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Environmental Restoration Program

CHROMIUM TRENCH REMOVAL SITE EVALUATION OPERABLE UNIT 2

MOUND PLANT
MIAMISBURG, OHIO

May 1995

FINAL

(Revision 0)

Department of Energy
Ohio Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

Contents

FIGURES

TABLES

ACRONYMS

AM	Action Memorandum
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis
ER	Environmental Restoration
EPA	Environmental Protection Agency
FFA	Federal Facilities Agreement
ICF KE	ICF Kaiser Engineers
MAT	Mound Applied Technologies
MSL	Mean Sea Level
NCP	National Contingency Plan
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
OSC	On-Scene Coordinator
PA	Preliminary Assessment
PPB	Parts Per Billion
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RSE	Removal Site Evaluation
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

This Removal Site Evaluation was performed in accordance with the National Oil and Hazardous Substances Contingency Plan (NCP) 40 CFR Part 300 and has identified a potential threat to human health, welfare, and the environment from a hazardous substance as defined by the Mound Plant Federal Facilities Agreement (FFA) (Docket No. OH 890:008 984), in subsurface soils and groundwater. The area of concern is located on the Main Hill at Mound Plant.

Past investigations at Mound Plant have identified the presence of a trench under the GH Building parking lot on the Main Hill. This trench, known as the chromium trench, has previously been identified as having received chromium waste. Historical use of the trench indicates that this chromium waste could potentially contribute to soil and groundwater contamination. The purpose of this RSE is to evaluate the need for additional action related to the trench. The RSE includes: an evaluation of the potential of the trench to contaminate the surrounding environment, the potential risk involved with the contamination, and the feasibility of performing a remediation, if needed. This RSE was performed using existing data.

The parking lot south of the GH Building is referred to as Area F, and the trench within Area F is referred to as Area 6. In 1963, 110 gallons of chromium plating bath solution treated with sodium bisulfide were disposed of in a trench in Area 6. In 1964 three 55 gallon drums of polonium-210 contaminated sand were also placed in or around the chromium trench. The sand was contained in drums that were crushed prior to being disposed of in the trench area. The sand may have also been contaminated with cobalt-60 and cesium-137.

Current information fails to accurately pinpoint the exact location of the trench. A magnetic survey of the trench area located an anomaly, which may be the trench. Its size suggests that a much larger magnetic source is in the trench than would be expected from only chromium plating solutions, drums of contaminated sand, and a washing machine.

Currently there is little information on effects the chromium trench has had on the environment. Limited investigations do show that the GH Building parking lot subsurface soils contain areas with ferrous materials, and contamination in the upper 5 feet from volatile organic compounds (VOCs).

To determine the need for a removal action, eight factors were considered, and it was determined that a removal action was appropriate for the soils in and around the chromium trench. However, the amount of data fails to provide enough information to perform an accurate action memorandum.

Therefore, additional sampling is proposed for the GH Building parking lot. Based on the results of the sampling, an accurate evaluation of remedial alternatives can be made.

1. INTRODUCTION

At Mound Plant, the Department of Energy (DOE) is the designated lead agency under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA). The removal actions at Mound Plant are implemented as non-fund Federal lead actions. DOE provides the On-Scene Coordinator (OSC). As a non-fund Federal lead, removal actions are not subject to United States Environmental Protection Agency (USEPA) limitations on the OSC ($50,000 authority) and are not subject to National Contingency Plan (NCP) limitations on the actions (i.e., $2,000,000 in cost and 12 months in duration)

CERCLA and the NCP define removal actions to include "...the cleanup or removal of released hazardous substances from the environment, such actions as may necessarily be taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release." USEPA has categorized removal actions in three ways: emergency, time critical, and non-time-critical, based on the type of situation, the urgency and threat of the release or potential release, and the subsequent time frame in which the action must be initiated. Emergency and time-critical removal actions respond to releases requiring action within 6 months; non-time-critical removal actions responded to releases requiring action that can start later than 6 months after the determination that a response is necessary.

