EG&G MOUND-25-13-11-01-01-9603110023

ENVIRONMENTAL RESTORATION PROGRAM

ACTION MEMORANDUM/REMOVAL SITE EVALUATION

OPERABLE UNIT 5
AREA 7 REMOVAL ACTION

MOUND PLANT
MIAMISBURG, OHIO

February 1996

PREPARED BY:

EG&G Mound Applied Technologies
P.O. Box 3000
Miamisburg, Ohio 45343-3000

for the

U.S. DEPARTMENT OF ENERGY
Under Contract
No. DE-AC04-88DP43495

FINAL

MIAMISBURG
AREA OFFICE

Department of Energy
Ohio Field Office
Miamisburg Area Office
P.O. Box 66
Miamisburg, Ohio 45343-0066

NOV 30 1995

Mr. Tim Fischer
U.S. Environmental Protection Agency (USEPA)
HSRM-6J
77 West Jackson Blvd.
Chicago, Illinois 60604

Mr. Brian Nickel
Ohio Environmental Protection Agency (OEPA)
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Fischer and Mr. Nickel:

Enclosed for your review, please find a copy of Operable Unit 5, DOE Response to EPA Comments for the Action Memorandum/ Removal Site Evaluation, Area 7 Removal Action, Draft, (Revision 1). If you have any comments, please respond in 30 days.

If there are any questions regarding this submittal, please contact Alan Spesard at (513) 865-3859.

Sincerely,

Arthur Kleinrath

Arthur W. Kleinrath
Project Engineer Team leader

Enclosure

cc w/enclosure:
John Sands, EM-453, HQ
Ruth Vandergrift, ODH
Regina Bayer, CH2M Hill
Tim Thorp, HAZWRAP
Sue Smiley, OH
Bill Taylor, ATSDR

cc w/o enclosure:
K. Hacker, EG&G
D. Rakel, EG&G
A. Spesard, MB
D. White, MB

US DOE MOUND PLANT
Operable Unit 5
Action Memorandum/Removal Site Evaluation
Area 7 Removal Action
Draft (Revision 1)
Ohio EPA Comments
September 1995

General Comments:

Comment #1: Certain statements made in the document refer to final remedial action -beyond this removal action- in Area 7 (e.g., Sections 5.1.1.3, page 5-4, paragraph 1 and Section 5.1.2, page 5-5, paragraph 3). In light of the current DOE "Mound 2000" effort toward accelerated cleanup and a final No-Action ROD, such statements should be removed or revised.

Response #1: Although this site is a PRS, the original objective of the removal action is to mitigate source migration rather than to remove all actinium-contaminated soil above a cleanup goal. This will be achieved by centering the excavation over the suspected source of contamination and the area of the highest known concentrations of actinium. The extent of the removal action is limited by the project budget, available resources, and physical features of the site. Future field work being considered will address the additional thorium contamination and any actinium contamination.

Action #1: None.

Comment #2: Will sampling and screening at Area 7 be expanded as a result of the elevated Thorium results found during recent excavation?

Response #2: Yes. This removal action focuses on the excavation of actinium-contaminated soil. Thorium contamination in Area 7 is a larger and separate scope. Additional sampling is being planned in order to evaluate the thorium contamination.

Action #2: None.

Comment #3: The selections of samples appears to be predicated on verbal and limited written evidence. The process is logical but biased. Given that the contaminated (AC-227) soils from the SW building were placed in or near the abandoned septic tank in 1959, what evidence does DOE have to support the conclusion that contamination has not migrated to another section of Area 7? The issue becomes more critical because the amount of contamination is unknown (as in elevated Thorium results, above). Further sampling around the outer perimeter of the region of interest would demonstrate whether migration has occurred.

Response #3: The suggested approach is correct for the removal of all contaminated soil in Area 7. However, as previously stated, the objective of this removal action is not to remove all actinium-contaminated soil. The objective and scope of the removal action is to remove the actinium-contaminated soil in the vicinity of the suspected tank location. A map of

the subsurface contamination detected by sampling results during the removal action will indicate the extent of actinium (and other) contamination within the excavated area. Additional sampling being considered will provide further contamination information.

Action #3: None.

Specific Comments:

Comment #1: Section 2.3, Page 2-7, first paragraph:
The exact volume and precise location of disposal soils in the removal area is unknown. Verbal reports estimate that approximately five dump truck loads of soils were deposited in and around the tank. In addition, the design of the tank is not clear. Mound should address whether inflow and outflow networks of the tank were present during the disposal period. These networks of pipe installed in excavated earth have the ability to act as preferential flow paths for contaminated water. DOE should recognize that if such paths are present, they too should be investigated for removal.

Response #1: Mound does not have sufficient information to address the issue of possible inflow and outflow networks that may have been associated with the septic tank. It is believed that the tank had some type of inflow piping from the temporary administration building it served. This would likely have been a gravity flow system and the inflow system would be up gradient from the tank. Due to the suspected location of the tank with respect to the original ravine, the system may or may not have had outflow piping. This could be confirmed if the tank is located during the removal action. Sampling down gradient of the removal action location did not reveal the presence of actinium in the groundwater. If the tank is found, Mound will use the results of sampling data collected around the tank and visual inspections to determine if potential preferential flow paths exist and the need for additional excavation.

Action #1: None.

Comment #2: Section 2.1.4, Page 2-7, Paragraph 1:
Within the proposed removal area Actinium-227 contamination were found at C008, C009 and B-16 (Fig. 1). Of eleven geoprobe borings, two showed contamination (D-1 and D-3). Figure 4 is a cross section highlighting the extent of the known contamination. Apparently the proposed removal area is based on the results of a magnetic survey and a geoprobe study. We request a copy of the geoprobe sampling grid used in the study.

Response #2: A number of sources were used to determine the location for the removal action. These include existing maps, information from soil borings and monitoring wells, a ground-penetrating radar study, and interviews with Mound employees, as well as, the results of the magnetic survey and the geoprobe study.

Action #2: A copy of the geoprobe sampling grid is shown in the attached figure. No change is required for the AM/RSE report.

Comment #3: Section 2.1.4, Page 2-13, Paragraph 2:
The second paragraph states that based on boring logs, the aquifer is approximately four feet thick. A point is made that the aquifer is perched and that it is "only a temporal source". An examination of the bore logs does not imply a perched zone. The log for Bore-16 shows gravel extending from 14 to 34 feet deep with water being encountered at 17.5 feet. This aquifer should be recognized as a substantial water boring zone. Whether or not the contamination in well O395 came from the septic area of the SW building is not known. However, the septic area should not be dismissed as a possible source due to underestimation of the transmissiveness of the underlying aquifer.

Response #3: The boring log for B-16 suggests a large amount of fill material (concrete chunks). For this reason, the lithologies from B-3 were used to infer the perched water bearing zone thickness.

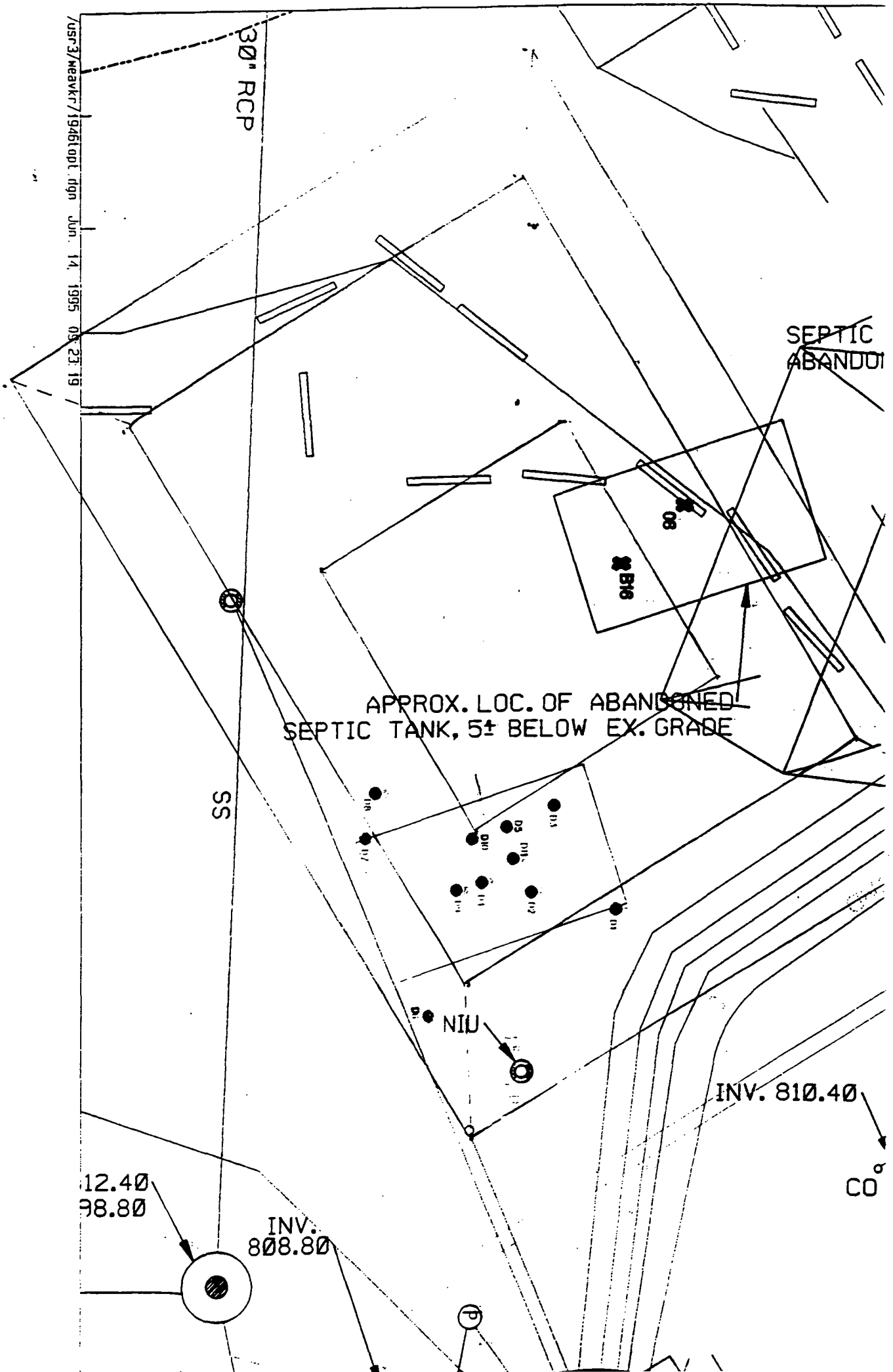
Action #3: None.

