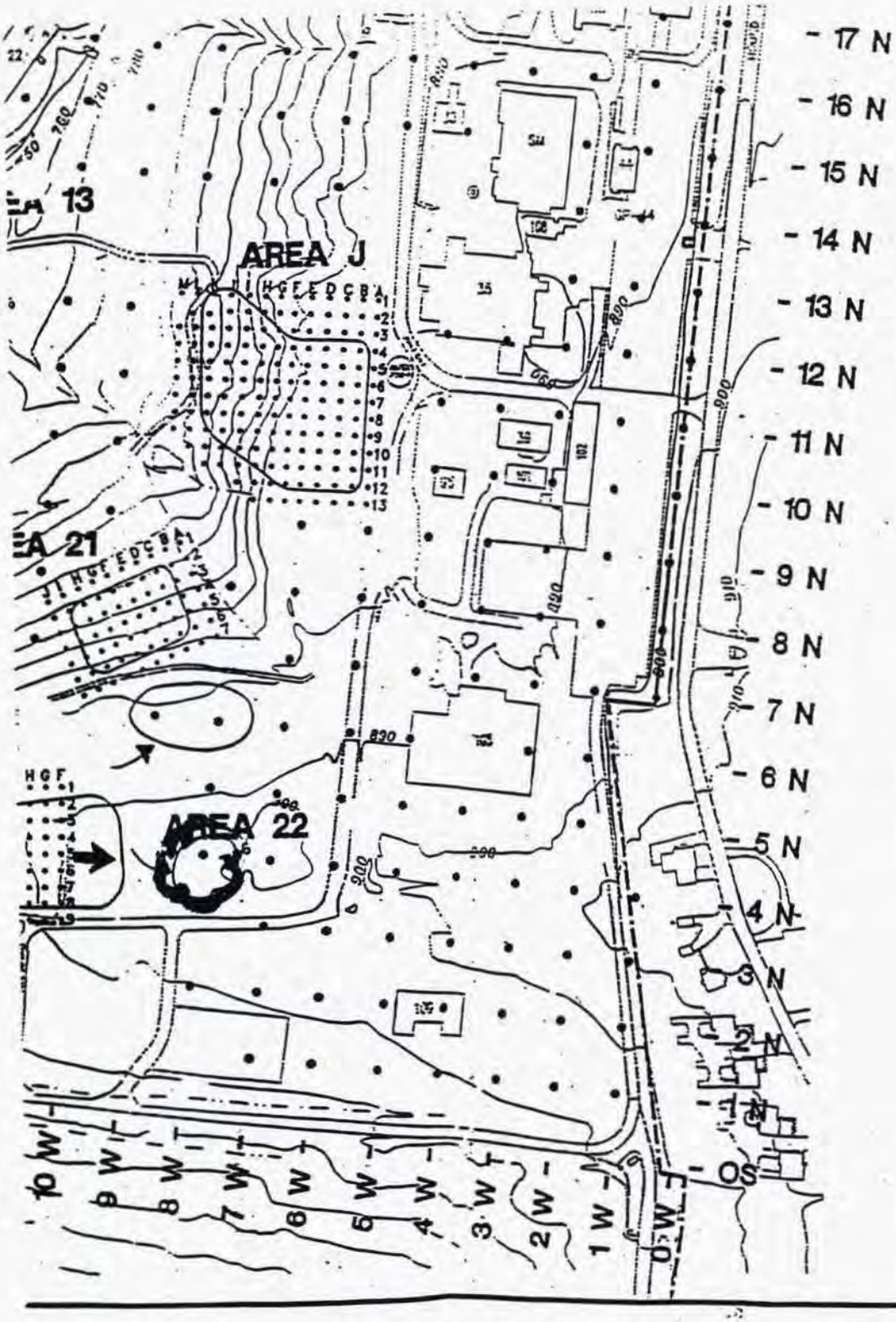
Relative Response

Total Halogenated Hydrocarbons

Plate 5

Page 21

Example PRS



ABLE UNIT 5 PHASE 1 RI/FS OPERATIONAL AREA

ITIONS OF AREAS OF CONCERN

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Example PRS

AI .NDIX D

RADIOLOGICAL DATA (FIDLER SURVEY MOUND SOIL SCREENING FACILITY DATA) FOR NON-AOC POINTS

	FIDLER SURVEY DATA					MOUND SOIL SCREENING FACILITY DATA			
SMPID	Contamination Criteria CH1	FIDLER Readings CH1	Contamination Criteria CH2	FIDLER Readings CH2	FIDLER Readings Out Channel	Plutonium - 238		Thorium - 232	
	Units: CPM	Units: CPM	Units: KCPM	Units: KCPM	Units: KCPM	Units: pCi/g		Units: pCi/g	
	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	Note:	RESULTS	Note:
04N06	137.8	100	6.5	5.0	NC	0	a	0.3	a
04N6.5	137.8	1000	6.5	80	45	NC		NC	
04N07	137.8	100	6.5	6.0	NC	19	a	0.8	a
04N08	179.4	100	10.92	8.5	NC	0	a	1.1	a
04N13	170.3	150	9.72	8.5	NC	13	a	0.7	a
04N14	170.3	110	9.72	6.0	NC	16	a	1.4	a
04N15	179.4	170	10.92	8.5	NC	19	a	1.2	a
04N16	179.4	140	10.92	8.0	NC	31	b	0.8	a
04N17	179.4	170	10.92	8.0	NC	15	a	1	a
04N18	179.4	160	10.92	8.5	NC	37	b	1	a
04N19	179.4	150	10.92	9.5	NC	35	b	1.5	a
04N20	130	75	6.5	5.5	NC	21	a	1.1	a
04N21	130	50	6.5	4.5	NC	11	a	0.1	a
04N22	157.3	120	8.45	8.0	NC	0	a	0.9	a
04N23	139	100	9.23	6.5	NC	16	a	0.6	a
05N02	253.5	115	12.48	9.0	NC	30	b	1.2	a
05N03	253.5	95	12.48	5.5	NC	16	a	1.3	a
05N04	253.5	115	12.48	7.5	NC	27	b	1.1	a
05N05	253.5	105	12.48	7.0	NC	1	a	0.8	a
05N06	184.6	70	11.7	4.0	NC	0	a	0.3	a
05N07	184.6	160	11.7	6.5	NC	0	a	0.8	a
05N08	184.6	125	11.7	8.5	NC	18	a	1.2	a
05N13	179.4	145	10.92	9.5	NC	16	a	1.2	a
05N14	179.4	120	10.92	7.0	NC	25	b	0.2	a
05N15	179.4	140	10.92	9.5	NC	41	b	0.5	a