Section 300.410 of the NCP outlines the process for conducting a removal site evaluation, which includes a removal preliminary assessment (PA) and, if warranted, a removal site inspection (SI). The OSC performs the removal PA based on readily available information, to identify the source and nature of the release or threatened release and to assess the threat to public health, the magnitude of the threat, and the factors necessary to determine the need for a removal action. The removal PA also determines if more information is needed to characterize the release, such as off-site or on-site inspection of conditions and sampling. If more information is necessary, the OSC performs a removal SI. For non-time-critical removal actions, OSCs further characterize the release and propose the removal action as a result of the EE/CA process. The subsequent selection of the appropriate response is made in an Action Memorandum.

This Removal Site Evaluation was performed in accordance with the National Oil and Hazardous Substances Contingency Plan (NCP) 40 CFR Part 300 and has identified a potential threat to human health, welfare, and the environment from a hazardous substance as defined by the Mound Plant Federal Facilities Agreement (FFA) (Docket No. OH 890:008 984), in subsurface soils and groundwater. The area of concern is located on the Main Hill at Mound Plant.

2. BACKGROUND

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. The chromium trench is one of 325 potential release sites identified at Mound Plant (DOE 1993a), and is located on the eastern end of the Main Hill (Operable Unit 2). The trench is bordered by the GH Building to the north, the lower parking lot to the east, building 45 to the south, and buildings 47 and 65 to the west (Figure 2.2).

The Main Hill of Mound Plant site is underlain by shale and thinly bedded limestone bedrock. Water within the shale is thought to be transmitted along fractures until deflected laterally at the intersections of competent shale beds unaffected by fracturing. This water then emerges at the surface along hillsides, as seeps. The seeps are believed to be associated with the perched groundwater in the bedrock.

There are eight groundwater seeps around the Main Hill at Mound Plant. Seep 0603 is located nearest the chromium trench. Seep 0603 is located northeast of the suspected location of the chromium trench and is at an elevation of 843.0' msl. The chromium trench is believed to be at an elevation of approximately 850.0' msl. Although seep 0603 is at the correct elevation to be influenced by the chromium trench, groundwater potentially impacted by the chromium trench most likely flows to the south-east based on bedrock topography in the area. No known seep lies downgradient of the chromium trench.

As noted above, the apparent competent bedrock surface in the area of the chromium trench dips to the southeast (DOE 1994a), and groundwater flow near the chromium trench is believed to be to the southeast. There are no near-by monitoring wells downgradient of the chromium trench to assess if groundwater has been impacted by the trench. Although chromium has been detected in both groundwater and production wells at the site, (2880 ppb at monitoring well 0305, 6.2 ppb at production well 0071 DOE,1993b), it is unknown if the contamination in these wells is due to the chromium trench or other on-site sources. Both these wells are located at the southwest end of Mound Plant, and are probably unrelated to the chromium trench.

The trench area was not covered for approximately one to two years during 1963 and 1964. This was the operational period of the trench, and construction period of the parking lot. Since 1964 the trench area has been covered with the asphalt parking lot. Because the area of the chromium trench is now covered, infiltration from precipitation is reduced. It is not known if the trench was constructed in the bedrock or overlying soils. The trench depth is also unknown.