Comment #4: Section 3.0, Page 3-1, Paragraph 1:
Please note that the final cleanup value for Actinium contaminated soils at Area 7 should be subject to the acceptability of the proposed Mound Guideline Values. In addition, if 5.3 pCi/g (per Guideline Values) represent a risk of 10^{-5} then how would 5 pCi/g calculate to be 7.5 X 10^{-5}, as indicated in the text?

Response #4: From the Draft version of the Mound Proposed Risk-Based Cleanup Values (Revision 2 May 1995), the actinium cleanup guideline is 10.0 pCi/g for a 10^{-5} risk, based on construction/Mound employee land use and all modes of exposure (ingestion, inhalation, direct exposure). The RESRAD calculation referred to in the AM/RSE was based on different and more conservative assumptions. The net effect is that the selection of 5 pCi/g is still a reasonable choice as the clean-up goal per the removal action.

Action #4: None.

Comment #5: Section 5.1.1, Page 5-1, Paragraph 1:
Expected distribution of Actinium-227 is stated to be between 6-18 feet below ground surface (Section 2.1.4, Page 2-12, Paragraph 4, last sentence). Why excavate to only 16 feet?


/usr3/weavkr/1946lopt.dgn Jun. 14, 1995 09:23:19
30" RCP
SEPTIC
ABANDON
B08
B16
APPROX. LOC. OF ABANDONED
SEPTIC TANK, 5± BELOW EX. GRADE
SS
NIU
INV. 810.40
CO
12.40
98.80
INV.
808.80

Response #5: The sentence on page 2-12 states that the expected distribution of actinium contamination is between 6 ft. and 18 ft. The limitations imposed on this removal action are:

- Keep the excavation above the groundwater table that was detected at 17 ft. below ground surface; and,
- Availability of sufficient quantity of LSA boxes.

As stated in the first line on page 5-6, the removal action will excavate as much of the actinium as feasible.

Action #5: None.

Comment #6: Section 5.1.1, Page 5-1, Paragraph 1:
The paragraph states that if the abandoned tank is encountered during excavation it will be removed. Unless tank contents are confirmed as uncontaminated, DOE should consider removal of the tank.

Response #6: The removal action objective includes removal of the septic tank and contents if the tank is encountered during the excavation.

Action #6: None.

Comment #7: Section 5.1.3.3, Page 5-7:
Mound has acknowledged that the source for Actinium-227 is at least partially located in ground water. Ground water from the source area has the potential to migrate radially down slope (Fig. 2). This radial flow includes southern components of flow that coincide with the regional flow direction of the drainage ditch. However, localized northeastern components of flow are also apparently possible. Soil contamination due to northeastern lateral transport should be considered during excavation as well as contamination from southern and southwestern components of flow.

Response #7: There is no evidence, based on existing data, that the groundwater is contaminated with actinium. The data includes samples collected from down gradient borings B-16 and B-3 and monitoring well 0395.

Action #7: None.

Specific Comments:

Comment #1: Section 2.1.1 Removal Site Evaluation
Page 2-2
Actinium-227 has a half-life of 21.6 years. Since the contaminated soil was reportedly buried in 1959, a discussion of actinium-227's decay products should be included in the text.

Response #1: Ac-227 decays by β emission to Th-227. Successive α decays produce a decay chain consisting of short-lived isotopes: Ra-223, Rn-219, Po-215, Pb-211, Bi-211, Tl-207, and Pb-207, which is stable. Since all of these decay products have half-lives much shorter than Ac-227 (presumed to be sometime before placement of the soils at the Area 7 site), the parent and decay products are in secular equilibrium, meaning that the relative proportion of all isotopes remains constant. Consequently, all of these decay products are present at the same activity as Ac-227's in the soil samples analyzed. The actual sample analysis scheme took advantage of Ac-227's decay chain by using multichannel analyzers tuned to detect the decay gamma radiation from Th-227 and Ra-223 to detect the presence of Ac-227.

Action #1: None.

Comment #2: Section 2.1.4 Release or Threatened Release into the Environment
Page 2-11, Figure 2.4
Designators should be included on the figure to indicate the cross-section orientation (east-west or north-south).

Response #2: Figure 2.4 is conceptual representation of the subsurface contamination and is not scaled in the horizontal direction. However, by referring to Figure 2.2, the conceptual model is approximately a east-west cross-section viewed looking north.

Action #2: None.

Comment #3: Section 5.1 Proposed Action
Page 5-1, Paragraph 1
A 20 ft. by 20 ft. excavation area does not cover the entire area shown by the Conceptual Model, Figure 2.4, and does not remove all soil greater than 5 pCi/g, the interim clean-up goal for actinium-227 mentioned on page 3-1. Please show on a figure the 20 ft. by 20 ft. area that is being targeted for excavation.

Response #3: The objective of the removal action is not to remove all actinium-contaminated soil in Area 7 that is above a concentration of 5 pCi/g. Rather, the objectives is to mitigate source migration by excavating a specified volume of soil from a predetermined excavation configuration, as described in Section 5.1.1. Using know soil sampling and

historical information, the excavation will be centered over the area of the suspected source of contamination. The 20 ft. by 20 ft. excavation will be centered in the 50 ft. by 50 ft. area (identified as the approximate location of removal action) shown in Figure 2.2.

Action #3: None.

Comment #4: Section 5.1.1 Proposed Action Description
Page 5-3, Paragraph 3
The text states that soils encountered in the excavation will be removed to below the detection limit of the field method used for monitoring the excavation. Provide details on what field instrumentation will be used to monitor the excavation, and what the expected detection limit for actinium-227 will be.

Response #4: As stated in Section 4.4.2, paragraph (i) of the Work Plan (DOE 1994b), each bucket of excavated soil will be screened using a FIDLER detector, in accordance with Mound Manual MD-80036 and the OU5 Field Sampling Plan. The FIDLER can be calibrated to read 5,000 to 7,000 counts per minute which correlates to a lower detection limit (LDL) for actinium-227 of approximately 20 pCi/g. For this removal action, however, the FIDLER will not be calibrated for any specific radionuclide. In accordance with the project Radiological Work Permit, if a reading of 500,000 counts per minute or greater is measured by the FIDLER, a soil sample is to be collected for laboratory analysis, for health and safety measures and to document the results of the excavation. A dedicated lab will be established on-site to analyze the soil samples from the Area 7 removal action. Using a Germanium crystal detector and a 10 minute count time, the LDL for actinium-227 is between 0.4 pCi/g and 10 pCi/g.

Action #4: Page 5-3, Paragraph 3 may need to be revised.

CONTENTS

ACKNOWLEDGEMENTS ACK-1

1. PURPOSE 1-1

2. SITE CONDITIONS AND BACKGROUND 2-1
   2.1 SITE DESCRIPTION 2-1
      2.1.1. Removal Site Evaluation 2-2
      2.1.2. Physical Location 2-4
      2.1.3. Site Characteristics 2-4
      2.1.4. Release or Threatened Release into the Environment 2-7
      2.1.5. National Priorities List Status 2-13
   2.2. OTHER ACTIONS TO DATE 2-13
      2.2.1. Previous Actions 2-14
      2.2.2. Current Actions 2-14
   2.3. STATE AND LOCAL AUTHORITIES' ROLES 2-14
      2.3.1. State and Local Actions to Date 2-14
      2.3.2. Potential for Continued State and Local Response 2-14

3. THREAT TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT 3-1
   3.1. THREATS TO PUBLIC HEALTH OR WELFARE 3-1
   3.2. THREATS TO THE ENVIRONMENT 3-1

4. ENDANGERMENT DETERMINATION 4-1

5. PROPOSED ACTION AND ESTIMATED COSTS 5-1
   5.1. PROPOSED ACTION 5-1
      5.1.1. Proposed Action Description 5-1
         5.1.1.1. Rationale, Technical Feasibility, Effectiveness 5-3
         5.1.1.2. Monitoring 5-3
         5.1.1.3. Uncertainties 5-4
         5.1.1.4. Institutional Controls 5-4
         5.1.1.5. Offsite Disposal 5-5
         5.1.1.6. Post-Removal Site Control 5-5
         5.1.1.7. Cross-Media Relationships and Potential Adverse Impacts 5-5
      5.1.2. Contribution to Remedial Performance 5-5
      5.1.3. Description of Alternative Technologies 5-6
         5.1.3.1. No Action 5-7
         5.1.3.2. Institutional Controls 5-7
         5.1.3.3. Contaminant 5-7
         5.1.3.4. Electrical Separation 5-7
         5.1.3.5. Soil Washing 5-8
         5.1.3.6. Vitrification 5-8
      5.1.4. Engineering Evaluation/Cost Analysis (EE/CA) 5-9
      5.1.5. Applicable or Relevant and Appropriate Requirements (ARARs) 5-9
         5.1.5.1. Air Quality 5-9
         5.1.5.2. Worker Safety 5-10

CONTENTS (continued)

5.1.6. Other Standards and Requirements 5-10
5.1.6.1. Mound Plant Manuals and Procedures 5-10
5.1.6.2. DOE Orders/Criteria 5-11
5.1.7. Project Schedule. 5-11
5.2. ESTIMATED COSTS 5-11

6. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN 6-1

7. OUTSTANDING POLICY ISSUES 7-1

8. ENFORCEMENT 8-1

9. RECOMMENDATION 9-1

10. REFERENCES 10-1

TABLES

Table II.1. Evaluation of Removal Action Appropriateness Criteria [40CFR300.415(b)(2)] 2-3
Table II.2. Radiological Results for Area 7 Soil Samples 2-9
Table V.1. Removal Action Cost Estimate 5-11

FIGURES

2.1. Location of Mound Plant, Miamisburg, Ohio 2-5
2.2. Location Map of Area 7 2-6
2.3. Conceptual Site Stratigraphy 2-8
2.4. Conceptual Model 2-11
5.1. Area 7 Removal Action Schedule 5-12