05N16	210.6	140	12.22	11.0	NC	16	a	1.1	a
05N17	210.6	145	12.22	9.0	NC	18	a	1	a
05N18	210.6	165	12.22	10.5	NC	39	b	0.8	a
05N19	130	105	6.5	9.5	NC	7	a	0.9	a

DRAFT
OTHER SOILS CHARACTERIZATION REPORT

MOUND PLANT
MIAMISBURG, OHIO

JANUARY 1996

U.S. DEPARTMENT OF ENERGY
OHIO FIELD OFFICE

DECONTAMINATION AND DECOMMISSIONING PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

Example PRS

Table 3.1 Area Designations

Location	Designation	Location	Designation
Area 5	05	Hot Spot S0166	80
Area 8	08	Hot Spot S0425	81
Area 8 (continued)	88	[redacted]	[redacted]
Area 9	09	Hot Spot S0982	84
Area 9 (continued)	99	[redacted]	[redacted]
Area 10	10	Hot Spot S0647	86
Area 12	12	Hot Spot C0028	87
Area 12 (continued)	72	Hot Spot S0307	90
Area 20	20	Hot Spot S0472	91
Area 23	23	Hot Spot S1092	92
Plant Drainage Ditch	66	Hot Spot S0208	93
Plant Drainage Ditch (cont.)	67	Hot Spot C0007	94

Based on field and Mound Rad Lab data, specific locations were targeted for resampling and offsite analysis. Generally, areas exhibiting the highest observed radionuclide concentrations, or the highest field instrument readings were targeted. Soil collected from these locations were split into representative samples and shipped to both Quanterra Environmental Services, Inc. (Quanterra) for alpha, beta, and gamma spectroscopy, and to Thermo Analytical, Inc. (TMA) for VOC, SVOC, TCLP metals, and cyanide analyses as defined in Section 5.4. All samples were packaged and shipped according to current International Air Transport Association (IATA) regulations. All containers provided for these samples were certified as clean according to US Environmental Protection Association (EPA) standards. The certifications are on file for each lot of containers.