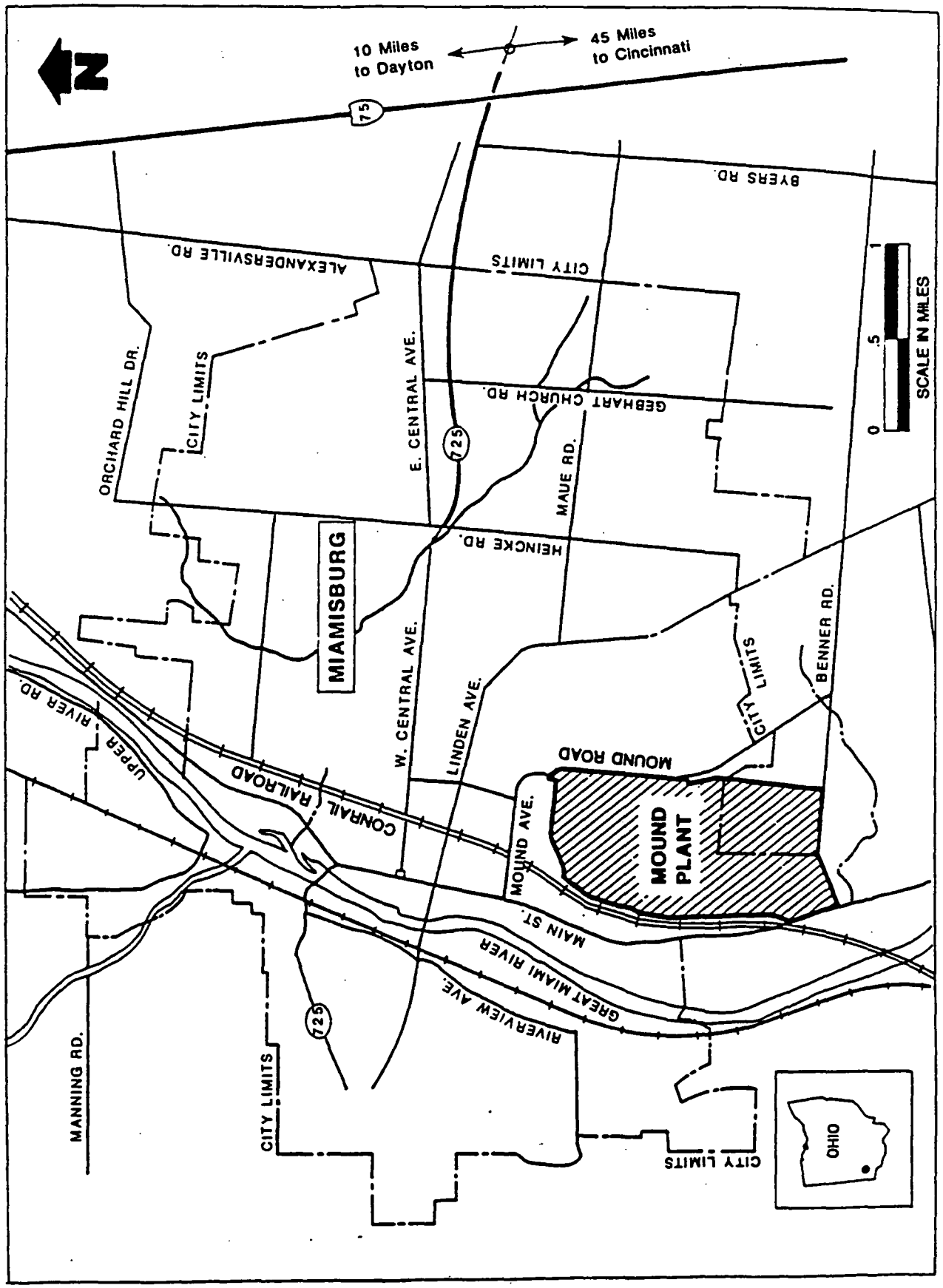

Figure 2.1. Location of Mound Plant, Miamisburg, Ohio

Topographic maps indicate that there may be as little as 15 feet of fill covering the trench. This was determined by comparing pre-Mound topographic maps with current topographic maps, and using the information from the magnetic survey to approximate the location of the trench. If true, this depth contradicts other information that the trench is 30 feet below ground surface (DOE 1992a).

3. SOURCE AND NATURE OF THE RELEASE

3.1. HISTORY

The parking lot south of GH Building is also referred to as Area F (DOE 1992a) and the chromium trench within Area F is referred to as Area 6. The chromium trench has been reported to be approximately 100 feet by 40 feet, and located near the center of Area F. Area 6 was filled with fill dirt (up to 30 feet) before the parking lot was built.