ACRONYMS

AEC	Atomic Energy Commission
AM	Action Memorandum
ARARs	applicable or relevant and appropriate requirements
BGS	below ground surface
BVA	Buried Valley Aquifer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
D&D	Decontamination & Decommissioning
DOE	U.S. Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
ER	Environmental Restoration
FFA	Federal Facilities Agreement
FSP	Field Sampling Plan
ID	identification
LSA	Low Specific Activity
mrem	millirem
MSL	Mean Sea Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NTS	Nevada Test Site
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
pCi/g	picocuries per gram
RCRA	Resource Conservation and Recovery Act
RESRAD	Residual Radioactive Material Program
RI/FS	Remedial Investigation/Feasibility Study
RSE	Removal Site Evaluation
SARA	Superfund Amendments and Reauthorization Act
SW	Semi-Works
TRU	Transuranic

ACKNOWLEDGEMENTS

This Action Memorandum/Removal Site Evaluation was prepared by EG&G Mound Applied Technologies for the U.S. Department of Energy. The principal author of this document is Mr. Bob Stanley. The contributors to this document are as follows:

Department of Energy, On-Scene Coordinator: Mr. Arthur Kleinrath
Department of Energy, (Rust-Geotech), Technical Review: Mr. Richard Neff
EG&G Mound Applied Technologies, Project Manager: Mr. Bob Stanley
EG&G Mound Applied Technologies, Technical Review: Dr. Dan Carfagno
EG&G Mound Applied Technologies, Technical Review: Mr. Alec Bray
EG&G Mound Applied Technologies, Technical Review: Mr. Keith McMahan
Science Applications International Corporation, Technical Review: Mr. Mike Balmert

DATE: February 13, 1996

SUBJECT: Request for a Removal Action at Mound Plant Operable Unit 5, Area 7, Miamisburg, Montgomery County, Ohio

FROM: Arthur Kleinrath, Remedial Project Manager/On-Scene Coordinator, Mound Plant, U.S. Department of Energy

TO: Administrative Record

1. PURPOSE

The U.S. Department of Energy (DOE) is the designated lead agency under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA) and removal actions at the Mound Plant are implemented as non-Superfund, federal-lead actions. DOE provides the On-Scene Coordinator (OSC). Non-Superfund federal-lead, removal actions are not subject to United States Environmental Protection Agency (EPA) limitations on the OSC ($50,000 authority) and are not subject to National Oil and Hazardous Substances Pollution Contingency Plan (NCP) limitations on removal actions (i.e., $2,000,000 in cost and 12 months in duration).

This action memorandum (AM) has been completed to document the Removal Site Evaluation (RSE), and to request and document approval of the proposed removal action described herein for the actinium-227 and radium-226 contaminated soils of Mound Operable Unit (OU) 5, Area 7 located within the DOE Mound Plant.

2. SITE CONDITIONS AND BACKGROUND

In 1949, Mound Plant was requested to undertake the production of actinium-227 to support the Atomic Energy Commission's substitution materials program. Since actinium-227 is not present in sufficient quantities in natural source materials to allow for economical recoveries, it is produced by the transmutation of radium-226 with neutrons in a nuclear reactor. Mound Plant conducted two separate small-scale actinium production programs. The first, conducted in R Building, was an experimental separation of radium-226 from barium-rich ore (pitch-blend residue) known as K-65. In October 1949, Mound Plant received 200 pounds of K-65 in a single drum. This material was stored at Mound Plant in an old explosives bunker known as the radium shack. The experimental separation produced small quantities of actinium-227.

The second and largest source of actinium-227 was from a separations process conducted in SW Building. A special shielded facility, known as the cave, was built in June 1951 on the east side of SW Building to separate and purify actinium-227 from irradiated radium-226. The Hanford Nuclear Reservation provided the irradiated radium-226 source.

Liquid wastes from the SW Building separations process were directed through the building floor trenches to separate sumps and a small evaporative treatment system located inside the SW Building. In early 1955, following the concrete entombment of the SW Building Separations Area, the soil beneath the area of SW Building adjacent to the separations area was found to be contaminated primarily with actinium-227, but, to a lesser extent, with radium-226 and thorium-228. The apparent source was identified as leakage from one of the floor sumps used to store liquid waste from the actinium separation operations. The contaminated soil was removed and disposed in what is now Area 7. The actinium-227 contaminated soils deposited in Area 7 are the focus of this removal action.

2.1. SITE DESCRIPTION

This section describes the RSE, physical site location, site characteristics, release of contaminants into the environment and the site's National Priorities List (NPL) status.

2.1.1. Removal Site Evaluation

The RSE requirements, as outlined under EPA's NCP regulations in 40 CFR 300.415, are presented throughout this AM/RSE. The source and nature of the release are described in Sections 2.1.3. and 2.1.4. An evaluation by public health agencies has not been performed for Area 7 and, therefore, is not included in this AM/RSE. The evaluation of potential exposures is described in this section and in Section 3. The determination of the need for a removal action is outlined in this section, in Table II.1.

The NCP includes eight factors that must be considered in determining the appropriateness of a removal action (40 CFR 300.415(b)(2)). These criteria, as applied to the contamination of Area 7 by actinium-227 contaminated soils from the SW Building, are evaluated in Table II.1.

It is suspected that the Area 7 contaminated soil may extend into a perched groundwater strata. Periodic monitoring of drinking water supplies has revealed no actinium-227 or radium-226 contamination. However, the contamination may have the potential to migrate via the plant drainage ditch to the Buried Valley Aquifer (BVA), which has been shown to be connected to nearby drinking water supplies. Therefore, the potential exists for contamination of drinking water supplies or sensitive ecosystems.

The actinium-227 contaminated soils from the SW Building were placed in or around an abandoned septic tank in Area 7 in 1959. The tank was reportedly used as a receptacle for the contaminated soil. As such, the abandoned septic tank could contain actinium-227 contaminated soils that may pose a threat of release. Existing information indicates that levels of actinium-227 up to 1,400 pCi/g have been found that potentially may migrate (DOE 1993a).

In summary, concentrations of actinium-227 exist that (a) provide high levels of contaminants in soils that can migrate, (b) have no other appropriate federal or state response mechanism, and (c) constitute a situation potentially threatening to the public welfare. A time-critical removal action, focused on source removal of the actinium-227 contaminated soils above risk-based guidelines from Area 7, is appropriate to mitigate potential source migration.

Table II.1. Evaluation of Removal Action Appropriateness Criteria [40 CFR 300.415 (b)(2)]

Criteria	Evaluation
(i) "...potential exposure to nearby human populations, animals, or the food chain..."	None
(ii) "Actual or potential contamination of drinking water supplies..."	The actinium-227 contaminated soil is partially located in a saturated layer of soil. Although the drinking water supply currently shows no actinium-227 contamination, the potential for contamination exists due to the unknown hydraulic connections between the Area 7 groundwater, the plant drainage ditch and the BVA.
(iii) "Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;"	Part of the actinium-227 contaminated soil may be located within the abandoned septic tank. The tank may have been used as a disposal container to reduce migration of contamination.
(iv) "High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;"	Cuttings from down gradient wells have detected radium-226. The only known source of radium-226 is the soil from the SW Building that is predominantly contaminated by actinium-227. SW Building soils sampled in Area 7 have found actinium-227 at a maximum concentration of 1,400 pCi/g. The presence of radium-226 down gradient from the source indicates that surface soil and groundwater are also likely pathways for the potential migration of actinium-227.
(v) "Weather conditions that may cause hazardous substances to migrate or be released;"	None
(vi) "Threat of fire or explosion;"	None
(vii) "The availability of other appropriate federal or state response mechanisms to respond to the release;" and	There are no state mechanisms, no other federal mechanisms (DOE is the designated lead agency at Mound under CERCLA), and no other DOE programs to provide an appropriate response.
(viii) "Other situations or factors that may pose threats to public health or welfare or the environment."	None

2.1.2. Physical Location

The Mound Plant is a 306-acre site on the border of the city of Miamisburg in Montgomery County, Ohio (Figure 2.1.). The site is approximately 10 miles south-southwest of Dayton and 45 miles north of Cincinnati. Area 7 is a large area within OU5, approximately 700 ft by 200 ft, located in the upper valley at Mound Plant, behind or below Buildings 29 and 98 (Figure 2.2). Surface water runoff from Area 7 drains to the plant drainage ditch south of Area 7, is conveyed to a holding pond, and is discharged to an NDPES outfall to the Great Miami River.

The removal action site is located within Area 7 near Building 29 and occupies an area of approximately 60 ft by 50 ft. It is roughly bounded by Building 29 to the northwest, the plant entrance road to the north, the asphalt lined pond to the east and the Area 7 parking lot to the south (Figure 2.2).

2.1.3. Site Characteristics

Area 7 was originally a steep ravine that formed the upper reach of the plant drainage ditch, and was historically used for contaminated waste and debris disposal as well as borrow material infilling. The majority of the debris and waste were deposited in the lower reaches (i.e., deep sections) of the ravine. The actinium-227 contaminated soils from the SW Building were reportedly deposited near or around an abandoned septic tank. The abandoned septic tank is located, according to the original plant construction drawings, near the head of the original ravine at the northern end of Area 7.

The abandoned septic tank was originally in use from 1946 through the early 1950's for treatment of sanitary waste discharged from the original Mound Plant construction administration building. The tank is assumed to be a 1,500 to 3,000-gallon concrete septic tank and is believed to have been installed without a leach field (i.e., designed to drain directly into the ravine). The tank has remained unused as a septic tank since it was abandoned in the early 1950's. The tank was reportedly buried within five feet of the original (1946) topography. Backfilling of the ravine has raised the current surface elevation to approximately 10-15 feet above the original contour.