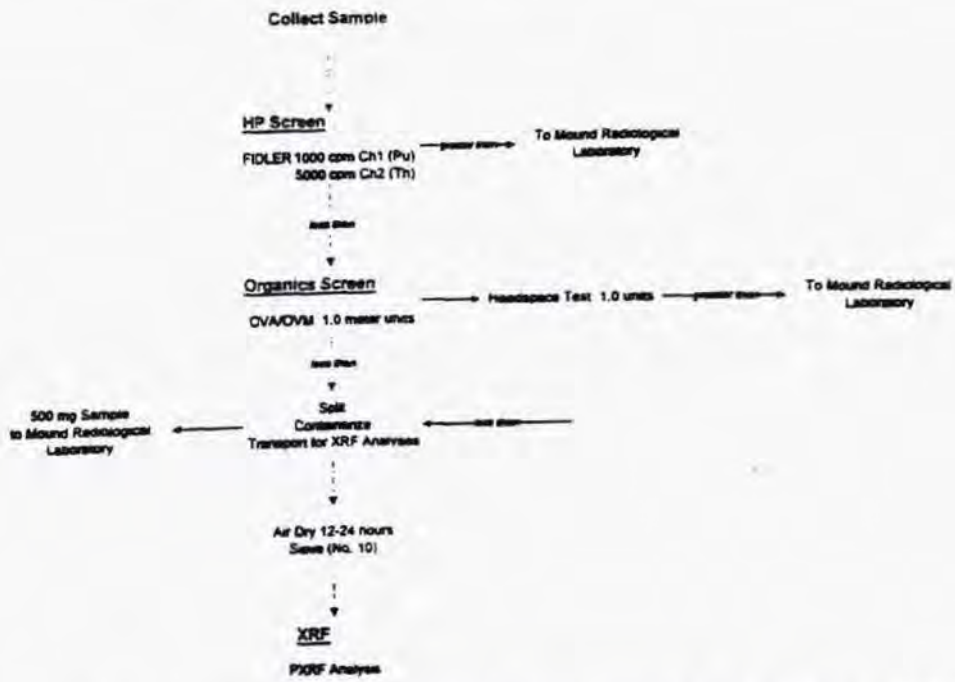
3.1.1.3 Screening

All samples collected in the field were subject to a sequential process of field and onsite laboratory screening in order to determine the extent of contamination. Samples were field screened first for radioactivity, then organic compounds, then were split for radiological compound analyses and PXRF analyses. If health-based action levels were exceeded in the field, then subsequent handling was terminated. These samples were placed in appropriate investigated derived materials (IDM) containers without subsequent handling. Figure 3.1 shows a flow chart for soil screening activities.

Example PRS

3.0 Methods

FIGURE 3.1 SOIL SCREENING FLOW CHART



Initial field screening of each sample was performed by the RCT with a BICRON FIDLER. The FIDLER is calibrated against Plutonium 238 (Pu238) on Channel 1 and Thorium 232 (Th232) on Channel 2. FIDLER readings are presented in counts per minute (cpm) per 100 cm^2 of probe area. FIDLER results were compared to Mound reportable action levels for these radionuclides. These reportable levels, based on the Mound Health Physics Procedures (MD-80036 Operation 1004), follow:

FIDLER:	1000 cpm above background	Channel 1 (Plutonium)
	5000 cpm above background	Channel 2 (Thorium)

Samples which exceeded 20.000 cpm above background on Channel 2 were theorized to exceed respirable limits of thorium for level D work, and received no further handling. These samples were placed in appropriate IDM containers without subsequent analyses.

After initial screening for radioactivity, the samples were checked for the presence of organic compounds. The soil core was cut in several places, and the cross section was immediately checked for the presence of vapors with an OVA and/or OVM. The sample was then chopped and mixed to form a composite for the sample interval. A Mound-