In 1963 approximately 110 gallons of chromium plating bath solution were treated with sodium bisulfide, resulting in a chemical reduction. The treated solution was disposed of in a trench at Area 6. It is unknown if the chromium solution was placed in the trench while still in drums or if it was poured from the drums into the trench. The amount of chromium placed in Area F was substantially below the 24 hour reportable quantity of 1000 pounds of chromium (DOE 1992a). The trench was reportedly only used in 1963.

In 1964, three 55 gallon drums of polonium-210 contaminated sand were placed in this area. The sand was the waste product from sand blasting of the metal framework of the WD Building sand filters. The sand was originally contained in drums which were then crushed and placed in the disposal area/trench. The area was then covered with clean backfill. Because of its short half life of 138.4 days, the polonium-210 should no longer be present due to radioactive decay. There is a concern that the polonium-210 contaminated sand may also have been contaminated with cobalt-60 and cesium-137 (DOE 1993b).

3.2. EXISTING INFORMATION

During a magnetic survey of Area 6, (DOE 1990) one large and seven smaller anomalies were detected in the area (Figure 3.1). The largest anomaly is believed to be the chromium trench, located in the south-central portion of Area 6. Magnetometer surveys detect ferromagnetic materials (such as steel and iron) which have magnetic susceptibilities that are several orders of magnitude higher than magnetic susceptibilities of common earth materials. Reportedly, only three crushed 55 gallon drums, a washing machine, and the possibility of two additional drums with chromium solution are buried in the trench. The size of the largest anomaly suggest that a greater amount of ferrous material was placed in the trench than reported. The other anomalies may represent small groupings of drums, construction debris, or other ferrous materials that may be contributing to the overall impact of the chromium trench on the environment (DOE 1990).

The effect of the chromium trench on local soils is unknown at this time. Because the chromium trench is reportedly under 30 feet of clean fill, it has not been thoroughly investigated. Soil gas samples taken in the GH Building parking lot indicate volatile organic compounds (VOC) contamination in the upper 5.0