Based on verbal and limited written evidence, the actinium-227 contaminated soils from the SW Building were placed in or near the abandoned septic tank in 1959. The precise role the abandoned tank played (i.e., locator or containment) as the disposal location for the actinium-227 and radium-226 contaminated

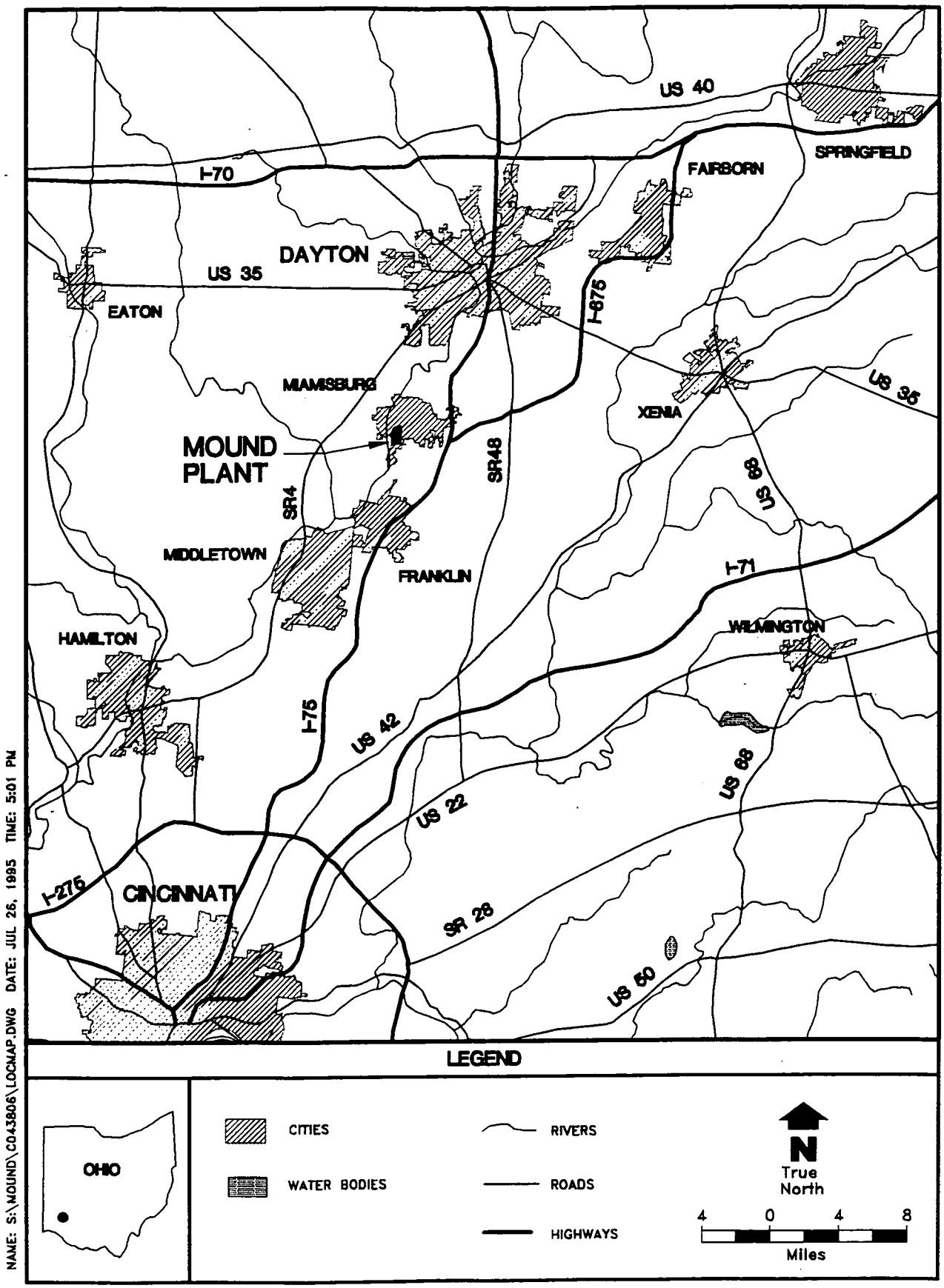
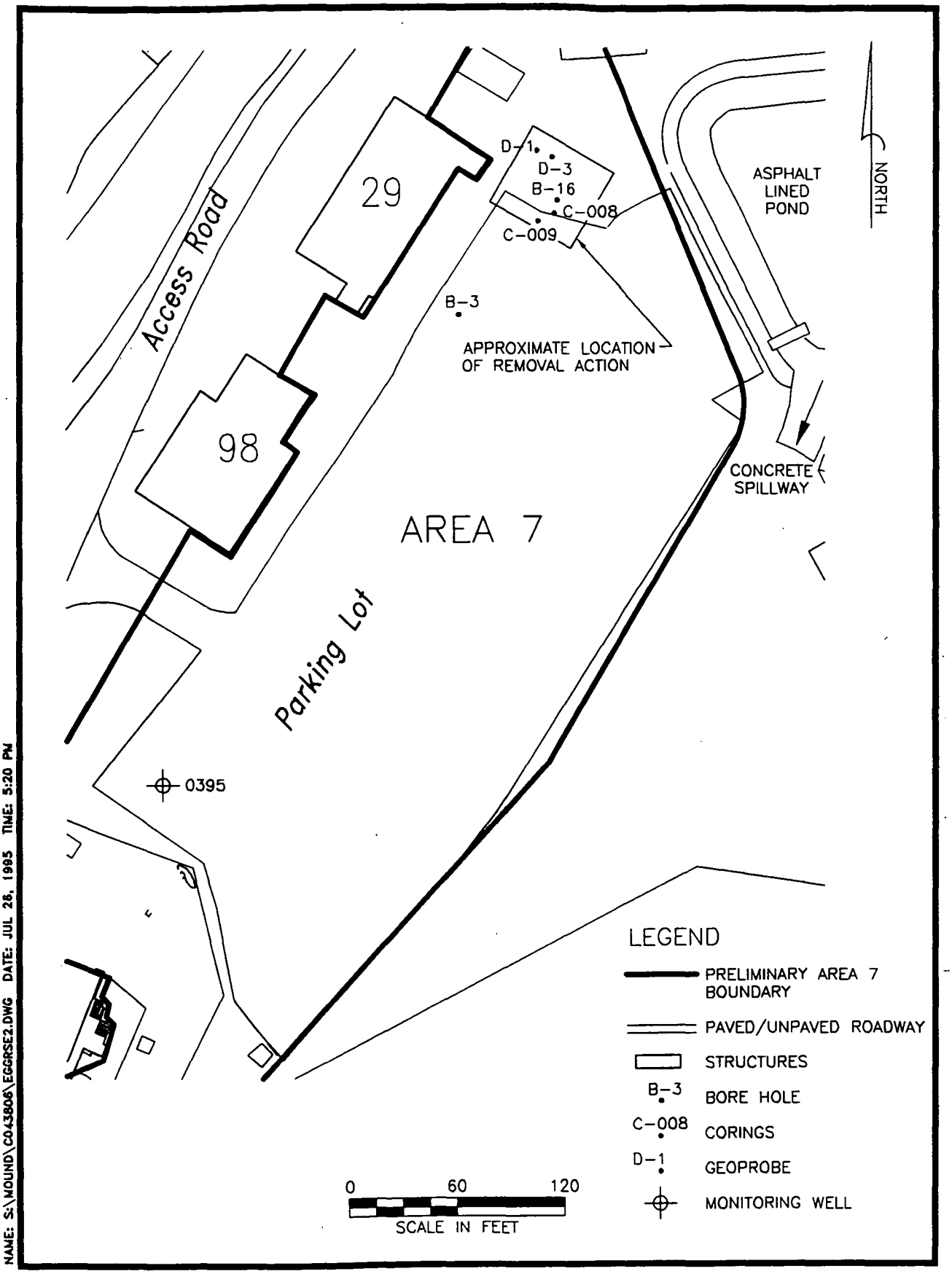


Figure 2.1. Location of Mound Plant, Miamisburg, Ohio



NAME: S:\MOUND\C043808\EGGRSE2.DWG DATE: JUL 28, 1995 TIME: 5:20 PM

Figure 2.2. Location Map of Area 7

soils is unknown. The exact volume of actinium-227 contaminated soil deposited in Area 7 is not known, although verbal reports estimate that less than five dump truck loads of actinium-227 contaminated soil and gravel from the SW Building were disposed in or around the abandoned septic tank.

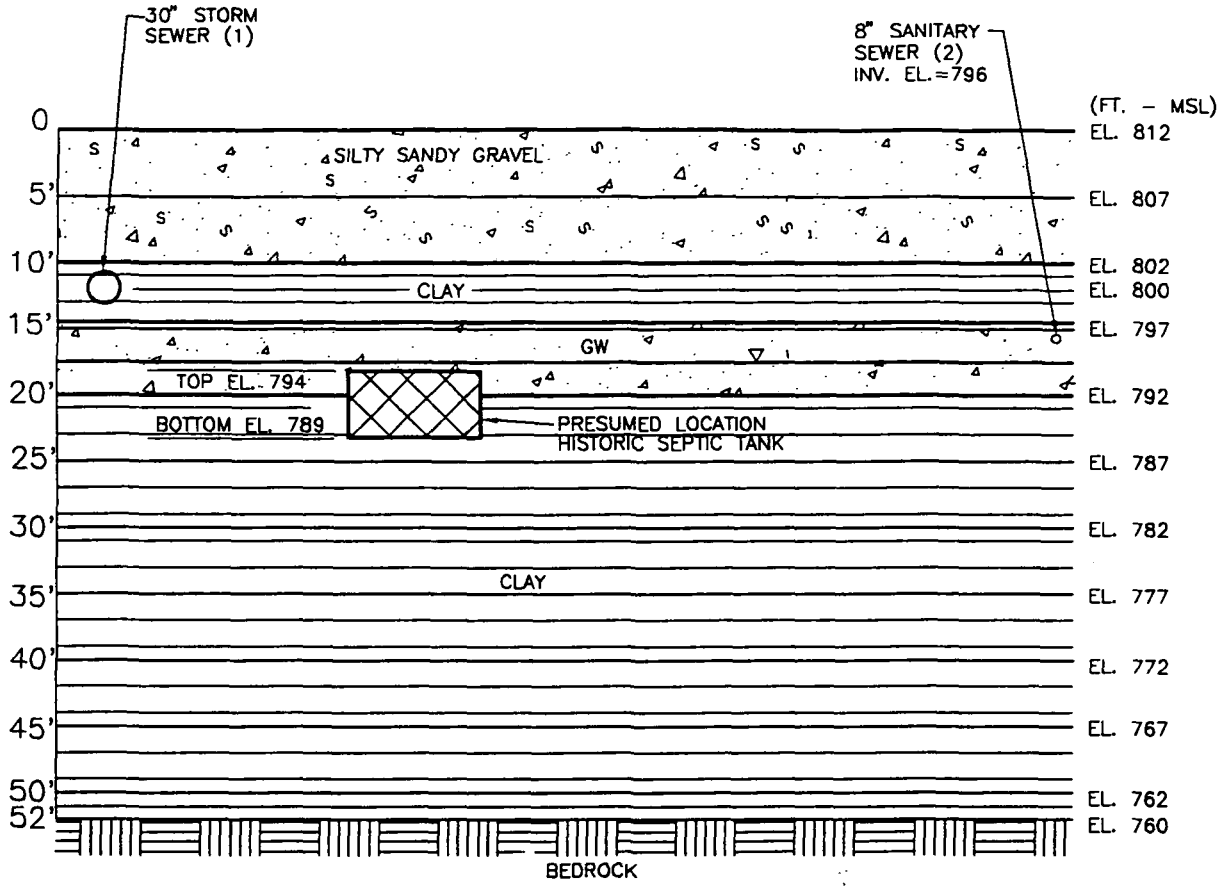
In 1984, the periodic filling of the ravine was completed and the area was leveled for the construction of the current parking lot. The current parking lot elevation is at 812 ft above mean sea level (MSL) in the vicinity of the septic tank. Based on construction drawings, the elevation of the top of the tank appears to have been about five feet below grade in 1947 (794 ft. MSL). The actinium-contaminated soil is expected to extend to the depth of the septic tank. Figure 2.3 is a conceptual illustration of the site stratigraphy that shows the presumed location of the septic tank.