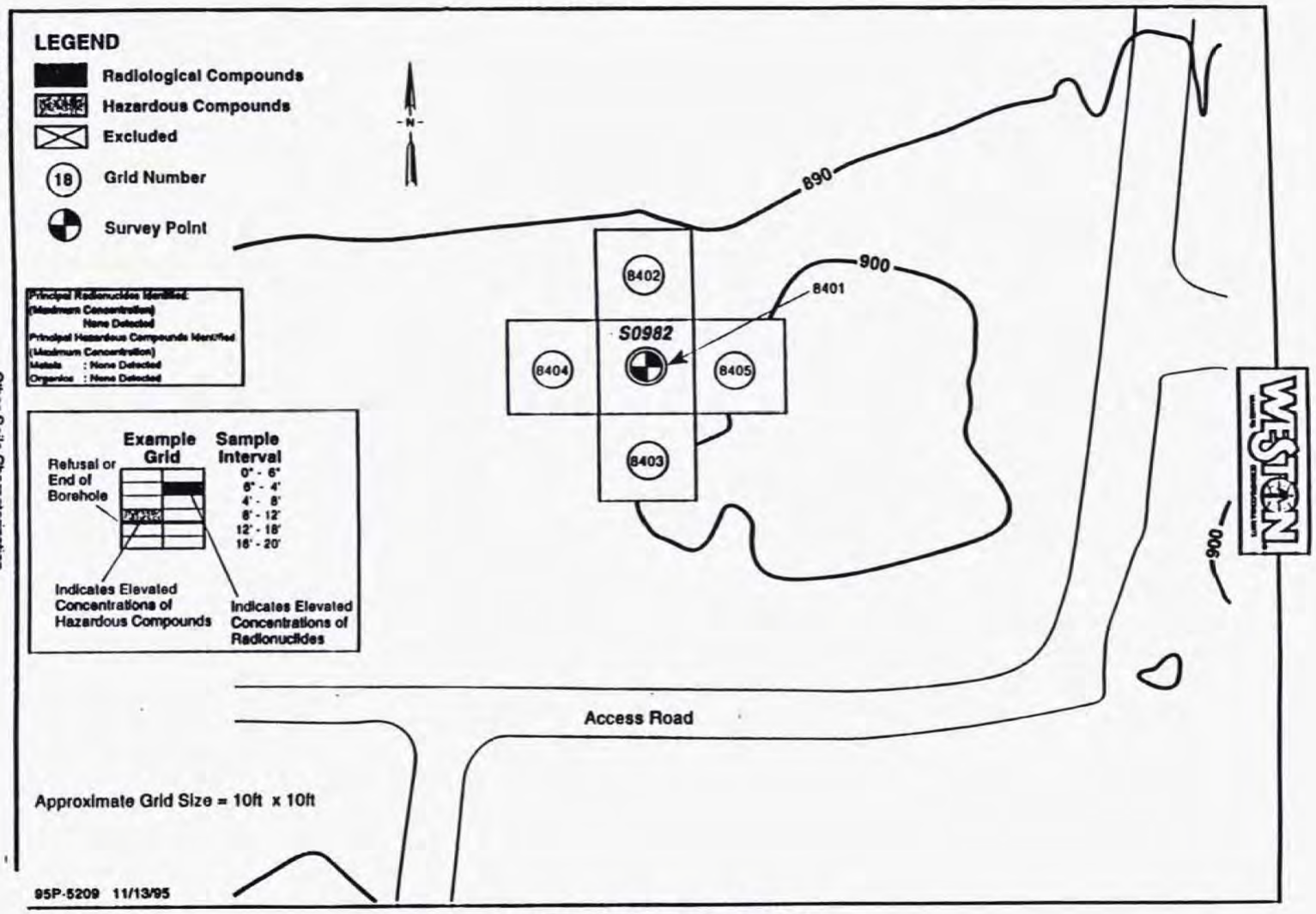


FIGURE 5.15 HOT SPOT S0982

Example PRS

5.0 Results

Hot Spots

S0166

Analyses of soil samples revealed no radiological, organic or inorganic compounds in concentrations exceeding the action levels defined in Section 5.1. Figure 5.12 graphically represents Hot Spot S0166 field sampling results.

S0425

One sample from hot spot S0425 (Area 81) triggered field screening action levels:

- One sample exceeded limits for hazardous compounds

Elevated concentrations of chromium were detected by the PXRF in soil samples collected from the site.

Table 5.12 shows Hot Spot S0425 field results exceeding action levels. Figure 5.13 graphically represents Hot Spot S0425 field sampling results.

Table 5.12 Hot Spot S0425 Field Sampling Results

	FIDLER		Organics		Rad Laboratory				
Sample ID	Channel 1 (1K)	Channel 2 (5K)	OVA	OVM	Pu 238 (25)	Th 232 (5)	Ra 226 (5)	Cs 137 (15)	Am 241 (20)
8101-5001	<1000	<5000	<1	<1					

	PXRF Metals								
Sample ID	As (102.07)	Ba (1489)	Cd	Cr HI	Cr LO (164.43)	Pb (172)	Hg	Se	Ag (2558)
8101-5001	48.025	180.09	<44.5	<347	178.18	<10	<37	<14	<29

S0971

Analyses of soil samples revealed no radiological, organic or inorganic compounds in concentrations exceeding the action levels defined in Section 5.1. Figure 5.14 graphically represents Hot Spot S0971 field sampling results.

S0982

Analyses of soil samples revealed no radiological, organic or inorganic compounds in concentrations exceeding the action levels defined in Section 5.1. Figure 5.15 graphically represents Hot Spot S0982 field sampling results.

Example PRS

exceeding the action levels are tabulated below. These tables identify samples from areas of potential contamination. Graphic representations of the Other Soils areas and Hot Spots with a data overlay have been included to facilitate interpretation, and aid in the computation of soil cleanup volumes.

Where Mound Rad Lab method detection limits exceed specified action levels, a symbol indicating the undetermined nature of the data ("U") accompanies the spreadsheet entry.

Table 5.2 shows the action levels used in the Other Soils Field Program to identify potentially contaminated soil.

Table 5.2 Field Action Levels

Field Instruments	Action Level
FIDLER	
Channel 1 (Pu)	1000 cpm Above Background
Channel 2 (Th)	5000 cpm Above Background
OVA	1 Meter Unit Above Background
OVM	1 Meter Unit Above Background
PXRF	
Arsenic	102.07 mg/Kg
Barium	1489 mg/Kg
Cadmium	NA
Chromium (High)	NA
Chromium (Low)	164.43 mg/Kg
Lead	172 mg/Kg
Mercury	NA
Selenium	NA
Silver	2559 mg/Kg
Mound Rad Lab	
Plutonium 238	25 pCi/g
Thorium 232	5 pCi/g
Radium 226	5 pCi/g
Cesium 137	15 pCi/g *
Americium 241	20 pCi/g

* NRC Limit

The action level for Cesium 137 was reduced for this report from the D&D action level of 80 pCi/g to the NRC action level of 15 pCi/g. The basis for adjusting this limit can be found in a communication with the Nuclear Regulatory Commission (NRC) which discusses decommissioning criteria and maximum acceptable isotope concentrations in soil. A copy of the communiqué may be found in Appendix H.