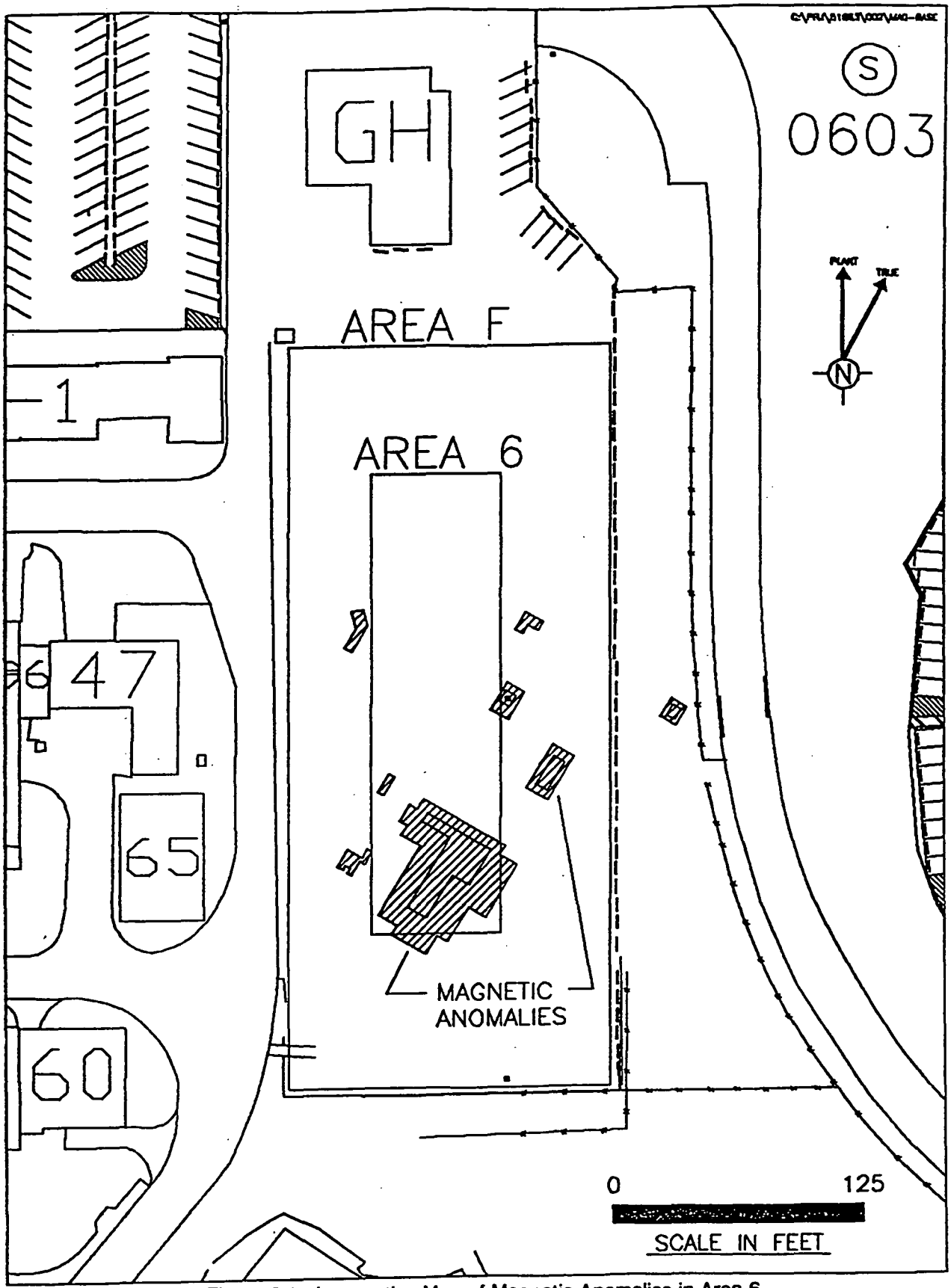

Figure 3.1. Interpretive Map of Magnetic Anomalies in Area 6

feet. Trichloroethene and toluene were the only contaminants detected as shown in Table III.1. Trichloroethene was detected at 6 and 8 ppb, and toluene at 13 and 255 ppb. The fill may not have been clean or has been influenced since being placed in the area (DOE 1992c).

One soil boring has been drilled in the GH Building parking lot; it was sampled at 18 inch intervals for radiological isotopes. Only radium-226 was detected, and all of the detections were below 1 pCi/g as shown in Table III.2. Reportedly radium-226 was only disposed of on-site in the upper plant valley in and around an old septic tank, located approximately 500 feet south of the chromium trench area. The boring was terminated at 15 feet and it is unknown if bedrock or evidence of the trench were detected in the boring (DOE 1992b).

Storm and sanitary sewers in the area of the GH Building parking lot were video surveyed in the summer of 1994. Results showed storm sewers running north-south between building 65 and the chromium trench, just west and upgradient of the trench, are in poor condition and probably leaking storm water to the subsurface (DOE 1994b). The storm sewer line from storm sewer manhole 04 004 to storm drain 04 014 has several cracks and offset joints. This sewer line drains runoff from the parking west of GH Building and the eastern end of the roads located on the Main Hill. During a rain event, large quantities of runoff travel south in this sewer line, with probable impact on the subsurface.

Table III.1. Soil Gas Survey in the GH Building Parking Lot

Sample Number	Trichloroethene	Toluene
Sample 1108	6 ppb	ND
Sample 1109	8 ppb	13 ppb
Sample 1110	ND	225 ppb

ND = Not
ppb = parts per billion

Table III.2. Radiologic Survey in the GH Building Parking Lot

Depth in Inches	18	36	54	72	90	108	126	144	162	180
Radium-226 pCi/g	0.4	0.6	0.7	0.7	0.8	0.9	0.7	0.5	0.4	0.5

4. EVALUATION OF POTENTIAL HEALTH RISK

Groundwater and soil/sediment risk-based cleanup guideline values for trivalent, and hexavalent chromium for residential and Mound construction/employees (DOE 1994c) were compared to the known data, as shown in Table IV.1. These groupings were chosen because of their relevance to possible exposure from groundwater in wells, and cleanup activities or future construction in the chromium trench area. The other groupings were not chosen because of the unlikelihood that a subsistence farmer or a person involved in recreational activities would be impacted by contaminants at the chromium trench area.