2.1.4. Release or Threatened Release into the Environment

Four borings (C0008, C0009, B-3 and B-16) have been placed near the suspected location for the tank and actinium-227 contaminated soils. Boreholes C0008 and C0009 were drilled as part of the Site Survey Project in 1985 (DOE 1993a). Boreholes B-3 and B-16 were installed in 1994, as part of the OU5 characterization effort. Actinium-227 contamination was detected in soil samples taken from C0008, C0009, and B-16. The maximum actinium-227 concentration in borehole C0008 was 1,400 pCi/g at 12 ft BGS. The maximum concentration in borehole C0009 was 200 pCi/g at 7.5 ft BGS, and the maximum concentration in the more recent borehole B-16 was 45 pCi/g at 15 to 18 ft BGS. Radium-226 was found to a lesser extent in each of the boreholes at a maximum of 2 pCi/g in C0009 (see Table II.2).

In an attempt to further define the locations of the buried septic tank and the source of actinium-227 contamination, Mound conducted a magnetic field survey at Area 7 in May 1995. The magnetic field survey detected the presence of buried objects to the north and west of B16. A series of eleven Geoprobes were installed in this area to collect subsurface information and soil samples. Actinium-227 was detected in two Geoprobe locations (D1 and D3) at depths between 8 ft and 16 ft BGS, with a maximum concentration of 184 pCi/g at D3.

Using the sampling information from the three soil borings and the Geoprobe a conceptual model presented in Figure 2.4 was developed to show the zone of contamination detected in the subsurface.



NOTES:

(1) 30" STORM SEWER CONSTRUCTED OF REINFORCED CONCRETE PIPE (RCP).

(2) 8" SANITARY SEWER CONSTRUCTED OF VITRIFIED CLAY PIPE (VCP).

(3) IDEALIZED STRATIGRAPHY BASED ON B-3 AND B-16 BORING LOGS.

NOT TO SCALE

NAME: S:\MOUND\C043806\EGGXB2.DWG DATE: JUL 26, 1995 TIME: 5:39 PM

Figure 2.3. Conceptual Site Stratigraphy

Table II.2. Radiological Results for Area 7 Soil Samples
Page 1 of 2

Location ID	Sample Depth (feet BGS)	Actinium-227 (pCi/g)	Radium-226 (pCi/g)
C0008	1.5	—	0.5
	3.0	—	0.6
	4.5	—	0.7
	6.0	—	0.7
	7.5	—	0.9
	9.0	—	0.5
	10.5	50	1.0
	12.0	1,400	1.0
	13.5	—	0.9
	15.0	—	0.5
	16.5	300	1.0
	18.0	10	0.7
C0009	0.0	—	0.5
	1.5	—	0.7
	3.0	—	2.0
	4.5	—	0.7
	6.0	30.0	0.6
	7.5	200	1.2
	9.0	—	1.5
	10.5	20	0.8
	12.0	—	—
	13.5	—	0.7
	15.0	—	—
	16.5	—	0.8

Table II.2. Radiological Results for Area 7 Soil Samples
Page 2 of 2

Location ID	Sample Depth (feet BGS)	Actinium-227 (pCi/g)	Radium-226 (pCi/g)
B-16	0-2	—	0.83
	10-12	8.9	—
	15-18	44.7	1.29
	20-24	—	0.37
	15-19	—	0.52
	25-28	—	0.71
B-3	15-19	—	0.52
	25-28	—	0.71
D-1	8-12	20	—
	12-16	133	—
D-3	12-16	184	—

— no result given
pCi/g picoCuries per gram
ID identification number
BGS below ground surface

NAME: S:\MOUND\C043806\EGGBORA2.DWG DATE: JUL 26, 1995 TIME: 4:57 PM

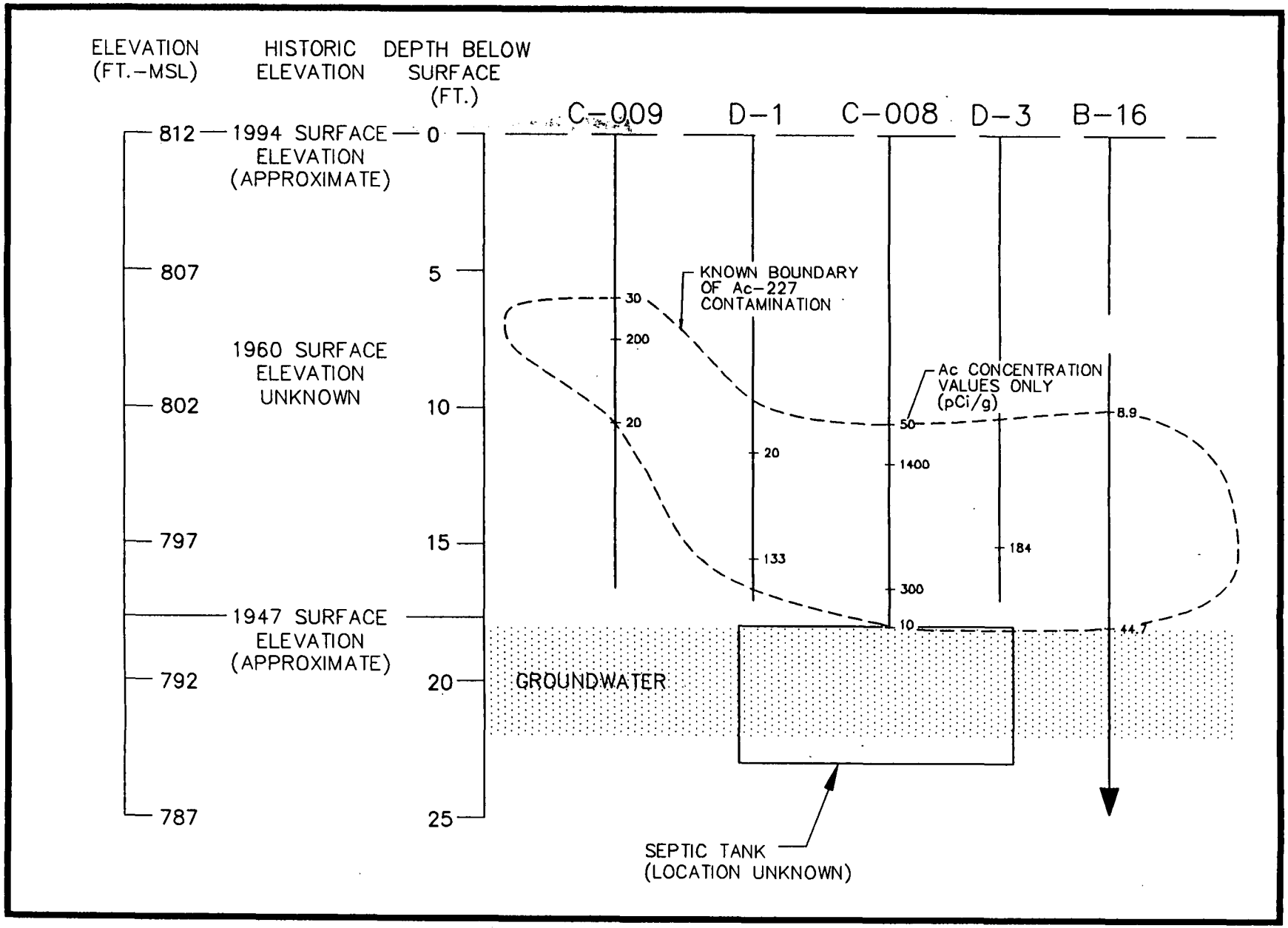


Figure 2.4. Conceptual Model

Thorium-232 which is naturally occurring, was detected in low concentrations in the top seven feet of soil and in the groundwater at B-16. Thorium-232 is ubiquitous to Mound Plant soils and is likely to be present throughout the vertical profile near the abandoned septic tank. Thorium-228 is reported to have been placed in Area 7 with the actinium-227 contaminated soils. Thorium-228 was not reported with sampling results from boreholes C0008 and C0009 but was detected in the soil and groundwater samples at B-16.

The expected depth of the abandoned septic tank, together with the contamination profiles determined from the boreholes indicates that the contaminated soil was placed partially above the top of the tank. Consequently, actinium-227 (and radium-226/thorium-228 to a lesser degree) is expected to be concentrated in a small, contiguous area ranging from 6 to 18 ft BGS in the vicinity of the abandoned septic tank.

No evidence of Resource Conservation and Recovery Act (RCRA) wastes were found in any borings. Further, based on existing information, there is no evidence of RCRA wastes being deposited in the part of Area 7 near the abandoned septic tank. The remaining portions of Area 7 are potentially contaminated with thorium-232, polonium-210, plutonium-238, cesium-137, and tritium according to existing information. Actinium-227 and radium-226 are contaminants unique to the actinium separations processes used in the SW Building and R Building. The abandoned septic tank location is the only reported placement of actinium-227 contaminated soils from the SW Building. No other source of actinium-227 contaminated soil is known in Area 7.