Area 5

Thirteen samples in Area 5 triggered field screening action levels.

Example PRS

6.0 Analysis and Conclusions

Hot spot CO028 also contains 30 cubic yards of soil with elevated concentrations of both radioactive and hazardous compounds.

Soil samples from hot spots SO425, SO175, S1092, and SO208 had elevated concentrations of hazardous compounds

Table 6.9 Area 80 Analysis

Area	Sub-Area	Contaminant Type	Contaminant Name	Extent Lateral (ft^2)	Extent Vertical (ft)	Volume Net (yd^3)	Volume Gross (yd^3)	Minimum	Maximum	Mean
80 SO166	NA	None Detected		NA	NA	NA	NA			

Table 6.10 Area 81 Analysis

Area	Sub-Area	Contaminant Type	Contaminant Name	Extent Lateral (ft^2)	Extent Vertical (ft)	Volume Net (yd^3)	Volume Gross (yd^3)	Minimum	Maximum	Mean
81 SO425	A	HAZ	Cr	100ft^2	0'-0.5'	NA	NA			

Table 6.11 Area 83 Analysis

Area	Sub-Area	Contaminant Type	Contaminant Name	Extent Lateral (ft^2)	Extent Vertical (ft)	Volume Net (yd^3)	Volume Gross (yd^3)	Minimum	Maximum	Mean
83 SO971	NA	None Detected		NA	NA	NA	NA			

Table 6.12 Area 84 Analysis

Area	Sub-Area	Contaminant Type	Contaminant Name	Extent Lateral	Extent Vertical	Volume Net	Volume Gross	Minimum	Maximum	Mean
84 SO982	NA	None Detected		NA	NA	NA	NA			

DRAFT
OTHER SOILS CHARACTERIZATION REPORT

Volume II – Appendices

MOUND PLANT
MIAMISBURG, OHIO

JANUARY 1996

U.S. DEPARTMENT OF ENERGY
OHIO FIELD OFFICE

DECONTAMINATION AND DECOMMISSIONING PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

Example PRS

WESTON

SHEET ____ of ____

CLIENT/SUBJECT S0982 84XX W.O. NO. ____

TASK DESCRIPTION ____ TASK NO. ____

PREPARED BY ____ DEPT ____ DATE ____

MATH CHECK BY ____ DEPT ____ DATE ____

METHOD REV. BY ____ DEPT ____ DATE ____

APPROVED BY ____ DEPT ____ DATE ____

Sample ID	Rad Laboratory		Fidler		α	β	Organics		Metals
	(2T) Plutonium	(5) Thorium	(1K) Channel 1	(5K) Channel 2			OVA	OVM	
8401-5001	—	—	—	—	—	—		—	
-5004	—	—	—	—	—	—		—	
8402-5001	—	—	—	—	—	—	—	—	
-5004	—	—	—	—	—	—	—	—	
8403-5001	—	—	—	—	—	—	—	—	
-5004	—	—	—	—	—	—	—	—	
8404-5001	—	—	—	—	—	—	—	—	
-5004	—	—	—	—	—	—	—	—	
8405-5001	—	—	—	—	—	—	—	—	
-5004	—	—	—	—	—	—	—	—	