Because Miamisburg city code outlaws the use of cisterns, potential for surface water exposure is associated with direct contact with the seep water. This is possible because the seeps are located on hillsides outside the Mound Plant security fences.

The only available groundwater data indicates that the groundwater concentration of chromium are below the levels in Table IV.1. However, the data are from wells that are far to the southwest of the chromium trench area. There are no seeps downgradient of the chromium trench area. No soil data exists for the trench area.

The lack of data prevents speculation on the actual impact of the chromium trench to the subsurface. However, their is a potential for the chromium trench to impact the subsurface and consequently, there is a potential health risk. The available data does not allow an estimation of that risk.

Table IV.1. Risk-Based Cleanup Guideline Value

Residential Groundwater for Chromium III and Chromium VI			Construction/Mound Employee Groundwater for Chromium III and Chromium VI			Construction/Mound Employee Soil/Sediment for Chromium III and Chromium VI		
Ingestion	Inhalation	Dermal	Ingestion	Inhalation	Dermal	Ingestion	Inhalation	Dermal
GV for THI = 1	GV for THI = 1	GV for THI = 1	GV for THI = 1	GV for THI = 1	GV for THI = 1	GV for THI = 1	GV for THI = 1	GV for THI = 1
Chromium III 3.7E+01	N/A	Chromium III 1.3E+04	Chromium III 1.0E+02	N/A	Chromium III 3.2E+04	Chromium III 2.1E+05	N/A	N/A
Chromium VI 1.8E-01	N/A	Chromium VI 2.6E+02	Chromium VI 5.1E-01	N/A	Chromium VI 1.6E+02	Chromium VI 1.1E+03	N/A	N/A

GV = Guideline Values
THI = Target Hazard Index
N/A = Not Applicable

5. DETERMINATION OF THE NEED FOR REMOVAL ACTION

The NCP provides eight factors that shall be considered in determining the appropriateness of a removal action under 40 CFR 300.415(b)(2). These criteria, as applied to the contamination of groundwater and soil at the chromium trench are shown in Table V.1.

Table V.1. Removal Action Criteria

Criteria	Chromium Trench Conditions
(i) ... potential exposure to nearby human populations, animals,or the food chain from hazardous substances or pollutants or contaminants;	Contamination may exit the site via groundwater seeps and subsurface groundwater flow, providing potential for exposure to humans, animals, and the food chain.
(ii) ... actual or potential contamination of drinking water supplies or sensitive ecosystems;	There is a potential to contaminate drinking water supplies through migration of pollutants from the trench to the Buried Valley Aquifer.
(iii) ... Hazardous substances or pollutants or contaminants in drums, barrels,tanks,or other bulk storage containers, that may pose a threat of release.	Trench was excavated and used to hold chromium plating solution, crushed drums containing contaminated sand, and a contaminated washing machine.
(iv) ... High levels of hazardous substances or pollutants or contaminants in soil largely at or near the surface, that may migrate;	Unknown at this time, soil gas survey in 1992 indicated VOC contamination at a depth of 5.0 feet beneath the GH Building parking lot.
(v) ... Weather conditions that may cause substances or pollutants or contaminates to migrate or be released;	Asphalt parking lot inhibits rainfall infiltration, however subsurface utilities are damaged in the area and this may supply water which aids migration of contaminates.
(vi) ... Threat of fire or explosion;	No apparent threat.
(vii) ... The availability of other appropriate federal or state response mechanisms to respond to the release;	None identified.
(viii) ... Other situations or factors that may pose threats to public health or welfare or the environment;	The possibility of future construction activities that could expose the contents of the chromium trench to the environment.

Based on the above criteria, a removal action is appropriate for the soils in and around the chromium trench.