As previously stated, a release into the environment began when the actinium-227 contaminated soils were placed in or around the abandoned septic tank in Area 7 in 1959 and continues through today. In 1993, radium-226 was detected in cuttings from the boring for monitoring well 0395 at 12 and 11 pCi/g at a depth of 60 to 65 ft BGS, and at 11 pCi/g at a depth of 70 to 75 ft BGS. [Note: the geologic log of well 0395 indicates groundwater occurs at 68 ft BGS]. The well is located down gradient of where the contaminated soils from the SW Building were placed in Area 7 (Figure 2.2). The only known source of radium-226 in Area 7 are the soils from the SW Building placed near or around the abandoned septic tank, and it is therefore considered likely that the radium-226 identified in borehole 0395 migrated from the SW Building soils placed in or around the septic tank. Additionally, based on expected distribution of the actinium-227 (and radium-226) contamination between 6 and 18 ft BGS, the contaminated soils are

expected to be partially beneath the recent groundwater level of 17.5 ft BGS, and therefore potentially contributing to a release in groundwater. (See Figure 2.3).

Based on the B-3 and B-16 boring logs the thickness of the groundwater layer ("aquifer") is approximately four feet. The aquifer is assumed to be perched and only a temporal source, from rainfall seeping into more permeable zones. The horizontal extent of the aquifer is expected to be confined; that is, it is not an effectively infinite source. However, it is not known whether this aquifer is connected to well 0395 groundwater. The area of expected actinium contamination (depths of six to 18 ft BGS) may extend into the saturated zone, which is expected to be from 17.5 to 21.5 ft BGS.

2.1.5. National Priorities List Status

The EPA placed the Mound Plant in Miamisburg, Ohio on the NPL by publication in the Federal Register on November 21, 1989.

2.2. OTHER ACTIONS TO DATE

The Mound Plant initiated a CERCLA program in 1989, now guided by the agreement between the DOE, Ohio Environmental Protection Agency (OEPA), and EPA. A Federal Facilities Agreement (FFA) under CERCLA Section 120 was executed between DOE, EPA Region V, and OEPA on October 12, 1990, and was revised on July 15, 1993 (EPA Administrative Docket No. OH 890:008 984). The general purposes of this agreement are to:

- Ensure that the environmental impacts associated with past and present activities at the site are thoroughly investigated and appropriate remedial action taken as necessary to protect the public health, welfare, and the environment;
- Establish a procedural framework and schedule for developing, implementing, maintaining, and monitoring appropriate response actions at the site in accordance with CERCLA, Superfund Amendments and Reauthorization Act (SARA), the NCP, Superfund guidance and policy, and Resource Conservation and Recovery Act (RCRA) guidance and policy; and,
- Facilitate cooperation, exchange of information, and participation of the parties in such actions.

The CERCLA program is assessing and evaluating the current risks, as necessary, for over 325 potential release sites. These potential release sites have been grouped into various OUs.

2.2.1. Previous Actions

In 1985, two core samples (C0008 and C0009) were taken as a part of the Mound Site Survey Project (DOE 1993a). In May, 1994 a ground-penetrating radar survey was performed in an attempt to locate the buried tank (DOE 1994a). In June 1994, boreholes B-3 and B-16 were drilled in Area 7 as a part of the OU5 Operational Area Phase 1 Investigation (SAIC 1995).

2.2.2. Current Actions

Remedial Investigation reporting activities are currently on-going in OU5, some of which include samples from Area 7.

2.3. STATE AND LOCAL AUTHORITIES' ROLES

2.3.1. State and Local Actions to Date

In 1989, as a result of Mound Plant's placement onto the NPL, DOE and the USEPA entered into a FFA which specified the manner in which the Mound CERCLA-based Environmental Restoration (ER) program was to be implemented. In 1994 the FFA was amended to include the OEPA. Under the ER program DOE remains the lead agency.

2.3.2. Potential for Continued State and Local Response

Area 7 is adjacent to Building 29 which is slated for release to commercial (non-DOE) use. Periodic environmental monitoring of Area 7 may be required until final remedial action is implemented for OU5. This monitoring would need to be coordinated with local, state, and federal authorities.

The current plant-wide environmental monitoring program will continue.

3. THREAT TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

There is currently no EPA cleanup standard for actinium-contaminated soil and no baseline risk assessment has been performed for OU5 Area 7. A risk analysis was conducted for actinium-227 contaminated soil at another location at Mound Plant. For that project, the risk model incorporated a residual radioactive material program (RESRAD) and considered sources, release mechanisms, exposure pathways, and receptors to develop a cleanup goal for actinium-227. Based on the assumptions selected for that project an actinium-227 concentration of 5 pCi/g resulted in a dose of less than 10 millirems (mrem) and a corresponding lifetime cancer risk of 7.5×10^{-5}. Until a risk assessment is performed for OU5 Area 7, this concentration will be used as the actinium-227 cleanup goal for the removal action. The following is a discussion of the potential threat of the source of actinium-227 in the Area 7 subsurface to public health, welfare, or the environment.

3.1. THREATS TO PUBLIC HEALTH OR WELFARE

Concern over the disposal of actinium-227 and radium-226 in and around the septic tank at Area 7 was raised when radium-226 was detected in down gradient well 0395. The presence of radium-226, which is more mobile in soils than actinium-227, suggests that the contaminants may be migrating from the source through the soil with the potential to enter the plant drainage ditch, south of Area 7. The plant drainage ditch is a tributary to a holding pond with a National Pollutant Discharge Elimination System (NPDES) permitted outfall to the Great Miami River. Migration of contamination to the plant drainage ditch creates the potential for exposure to actinium-227 and radium-226.

3.2. THREATS TO THE ENVIRONMENT

As discussed above, actinium-227 and radium-226 contaminated soils were deposited in the former ravine in Area 7. This material has been a source of contamination that has been released to the environment. Subsurface soil and groundwater act as potential pathways for the migration of this contamination to the plant drainage ditch and subsequently to the Great Miami River. No actinium-227 or radium-226 contamination has been detected in the drainage ditch soils or surface waters.

4. ENDANGERMENT DETERMINATION

All AMs must contain an Endangerment Determination (EPA 1990). Actual or threatened releases of pollutants and contaminants from this site, if not addressed by implementing the response action selected in this AM, may present an imminent and substantial endangerment to public health or welfare or the environment. This determination is based on the existing actinium-227 and radium-226 source area located within Area 7 and the potential for the migration of the contamination.

5. PROPOSED ACTION AND ESTIMATED COSTS

5.1. PROPOSED ACTION

The proposed action, in an effort to mitigate source migration, is the removal of actinium-227 contaminated soils in a 20 ft by 20 ft area to a depth of 16 ft BGS, using on-site interim storage and future offsite permanent disposal.

5.1.1. Proposed Action Description

The proposed removal action will include:

- removal of asphalt and concrete from a 60 ft by 50 ft area;
- sloped excavation to six feet BGS;
- excavation of an additional 10 ft BGS in a 20 ft by 20 ft area; and
- backfilling and site restoration.

The excavated soils will be loaded into low specific activity (LSA) boxes, stored in a Mound Plant interim storage location and disposed of based on analytical results and waste characterization. LSA boxes containing soil classified as hazardous waste will be transferred to a hazardous waste disposal facility or transported to a Mound Plant interim hazardous waste storage location to await final disposal. LSA boxes containing soil classified as transuranic (TRU) waste will be re-labelled and transported to a Mound Plant interim storage location awaiting final offsite disposal. Clean soil will be disposed of in the Mound Spoils Disposal Area or other location to be determined.

Groundwater is estimated to be present at a depth of about 17 feet BGS. This removal action is not expected to reach groundwater.

The upper six feet of soil (i.e., the overburden) is believed to be contaminated, at least in part with thorium-232, which is ubiquitous at Mound Plant. However, the upper six feet of soil is not expected to be contaminated with actinium-227. The overburden will be removed by suitable equipment, leaving sidewalls sloped to a stable configuration. Any uncontaminated portion of the overburden soils will be moved to the uncontaminated spoils area. During the excavation of the overburden, contamination will

be monitored. If contamination is encountered at levels requiring interim storage and potential disposal, the contaminated portion of the soil will be handled according to the procedures for the lower horizons (i.e., interim storage, laboratory analysis, offsite disposal).

The soils below the upper six feet are considered potentially contaminated with actinium-227. Each bucket of soil will be scanned using field instrumentation per the Mound Manual MD-80036 and the OU5 Field Sampling Plan (FSP) (DOE 1993b), noting the grid sampling location and field reading of each lift. The sides of the excavation will be vertically shored or laid back to acceptable slopes. Excavation will be by toothless bucket on a suitable excavator. The excavator will load the soils directly into storage/disposal boxes. The boxes will be moved to a temporary staging area within the boundaries of the existing parking lot for sampling and disposition.

The monitoring and excavation will proceed to the expected depth of 16 feet BGS. At this level, the footprint of the excavation is planned to be approximately 20 ft by 20 ft (400 ft^2). Storage/disposal boxes are available in sufficient numbers to accommodate all of the soil between six feet BGS and 16 feet BGS, within the expected area of excavation.

Migration of the contamination from its original disposal configuration is expected to have occurred, both vertically and laterally. Modification of the excavation to enable pursuit of a limited amount of migrated contamination is allowed for in the selected sloping and excavation methods, and in the number of storage/disposal boxes available for this removal action. However, extensive migration of the contamination can only be removed within the available budget, physical constraints of the site (e.g., utilities, buildings), safety considerations, and excavation equipment limitations.

If the abandoned septic tank is encountered either partially or fully intact during the excavation, it will be freed from the surrounding soils by use of the excavator. The contents of the tank, if any, will be sampled, and the soils around the tank will be sampled to determine, to the extent possible, the original placement pattern of the soils from SW building. Any derived understanding of the probable original placement of the contaminated soils will be used in tracing the lateral extent of the soil migration. The contents of the tank, if any, may be characteristic of the soils originally moved from SW building; samples will be taken and archived for more detailed analysis, should that prove valuable. The remains of the tank will be reduced in size and placed in a metal box(es) for sampling and release or offsite disposal. The septic tank is expected to be contaminated.