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Example PRS

PXRF Master File

PRS 313

DATE	FILE	ID	"TIME"	"Cr/HI"	"K"	"Ca"	"Ti"	"Cr/LO"	"Mn"	"Fe"	"Co"	"Ni"	"Cu"	"Zn"	"As"	"Se"
21-Aug-95	A0821958	17509-6017	16.813	-360.76	2816.6	66440	2819.9	89.908	650.38	24393	196.76	4.6675	-18.314	49.777	18.289	-0.03497
27-Jul-95	A0727795A	18001-5001	13.048	-752.65	3612.8	239163	484.09	-125.73	-81.682	6783.3	-28.108	-0.29142	41.645	8.6526	43.93	16.751
27-Jul-95	A0727795A	18002-5001	13.279	-814.78	2821.4	240077	562.14	-122.84	499.13	9799.5	41.673	23.351	50.502	97.535	14.425	36.426
27-Jul-95	A0727795A	18003-5001	13.566	-680.85	3221.8	217459	378.2	-124.47	316.5	6791.2	54.095	-6.5998	30.267	35.447	14.564	25.232
27-Jul-95	A0727795A	18004-5001	13.949	-832.76	3257.3	233723	474.14	-165.14	135.5	7209.9	-157.94	34.288	57.321	-4.1015	17.988	10.338
27-Jul-95	A0727795A	18005-5001	14.231	-669.8	3434.4	216227	846.82	-123.82	165.43	11062	79.5	-10.237	92.282	161.41	9.0517	16.953
27-Jul-95	A0727795A	18005-6001	14.465	-484.6	3005.4	215162	840.03	-205.56	552.22	11902	44.774	-41.742	79.02	111.3	-7.1288	18.563
5-Apr-95	A0405595A	18101-5001	15.475	-121.78	13327	71145	1355.8	178.18	104.58	17285	-237.16	-32.095	24.337	76.417	48.025	-35.259
5-Apr-95	A0405595A	18101-5004	16.083	-120.43	26805	90596	2526.3	85.377	273.37	22434	-125.59	35.244	-46.942	17.041	30.836	-40.244
5-Apr-95	A0405595A	18101-5008	16.318	73.752	33032	99630	2856.5	-67.12	16.873	27704	-254.09	18.813	-27.935	23.386	26.751	-41.534
5-Apr-95	A0405595B	18101-5012	17.25	730.8	18477	182197	1973	135.53		17085		0	0	52.35	0	0
5-Apr-95	A0405595B	18101-5012	17.233	86.716	18766	182439	2060.1	99.297	214.45	18865	-361.87	11.022	-17.29	4.1906	14.916	-28.916
5-Apr-95	A0405595A	18101-5016	8.886	-129.25	29574	119404	2885.4	-14.114	25.085	24373	-254.56	6.3728	18.841	68.382	23.158	-24.087
5-Apr-95	A0405595B	18101-6012	17.51	121.75	20572	165731	2011.9	76.179	17.465	18657	-99.67	5.4681	25.814	23.296	12.406	-46.752
29-Mar-95	81025001	18102-5001	12.77	-740.15	13924	74862	2117	-0.38568	354.98	18525	-47.373	-19.926	5.3081	719.35	8.4801	-15.065
29-Mar-95	81025004	18102-5004	10.509	-807.94	30178	103032	3111.8	-111.06	647.25	27288	-84.818	-24.256	52.128	121.78	-1.9319	-17.855
29-Mar-95	81025008	18102-5008	10.282	-635.51	34626	95827	3520.1	-104.44	454.97	28083	-252.4	85.09	49.456	96.373	4.3029	-21.1
29-Mar-95	81025012	18102-5012	10.01	-870.59	22673	161826	2523.9	-124.17	504.92	23739	-174.84	76.338	43.951	73.414	-7.3438	-15.646
29-Mar-95	81026001	18102-6001	11.087	-397.7	13550	71799	1930.3	29.259	280.78	18028	-212.14	-47.581	84.071	773.8	-7.9482	-4.1828
24-Mar-95	81035001	18103-5001	12.752	-487.07	16843	62850	1824.5	-14.976	456.17	18580	-78.785	12.965	87.579	157.75	-1.15	-9.1047
24-Mar-95	81035004	18103-5004	12.96	-770.17	33723	53378	3535.7	-30.376	876.07	28041	129.06	-21.529	75.378	68.423	-7.4634	-30.947
24-Mar-95	81035008	18103-5008	13.197	-496.86	32970	106327	3208.7	-106.39	348.91	27740	22.513	76.687	45.48	84.255	1.6091	-3.7808
24-Mar-95	81035012	18103-5012	13.487	-382.09	38018	100989	3957.4	-46.659	435.71	31310	195.21	25.898	79.18	51.705	-33.38	-8.9191
24-Mar-95	81035016	18103-5016	13.787	-661.47	33683	106070	3386	-71.252	510.32	26820	-82.287	28.661	74.464	115.4	13.212	-8.4544
24-Mar-95	81045001	18104-5001	12.413	-652.02	15088	58459	2026.3	-33.269	670.69	19218	-23.66	33.126	58.978	141.51	14.997	-5.6564
23-Mar-95	8104-5004	18104-5004	15.566	-466.69	27658	108353	2715	-77.774	274.36	25504	-96.936	16.124	13.361	84.881	-9.5305	4.8881
23-Mar-95	8104-5008	18104-5008	15.328	-558.29	27083	127977	2490.1	-95.38	540.61	23395	69.155	8.9215	35.034	99.435	-12.098	-15.182
23-Mar-95	81045012	18104-5012	15.076	-719.95	13686	222541	1503.8	-178.91	346.53	15640	69.203	29.598	24.791	71.162	24.345	-11.375
23-Mar-95	81046004	18104-6004	15.807	-557.09	25439	104980	2641.2	26.686	657.86	26219	104.73	-89.77	-1.9848	46.331	8.7835	-27.336
13-Mar-95	81055001	18105-5001	14.792	-260.19	15053	48843	2180.7	14.595	182.43	20859	-147.06	-0.269857	-18.714	320.86	47.653	2.1282
13-Mar-95	81055004	18105-5004	16.429	-576.29	8488.9	124085	1119.9	78.473	-227.42	11782	-49.037	-46.112	2.5309	84.452	44.628	-0.79656
13-Mar-95	81055008	18105-5008	14.545	-36.687	15964	129109	1740.8	-34.005	105.2	15206	63.029	-93.811	-14.695	96.812	37.88	12.76
13-Mar-95	81055012	18105-5012	16.213	-273.41	33120	121095	3236.4	-80.233	167.28	24816	138.42	-62.609	-11.777	73.982	49.116	7.4301