6. REMOVAL ACTION LIMITATIONS

If the chromium trench is at its reported depth of 30 feet, excavation to remediate the trench would prove very difficult. Shoring would be required as well as continuous monitoring for radiological isotopes. The excavation would require removing much larger quantities of soil to allow the excavation equipment to enter the excavation to remove soil at a depth of 30 feet. This would likely require removing fences and closing roadways. If, however, the trench is at a depth of 15 feet as indicated in Section 2, excavation could be the least disruptive of the remediation alternatives. It is also unknown if the backfill material was in fact clean, or was contaminated with radiological isotopes. By removing the asphalt parking lot and the fill materials covering the chromium trench, the potential for exposure to the contents of the trench is increased. Also the potential for contaminants to migrate off site or to become air-borne is increased.

Because of the lack of data, it is difficult to speculate on other possible remedial alternatives. It is unknown if there is mixed waste present and whether volatile organics, pesticides, poly chlorinated biphenyls, or other organic compounds are present. Remedial alternatives will vary depending on the contaminants present. Therefore, it is difficult to judge what limitations may be associated with the different remedial alternatives.

7. CONCLUSIONS

Current information fails to accurately pinpoint the exact location of the trench. Information gathered during a magnetic survey of Area 6 (chromium trench) located one large anomaly approximately 40x70 feet and seven other anomalies of smaller proportions in the area. Based on the reported size of the trench, the large anomaly may be the chromium trench. The magnetic survey suggest a much larger magnetic source in the chromium trench than would be expected from only the chromium plating solution, drums of contaminated sand, and a washing machine. In past investigations the chromium trench was reported to be covered with 30 feet of fill. Topographic maps indicate that there may be as little as 15 feet of fill covering the trench. The other magnetic anomalies in this area may vary in depth from a few feet to 30 feet under the present ground surface. At this time, the source of the smaller anomalies is unknown. It appears from their random locations in the subsurface area that they were disposed of at different times and depths during the construction of the GH Building parking lot.

There has only been a single attempt at drilling a soil boring in the area of the trench, this boring was terminated at 15 feet. Because the boring log is not available, it is unknown if drilling was stopped because bedrock was encountered or because signs of the original trench or its fill were observed during the sampling.

Although there is very little data to evaluate the need for a removal action, Section 5 indicates there is a potential for release of hazardous substances or contaminants to the environment. In addition, there is a potential for the chromium trench to contaminate a drinking water supply.

8. RECOMMENDATIONS

The amount of data fails to provide enough information to perform an accurate Action Memorandum. With the amount of data available, it would be very difficult to evaluate the volume of soil that needed remediation the types of contaminants that would require remediation, and the types of possible remedial alternatives. The Action Memorandum would need to know if mixed waste is present, if the soil is contaminated with organics and metals, and a better estimate of the extent of contamination.

Because inaccuracies related to the lack of data would severely limit the usefulness of the Action Memorandum, we recommend that additional data be obtained. The eastern portion of Main Hill has few monitoring locations, (monitoring wells, intercepter trenches, seeps). During Phase II of the OU-2 RI/FS, two monitoring well clusters are planned near the chromium trench and fifteen borings are planned in the GH Building parking lot. We propose here that the portion of Phase II to investigate the GH Building parking lot be completed immediately with some modification to the scope. This additional information will be used to complete the Action Memorandum. We recommend the following activities:

- One monitoring well cluster be installed on a line between the chromium trench and seep 0603. The other well cluster would be installed in the southeast corner of the GH parking lot, downgradient from the interpreted location of the chromium trench. These well clusters would be installed in the perched water zone, at the bedrock interface, and approximately 5.0 feet into the bedrock.

- The 15 soil borings planned in the GH parking lot be drilled until refusal at the bedrock interface. Samples would be taken at 2.5 foot intervals for the entire depth of the boring, and analyzed for chromium III, chromium VI, total chromium, and for radiological isotopes.

- Additional soil/sediment samples should be taken in the drainage ditch located south (downgradient) of the chromium trench area, and analyzed for the parameters listed above.

Based on the results from the monitoring wells, soil borings, and soil/sediment samples, an accurate evaluation of remedial alternatives can be made in an Action Memorandum to best address the removal of the contents of the chromium trench and the subsurface soils under the GH Building parking lot.