The excavated area will be backfilled with clean imported soils. The backfilled soils will be compacted to the extent practical and safe. The area will be returned to use as a parking lot.

The excavated soils will be stored in the LSA boxes until offsite disposal can be effected. The storage area will be monitored and maintained on a routine basis.

At the completion of the removal action, it is expected that some residual contamination will remain, but at low concentrations. Soils encountered in the excavation will have been removed to below the detection limit of the field method used for monitoring the excavation. Each bucket of excavated soil will be screened using a FIDLER detector, in accordance with Mound Manual MD-80036 and the OU5 Field Sampling Plan. The FIDLER can be calibrated to read 5,000 to 7,000 counts per minute which correlates to a lower detection limit (LDL) for actinium-227 of approximately 20 pCi/g. For this removal action, however, the FIDLER will not be calibrated for any specific radionuclide. In accordance with the project Radiological Work Permit, if a reading of 500,000 counts per minute or greater is measured by the FIDLER, a soil sample is to be collected for laboratory analysis, for health and safety measures and to document the results of the excavation. A dedicated lab will be established on-site to analyze the soil samples. Using a Germanium crystal detector and a 10 minute count time, the LDL for actinium-227 is between 0.4 pCi/g and 10 pCi/g. Any contaminated soils beyond the feasible limit of the excavation will remain in place until final site remedial actions are completed.

5.1.1.1. Rationale, Technical Feasibility, Effectiveness

The removal action chosen for Area 7 is necessary to remove an area of known contamination and ensure that further migration of the contamination does not occur. The soils placed in or around the abandoned septic tank represent a volume of concentrated contaminants that can serve as a continuing source of migrating contamination. Direct removal of this source is feasible. Depending on the current distribution of the contamination, complete removal of the actinium-227 contamination may not prove possible.

5.1.1.2. Monitoring

Health and safety monitoring will be performed throughout the removal action according to standard Mound procedures. Sampling and analysis of excavated soils is described in more detail in the OU5, Area 7 Removal Action Work Plan (DOE 1994b).

5.1.1.3. Uncertainties

The major uncertainties at the site are the original location of the septic tank and its contents, the original quantity and contamination levels of actinium-227 contaminated soil, and the current nature and extent of actinium-227 contaminated soil. The minor uncertainties include the current location and condition of the septic tank and the nature and extent of groundwater that may be encountered during the removal.

All of the uncertainties are within manageable bounds. Although the major uncertainties impact the total amount of soil that will potentially need to be removed, given the constraints, the contamination that has migrated beyond the defined bounds and objectives of this removal action will be addressed through final remedial actions. These uncertainties therefore do not significantly affect this removal action.

Uncertainties about the current location and condition of the abandoned septic tank are important, but not a hindrance to the removal action. Sufficient indications about the probable location of the septic tank are available to identify the likely area of its location. Absolute location of the contamination source is not a prerequisite to beginning the removal, and the level of uncertainty regarding the location of the contamination is not a hindrance to the removal action.

Uncertainties about the nature and extent of the groundwater will be addressed in the field. Field decisions on dewatering efforts will be made as information is gained, rather than relying on pre-excavation studies. The need for removing water directly from the excavation will be avoided if possible.

5.1.1.4. Institutional Controls

DOE will remain in control of the Area 7 site for the next several years, although portions of the Mound Plant may be released to non-DOE uses. It is expected that residual contamination will remain after the removal action is complete which will be remediated as part of later OU5 Area 7 remedial actions. Until that time, DOE's control of the site will continue to be relied on as an institutional control to limit access and reduce exposure potential for any remaining contaminants.

5.1.1.5. Offsite Disposal

Contaminated materials taken from the excavation will be disposed of offsite at a later time. At that time, all requirements of the disposal site and any other regulations governing the transportation and disposal of the contaminated materials will be met.

EPA's Offsite Policy does not apply to this removal action.

5.1.1.6. Post-Removal Site Control

Post removal site control will be provided by DOE/Mound. See Institutional Controls above.

5.1.1.7. Cross-Media Relationships and Potential Adverse Impacts

The potential cross-media impact associated with the removal action is the potential for unintended release of contaminated materials to the surface of the parking lot and erosion to nearby drainage ditches. Careful monitoring and control will be implemented during the removal action and for the interim storage of the LSA boxes containing the contaminated materials until they are removed from the site for disposal.

No potential adverse impacts of the removal action have been identified.

5.1.2. Contribution to Remedial Performance

No record of decision for Area 7 has been signed and the long-term cleanup of Area 7 has not been decided. The range of feasible alternatives has not been identified for Area 7. Therefore, it is not possible to identify with certainty the interaction of this removal action with the final cleanup of Area 7. However, reduction of the source of actinium-227 contaminated soils should be consistent with any foreseeable final actions.

To facilitate further actions in or near the site of the removal action, the exact dimensions of the excavation and the levels of contamination identified and removed will be documented. Any areas suspected of containing remaining contamination will also be documented. The excavation will be

documented by photographs, record drawings, the OSC report, and other information collected during the removal action to further delineate the limits of the excavation.

This removal action will address the threat of further migration of the actinium-227 contamination placed in or around the abandoned septic tank. Because final actions for Area 7 are not scheduled for several years, removal of the actinium-227 contaminated soils is necessary to keep the final response actions for Area 7 from being more difficult or extensive than necessary.

The removal action will excavate as much of the actinium-227 contamination as feasible. It is expected that a large portion of the contaminated soil can be removed within the constraints described herein. Any remaining contamination is expected to be at lower concentrations than the materials originally placed in Area 7.

5.1.3. Description of Alternative Technologies

Several alternative technologies were identified and screened for their ability to meet specific criteria for the removal action. Criteria used to screen alternatives include timely response, protection of human health and the environment, effectiveness, implementability and cost.

Alternative technologies frequently evaluated for CERCLA remediation include institutional controls, containment, collection, treatment and disposal. Based on the Area 7 conditions, the following alternatives (in addition to the proposed alternative of excavation and disposal) were developed.

1. No Action
2. Institutional Controls
3. Containment
4. Electrical Separation
5. Soil Washing
6. Vitrification

The performance capabilities of each alternative with respect to the specific criteria is discussed below.

5.1.3.1. No Action

The "No Action" approach was eliminated from consideration because the need for action has been demonstrated as necessary based on the responses to the criteria discussed on Section 2.1.1.

5.1.3.2. Institutional Controls

Existing Mound Plant institutional controls effectively minimize the potential for contact of the Area 7 contamination with the general public. Implementation of additional institutional controls to minimize the potential for human contact with the existing contamination will not prevent further migration of the contaminants from the source. Also, institutional controls will be difficult to implement when commercial use of adjacent areas is permitted. Thus, institutional controls were eliminated from further consideration.

5.1.3.3. Containment

The source of actinium-227 contamination is believed to be located under the existing Area 7 parking lot which serves as a contaminant cap. Vertical barriers, such as sheet piles or slurry walls would have to be installed to prevent the horizontal migration of contaminants. A containment system would be effective in protecting human health and the environment. However, since the source is believed to be at least partially located in groundwater, complete vertical containment of the source would be required to prevent groundwater contact with the contaminants. The close proximity of the suspected source with surrounding structures and utilities complicates the implementability of this alternative and, thus, prevents a timely response. For these reasons, the containment alternative was not selected for the removal action.

5.1.3.4. Electrical Separation

Electrical separation is an in-situ process that relies on low intensity direct current through the contaminated soil to promote the removal of contaminants using mass transfer mechanisms of electro-osmosis and ion migration. In-ground electrodes produce positively charged hydrogen ions at the positive electrode (anode) and hydroxyl ions at the negative electrode (cathode). The hydrogen ions form an acid font which extracts organic compounds, heavy metals and radionuclides from the soil structure and initiates a movement to the negative cathode. Soluble compounds accumulate at the cathode and are pumped to a recovery system.

The effectiveness and implementability of the process is impacted by complex mixtures of radionuclides, depth of the waste, and subsurface anomalies which are all characteristic of the project site. Consequently, a bench scale treatability study using site material would be necessary to determine if the technology is a suitable removal alternative. Due to the time-critical nature of this removal action, known anomalies in the Area 7 subsurface, and the need for a treatability study, electrical separation was not considered a viable alternative.

5.1.3.5. Soil Washing

Soil washing is an ex-situ waste minimization technology that has been successfully proven to remove radionuclides and other contaminants from soils. The liquid-based process removes contaminants either by dissolving or suspending them in a wash solution or by concentrating them by particle size distribution techniques.

The effectiveness of the process is highly dependant on soil characteristics. Soil washing is most effective in sand and gravel. Since the zone of contamination is primarily in clay and a saturated gravel layer, the ability of the process to remove contaminants to action levels is questionable. Thus, the washed media may be unsuitable for use as fill material at the site. In this case, all excavated material would have to be disposed as LSA waste which negates any advantage of treatment. Hence, this alternative was eliminated from consideration.

5.1.3.6. Vitrification

In-situ vitrification involves the use of electric current to convert a contaminated media into glass- or rock-like material. Inorganics and radionuclides are immobilized in the residual product. Process equipment is brought to the site on over-the-road trailers. Electrodes are used to raise the subsurface temperatures to a soil melt temperature between 1,600 and 2,000 °C.

Vitrification is a high-energy-demanding process that requires about 800 to 1,000 kilowatts per ton for treatment. It produces air emissions which would be difficult to collect and expensive to treat, making the cost of vitrification significantly higher than that of soil washing. The presence of groundwater reduces implementability of the process. Inorganic debris in the subsurface should be limited to a maximum of 20 percent by volume for vitrification to be effective. The resulting glass- or rock-like

material makes the effectiveness of vitrification difficult to assess and would render portions of Area 7 unsuitable for commercial use. Consequently, vitrification was eliminated from further consideration.

5.1.4. Engineering Evaluation/Cost Analysis (EE/CA)

Because this is a time-critical removal, an EE/CA is not required.

5.1.5. Applicable or Relevant and Appropriate Requirements (ARARs)

Mound OU5 ARARs for the ER Program Remedial Investigation/Feasibility Study (RI/FS) project have been identified (DOE 1993b). CERCLA regulations require that removal actions comply with ARARs only to the extent practicable.

Only those ARARs that relate to the actual removal action and not to long-term remediation, apply to the removal. The following ARARs are federal and state requirements that are considered practicable for this removal action.