6-Apr-95	A0406595A	18301-5001	9.238	-56.862	23933	67806	2690.3	19.286	524.67	26557	-212.53	45.244	-3.1291	67.791	41.83	-18.474
6-Apr-95	A0406595A	18301-5004	9.471	-359.38	18259	153963	1979.9	40.576	-24.624	21739	-120.05	50.83	1.3992	39.291	18.643	-40.338
5-Apr-95	A0405595A	18302-5001	14.148	-21.87	28823	58956	2828.8	-0.083[illegible]	482.81	29685	-169.23	-18.285	27.231	85.158	17.084	-31.804
5-Apr-95	A0405595A	18302-5004	14.376	-229.71	20843	63825	2613.8	107.03	925.26	22219	-20.539	63.044	-5.1819	84.239	16.187	-32.882
6-Apr-95	A0406595A	18303-5001	9.894	-243.35	23439	78227	2870.2	43.783	518.57	26818	-163.24	2.1177	8.274	63.065	35.236	-34.551
5-Apr-95	A0405595A	18303-5004	14.704	180.72	22486	142797	2406.3	32.337	-151.18	22998	-76.174	-18.268	77.156	35.324	-8.1202	-24.842
5-Apr-95	A0405595A	18304-5001	14.934	-14.856	15698	51777	2559.2	76.742	552.81	17488	-52.354	-48.763	43.121	43.672	16.716	-30.225
5-Apr-95	A0405595A	18304-5004	15.214	-138.39	17735	126849	1821.9	162.69	338.06	20584	-150.68	71.452	-16.001	20.899	40.297	-24.047
5-Apr-95	A0406595A	18305-5001	8.924	-121.66	19038	29824	2698.1	95.019	634	28680	-49.005	-42.045	13.547	56.815	11.757	-28.134
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5-Apr-95	A0405595A	18401-5001	13.258	26.596	16877	27964	2590.2	47.757	526.89	21405	-71.548	2.0537	6.0756	22.827	27.998	-28.035
5-Apr-95	A0405595A	18401-5004	13.432	-181.56	14689	178307	1869.2	11.881	338.81	17821	-105.42	-29.971	-33.972	48.253	26.002	-38.763
5-Apr-95	A0405595A	18401-6004	13.68	-317.35	12908	173850	1635.3	125.88	220.34	16523	-253.24	47.115	9.0811	40.831	45.812	-30.834
6-Apr-95	A0406595A	18402-5001	10.426	-263.24	17106	17627	2892.8	34.536	677.34	20241	-0.69649	-42.077	12.334	45.529	-4.5062	-28.852
30-Mar-95	84025004	18402-5004	9.098	-522.72	13835	101198	2197	-129.64	789.23	18356	-123.57	-17.274	37.818	37.621	5.8983	-5.6622
6-Apr-95	A0406595A	18403-5001	12.864	-158.59	16238	31653	2827.7	68.125	332.51	18950	-194.25	-63.42	-18.222	12.007	20.171	-37.078
30-Mar-95	84035004	18403-5004	9.363	-604.45	12169	174597	1338.9	-136	224.57	14664	-134.86	17.476	46.718	71.964	-2.7337	-10.915
6-Apr-95	A0406595A	18404-5001	10.888	-225.35	15598	18700	2554.2	69.802	364.88	20007	29.035	-30.480	-27.177	33.247	25.709	-23.308
6-Apr-95	A0406595A	18404-5004	11.142	-107.37	13221	146126	1901.3	88.277	386.80	18818	16.875	-5.2231	-14.276	21.89	12.331	-38.756
6-Apr-95	A0406595A	18404-6004	11.402	-229.86	14678	155225	2050.2	-20.887	531.9	20829	-41.119	-9.8775	-13.443	64.801	14.692	-44.385
30-Mar-95	84055001	18405-5001	8.874	-476.54	18753	22355	3471	0.52046	743.92	21512	-186.81	-10.380	78.415	57.195	10.071	2.1835
[illegible]	[illegible]	18405-5004	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31-Aug-95	A[illegible]	18501-5004	14.286	-495.85	4800.6	241339	414.15	-46.661	-33.473	9482.9	-69.09	151.5	-48.576	7.3346	70.43	-8.7807
31-Aug-95	A[illegible]	18501-5007	14.506	-775.34	16235	129852	1587.8	83.833	336.29	17954	[illegible]				70.842	-8.4164
30-Aug-95 | AO															72.801	-8.9042
30-Aug-95 | AO															6.116	-21.719
30-Aug-95 | AO															9.298	-11.961
30-Aug-95 | AO															6.882	-9.8486
30-Aug-95 | AD															3.191	-30.619
30-Aug-95 | AD															9.545	-33.18
30-Aug-95 | AD															4.188	-16.314
30-Aug-95 | AD															8.839	-8.8428
30-Aug-95 | AD															5.198	-17.505
30-Aug-95 | AD															0.558	-13.083
30-Aug-95 | AD															7.143	-27.837
30-Aug-95 | AD															9.305	-5.4338
30-Aug-95 | AD															1.888	-17.053
28-Mar-95 | 87															4.903	-32.111
28-Mar-95 | 87															7.541	-31.258
28-Mar-95 | 87															7.831	-39.316
28-Mar-95 | 87															1.125	-2.7678
28-Mar-95 | 81															1.419	3.3306
24-Mar-95 | 81															3.771	-11.453
24-Mar-95 | 81															3.773	-17.23
24-Mar-95 | 81															3.917	-15.24
24-Mar-95 | 81															1.8914	-5.1829
24-Mar-95 | 81															1.864	-8.8381
24-Mar-95 | 81															0.9804	-11.084
24-Mar-95 | 81															1.3759	-12.886
24-Mar-95 | 81															1.3156	-16.606
24-Mar-95 | 81															21.729	-13.3
24-Mar-95 | 81															10.86	-24.082
24-Mar-95 | 81															13.327	-19.821
28-Aug-95 | A															16.885	-0.30827
28-Aug-95 | A															81.713	-28.583
28-Aug-95 | A															65.859	-26.458
28-Aug-95 | A															106.23	-34.694
28-Aug-95 | A															64.735	-28.088
28-Aug-95 | A															60.503	-39.187
28-Aug-95 | A															84.324	-47.822