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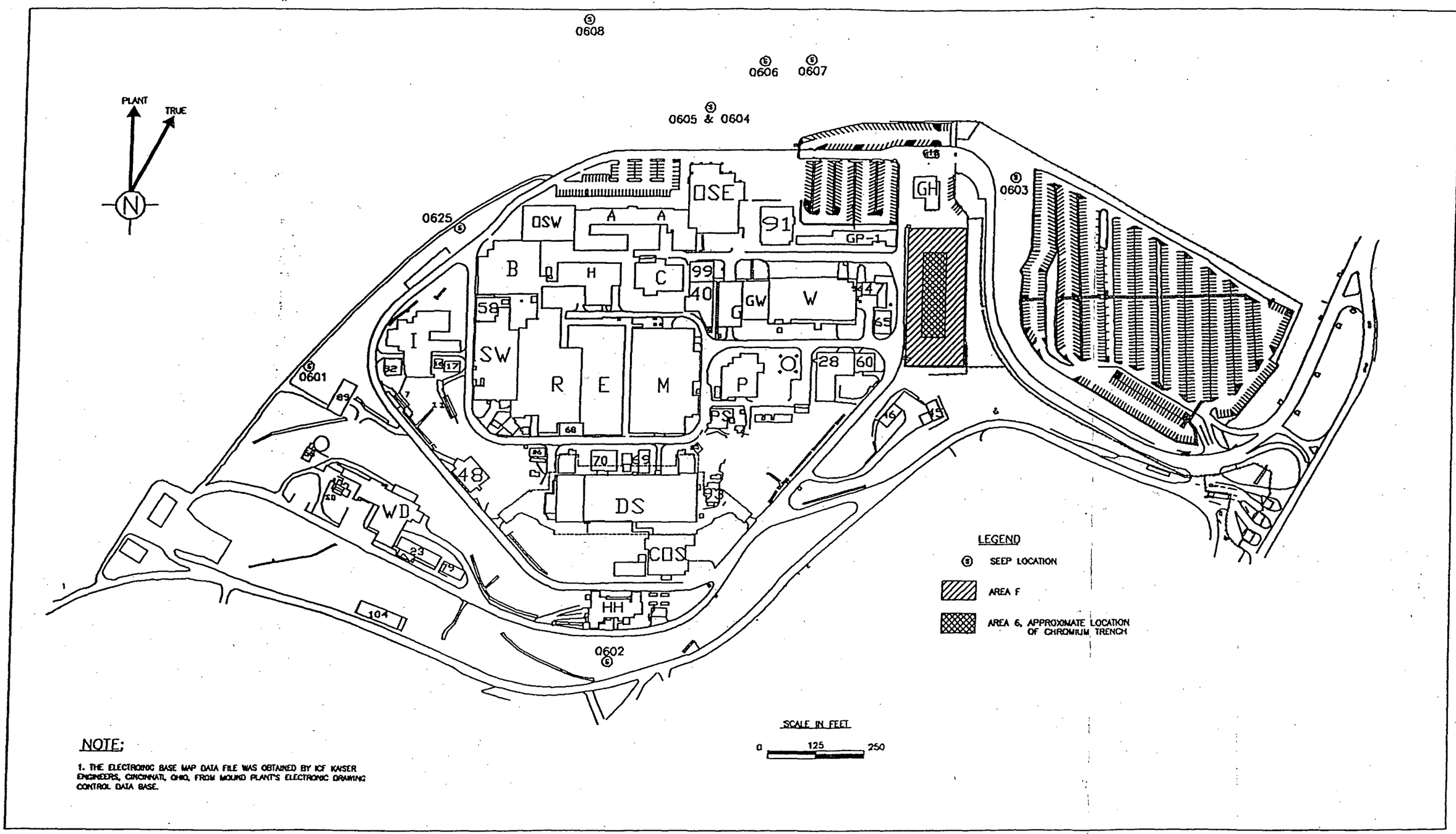

Figure 2.2. Location of Chromium Trench