5.1.5.1. Air Quality

- 40 C.F.R. Part 61 Subpart H: National Emissions Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities.
- Ohio Administrative Code (O.A.C.) 3745-15-07(A): Air Pollution Nuisances Prohibited
- O.A.C. 3745-17-02(A,B,C): Particulate Ambient Air Quality Standards
- O.A.C. 3745-17-05: Particulate Non-Degradation Policy
- O.A.C. 3745-17-08 (A)(1), (A)(2), (B), (D): Emission Restrictions for Fugitive Dust

5.1.5.2. Worker Safety

- 29 C.F.R. Part 1910: Occupational Safety and Health Act (OSHA) - General Industry Standards

- 29 C.F.R. Part 1926: OSHA - Safety and Health Standards

- 29 C.F.R. Part 1904: OSHA - Recordkeeping, Reporting, and Related Regulations

5.1.6. Other Standards and Requirements

The following is a list of other standards and requirements applicable to this removal action.

5.1.6.1. Mound Plant Manuals and Procedures

Mound Plant manuals and procedures applicable to this removal action include:

- Quality Policy and Responsibilities (MD-10334)
- Quality Assurance Program for Engineering Dept. (MD-10241)
- Standards and Calibration System (MD-10096)
- Safety and Hygiene Manual (MD-10286)
- Radiological Protection Program Manual (MD-10019)
- D&D Field Coordinator Manual (MD-10167)
- Low-level Waste Management Manual (MD-81240)
- General Procedures for Calibration of Radiation Protection Instrumentation (MD-10215)
- Waste Certification Program Plan (MD-81020)
- D&D Decontamination Procedures (MD-10332)
- Form ML-7588 Engineering Review Transmittal Sheet
- Form ML-8440 Project Quality Assurance Review
- Form ML-8816 Engineering Department Non Conformance Report
- Health Physics Procedures (MD-80036)
- Work Package Development Manual, Decontamination and Decommissioning - Mound, 1992

- Quality Assurance Plan for Decontamination and Decommissioning Project Management (MD-10241)
- Debris Disposal (WS12)
- Environmental Restoration Procedures (OU9 RI/FS QAPjP)

5.1.6.2. DOE Orders/Criteria

The following list of DOE Orders and criteria are applicable to this removal action:

- Radiation Protection for the Public and the Environment (5400.5)
- Radioactive Waste Management (5820.2A)
- Project Management System (4700.1)
- Radiation Protection for Workers (5480.11)

5.1.7. Project Schedule

The schedule established for planning and implementing the removal action is shown in Figure 5.1.

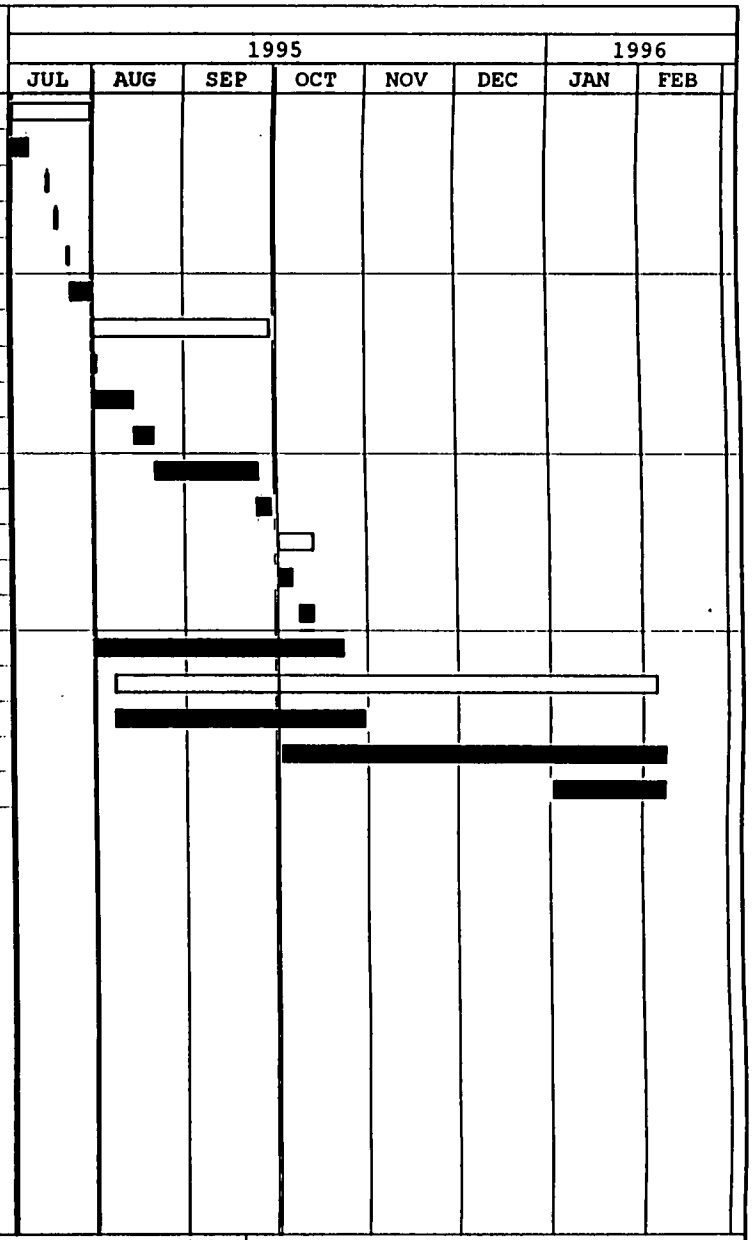
5.2. ESTIMATED COSTS

The cost estimate to perform the removal action is shown in Table V.I. Costs include the construction activities, all engineering and construction management, waste disposal, and site restoration. A detailed breakdown of the estimated removal action costs are presented in the OU5 Area 7 Removal Action Work Plan (DOE 1995 - Future).

Table V.1. Removal Action Cost Estimate

Activity	Cost ($x1000)
Engineering/Project Management	350
Excavation/Site Closure	555
Waste Transportation/Disposal	295
Total	1,200

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	WORK DAYS
SITE PREPARATION	5JUL95	31JUL95	19
Set Up Field Equipment, Trailer	5JUL95	10JUL95	4
Survey Utilities	17JUL95	17JUL95	1
Mark Grid	20JUL95	20JUL95	1
Set Up Work Zones	24JUL95	24JUL95	1
Set Up Temporary Storage Area	25JUL95	31JUL95	5
REMOVAL ACTION EXCAVATION	1AUG95	29SEP95	44
Remove Asphalt	1AUG95	2AUG95	2
Excavate Top 6 Feet	1AUG95	14AUG95	11
Install Dig-Face System	15AUG95	21AUG95	5
Excavate From 6 to 16 Feet	22AUG95	25SEP95	25
Remove Dig-Face System	25SEP95	29SEP95	5
SITE CLOSURE	2OCT95	13OCT95	10
Backfill Excavation	2OCT95	6OCT95	5
Demobilization	9OCT95	13OCT95	5
TEMPORARY STORAGE	1AUG95	23OCT95	60
WASTE MANAGEMENT / DISPOSAL	8AUG95	5FEB96	130
Transfer to Mound Interim Storage	8AUG95	30OCT95	60
Disposal at Envirocare	3OCT95	8FEB96	93
OSC REPORT	2JAN96	8FEB96	28



Plot Date 24JUL95
Data Date 5JUL95
Project Start 5JUL95
Project Finish *******

(c) Primavera Systems, Inc.

Summary Activity
Activity Bar

USA7

Sheet 1 of 1

Mound OU5 Area 7 Removal Action

Date	Revision	Checked	Approved

Figure 5.1. Area 7 Removal Action Schedule

6. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

The contamination in Area 7 poses a potential threat to public health and welfare and the environment because:

- the actinium-227 contamination has spread to surrounding soils;
- the actinium-227 contamination potentially threatens groundwater; and
- the source of the actinium-227 contamination (septic tank) has uncertainty associated with it regarding location, physical condition and quantity of contaminated soil.

If no action is taken to remove the contaminated soils, further migration of actinium-227 into surrounding soils and potential migration into groundwater is likely.

7. OUTSTANDING POLICY ISSUES

There are currently no outstanding policy issues affecting performance of this removal action.

8. ENFORCEMENT

The DOE is the sole party responsible for the cleanup of contaminated soils in OU5, Area 7. Therefore, DOE is undertaking the role of lead agency, per the FFA, for the performance of this removal action. The funding for this removal action will be through DOE budget authorization and no Superfund monies will be required.

9. RECOMMENDATION

This decision document represents the selected removal action for the Mound OU5, Area 7 Actinium-Contaminated Soils site in Miamisburg, Ohio, developed in accordance with CERCLA as amended by SARA, and consistent with the NCP. This decision is based on the administrative record for the site.

Conditions at the site meet the NCP Section 300.415 (b)(2) criteria for a removal and I recommend initiation of the response actions.

Approved:

_____ _____

Arthur Kleinrath, DOE/MB, On-Scene Coordinator Date

Disapproved:

_____ _____

Arthur Kleinrath, DOE/MB, On-Scene Coordinator Date

10. REFERENCES

U.S. EPA. 1990. Superfund Removal Procedures Action Memorandum Guidance. Office of Emergency and Remedial Response. U.S. Environmental Protection Agency. December 1990.

DOE. 1993a. "OU9, Site Scoping Report, Volume 3 - Radiological Site Survey" U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM. FINAL. June 1993.

DOE. 1993b. "OU5 South Property Remedial Investigation/Feasibility Study Work Plan" prepared for EG&G Mound Applied Technologies and the U.S. Department of Energy. December 1993.

DOE. 1994a. "Removal Action Reconnaissance Report, Ground Penetrating Radar Survey for Area 7 Buried Septic Tank [DRAFT]" prepared for EG&G Mound Applied Technologies and the U.S. Department of Energy. May 1994.

DOE. 1994b. "Actinium-Contaminated Soil Removal Action Work Plan, Operable Unit 5, Area 7." U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM. FINAL. October, 1994.

SAIC. 1995. "Operable Unit 5, Operational Area Phase 1 Investigation, Area 7 Field Report," Working Draft, prepared for EG&G Mound Applied Technologies, Miamisburg, OH. December, 1994.