Key to interpreting sample data:

Sample nomenclature is of the form **XXYY-ZZ00**

Where:
XX = Area designation

YY = Sample Location
- 01 = Historical Hot Spot Location
- 02 = Approx 10 feet north of historical location
- 03 = Approx 10 feet south of historical location
- 04 = Approx 10 feet west of historical location
- 05 = Approx 10 feet east of historical location

ZZ = Sample Type
- 50 = Soil

00 = Sample Depth
- 01 = Surface
- 04 = 0-4 feet
- 08 = 4-8 feet
- 12 = 8-12 feet

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Example PRS

RISK-BASED GUIDELINE VALUES

MOUND PLANT
MIAMISBURG, OHIO

December 1995

Submitted to the
Office of Southwestern Area Programs (EM-453)
Environmental Restoration
and the
Miamisburg Area Office
U.S. DEPARTMENT OF ENERGY

Prepared by
HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
Environmental Management and Enrichment Facilities
Managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

FINAL
(REVISION 0)

TABLE 4A

Construction/Mound Employee - Soil/Sediment Guideline Values: Chemicals (Units = mg/kg)

CHEMICAL	Ingestion				Inhalation				Ingestion + Inhalation			
	GV for TR=10^{-4}	GV for TR=10^{-5}	GV for TR=10^{-6}	GV for HI=1	GV for TR=10^{-4}	GV for TR=10^{-5}	GV for TR=10^{-6}	GV for HI=1	GV for TR=10^{-4}	GV for TR=10^{-5}	GV for TR=10^{-6}	GV for HI=1
High Explosives												
HMX				5.50e+04								
PETN												
RDX	2.70e+03	2.70e+02	2.70e+01	3.20e+03								
Inorganics												
Aluminum												
Antimony				4.25e+02								
Arsenic				3.20e+02	6.00e+05	6.00e+04	6.00e+03					
Barium				7.50e+04				1.55e+07				7.50e+04
Beryllium	7.00e+01	7.00e+00	7.00e-01	5.50e+03	3.65e+06	3.65e+05	3.65e+04		7.00e+01	7.00e+00	7.00e-01	
Cadmium (Diet)				1.05e+03	5.00e+06	5.00e+05	5.00e+04					
Chromium III				1.05e+06								
Chromium VI				5.50e+03	7.50e+05	7.50e+04	7.50e+03					
Cobalt												
Copper												

TABLE 4A

Construction/Mound Employee - Soil/Sediment Guideline Values: Chemicals (Units = mg/kg)

CHEMICAL	Ingestion				Inhalation				Ingestion + Inhalation			
	GV for TR=10^{-6}	GV for TR=10^{-5}	GV for TR=10^{-4}	GV for HI=1	GV for TR=10^{-6}	GV for TR=10^{-5}	GV for TR=10^{-4}	GV for HI=1	GV for TR=10^{-6}	GV for TR=10^{-5}	GV for TR=10^{-4}	GV for HI=1
Cyanide				2.15e+04								
Iron												
Lead												
Lithium												
Manganese (Diet)				1.50e+05				1.55e+06				1.35e+05
Mercury				3.20e+02				9.50e+06				3.20e+02
Nickel				2.15e+04								
Silver				5.50e+03								
Thallium												
Vanadium				7.50e+03								
Zinc				3.20e+05								
Organics												
1,1,1-Trichloroethane												
1,1-Dichloroethane				1.05e+05				3.90e+01				3.90e+01
1,2-Dichloroethane	3.30e+03	3.30e+02	3.30e+01		1.70e+03	1.70e+02	1.70e+01		1.10e+03	1.10e+02	1.10e+01	