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Remediation Activities at the Fernald Environmental Management
Project (FEMP)

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INTRODUCTION

The Fernald Environmental Management Project (FEMP) is a United States Department of Energy (DOE) facility located in southwestern Ohio (Figure 1). The facility began manufacturing uranium products in the early 1950's and continued processing uranium ore concentrates until 1989. The facility used a variety of chemical and metallurgical processes to produce uranium metals for use at other DOE sites across the country.

Since the facility manufactured uranium metals for over thirty years, various amounts of radiological contamination exists at the site. Because of the chemical and metallurgical processes employed at the site, some hazardous wastes as defined by the Resource Conservation and Recovery Act (RCRA) were also generated at the site. In 1989, the FEMP was placed on the National Priorities List (NPL) requiring cleanup of the facility's radioactive and chemical contamination under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

This paper discusses the proposed remediation activities at the five Operable Units (OUs) designated at the FEMP. In addition, the paper also examines the ongoing CERCLA response actions and RCRA closure activities at the facility.

CERCLA ACTIVITIES

The FEMP is divided into five OUs for the purpose of the CERCLA cleanup activities (Figure 2).

Operable Unit 1

OU1 consists of six waste pits, a burn pit, and a settling basin (Figure 3). The waste pits received wastes generated by the various chemical and metallurgical processes used at the facility for producing uranium. Uranium wastes in both wet and dry states were placed in the pits at various times from the 1950's through 1980's. The burn pit was used to dispose and burn laboratory chemicals, waste oils, and other low-level radioactive contaminated materials. The settling basin collects surface water runoff from the waste pit area.

A generalized methodology to remediate OU1 is provided in the Record of Decision (ROD) signed by U.S. EPA in 1995. More detailed information on the proposed remediation methods is provided in the Remedial Design Work Plan (RDWP) scheduled for approval by U.S. EPA in 1996. The generalized approach to remediate the pits includes excavation of the pit materials, blending (and drying if necessary due to moisture content), packaging, and shipment of the waste by rail to a disposal facility. Any underlying contamination of the soils below the pits will also be addressed by OU1. The excavated areas will be backfilled with either clean soil or soil meeting the site's cleanup criteria and reseeded.

Operable Unit 2

OU2 at the FEMP consists of a former solid waste landfill, two fly ash piles, two sludge disposal ponds, and a construction rubble disposal site (Figure 4). The ROD signed by U.S. EPA in 1995 lists the general cleanup method to include excavation of the waste materials from all of the areas. The excavated areas will be backfilled with soil and reseeded. The wastes excavated and removed from the areas will be placed in a disposal facility intended to be built on the FEMP site. The RDWP for OU2 is scheduled for approval in 1996.

In addition, OU2 initiated a CERCLA removal action in 1995 to control seepage from the inactive fly ash pile and the construction rubble site. The seepage drains to a collection basin and is pumped to the site's advanced wastewater treatment system to treat both chemical and radiological contaminants.

Operable Unit 3

OU3 includes all of the buildings and structures (including process and storage tanks) within the former production area of the FEMP complex (Figure 5). In 1994, an interim ROD for OU3 was signed by U. S. EPA. The interim ROD (IROD) described the general methodology intended to be used to address the removal of the structures within the process area. The IROD was developed since the removal of deteriorating buildings and structures could hasten the cleanup process at the FEMP.

The IROD was approved by U.S. EPA in 1994 before the Remedial Investigation/Feasibility Study (RI/FS) for OU3 was completed. Removal of holdup material and building decontamination/demolition activities continued during the RI/FS process.

The IROD also presented the concept that some existing CERCLA removal actions would continue over the next several years. Ordinarily under CERCLA, removal actions cease when RODs are signed since remedial actions are ultimately the solution to the contamination problems at the site.

Under the IROD however, the FEMP continues to use several removal actions to remove materials from former process equipment and treat existing hazardous waste streams. During 1995, three hazardous waste streams stored in tanks at the FEMP were treated to render the waste streams as non-hazardous. The treatments included neutralization, precipitation, and stabilization using a solidification process. Filtercake from the wastewater treatment processes along with the solidified waste stream will be shipped to an off-site disposal facility.

Also, under the IROD activities the removal of holdup material present inside former process equipment continued as a removal action. The IROD called for the submittal of implementation plans to U.S. EPA describing the decontamination and demolition activities of specific buildings/structures at the FEMP. U.S. EPA would approve the implementation plans before any demolition activities on the appropriate building would occur.

Additionally, RCRA closure activities for hazardous waste management units (HWMUs) continued within OU3 during 1995. The activities included the typical decontamination methods of scrubbing and rinsing to remove hazardous contaminants from surfaces. The activities were conducted in the accordance with closure plans approved by Ohio EPA.

OU3 considered the integration of RCRA closure and CERCLA removal/remedial actions during the cleanup process. The FEMP discussed integration activities with Ohio EPA in 1993. In 1994, a Director's Findings and Orders (DF&O) drafted by Ohio EPA addressed the integration of RCRA closure and CERCLA cleanup activities for the RCRA HWMUs. The intent of the draft Order is to eliminate any duplicative cleanup actions while at the same ensure the environment is protected. The draft Order is in the final stage of review at the present time.

Operable Unit 4

OU4 at the FEMP consists primarily of four ore silos and ancillary structures (Figure 6). Two of the silos contain radium-bearing, low-level radioactive wastes generated during the 1950's. A third silo contains uranium wastes while the fourth silo is empty. The ROD for OU4 signed by U. S. EPA in December 1994 selected the remedy of vitrification (glassification) to stabilize the residues and sludges from the silos. Following treatment, the vitrified residues will be containerized and sent to the Nevada Test Site for disposal. Contaminated soil and debris from OU4 will be placed in the on-site disposal facility.

Operable Unit 5

OU5 consists of the environmental media associated with the FEMP site. The media includes groundwater, soils, and sediments. OU5 submitted a draft ROD to U.S. EPA in 1995 for review. The draft ROD proposes as the selected remedy to excavate contaminated soils and sediments that exceed proposed final remediation concentrations. The excavated materials would be placed in the on-site disposal facility provided the appropriate waste acceptance criteria is met. In addition, the proposed remedy includes a pump and treat process to address groundwater contamination of the site's underlying aquifer.

One of the most difficult issues to resolve pertaining to OU5 was the closure of RCRA HWMUs which lie above underlying soil contamination. The DF&O drafted by Ohio EPA in 1995 allowed many of the RCRA units to be remediated under CERCLA and the OU5 ROD. However, some HWMUs were already in the closure process, with approved RCRA closure plans or completed field work. The regulators could not approve closure of these units without remediation of the underlying soils, even though the contaminants exist throughout the site. Exceptions were made in those cases where the evidence was clear that the soil contaminants clearly could not have originated from the RCRA unit. The FEMP decided to complete the closure field work in those instances where work was already begun and submit a closure certification report to Ohio EPA. The regulators agreed to accept the report and acknowledge that the work was performed in accordance with the approved closure plan. Official closure will not be granted until the soils are remediated using the OU5 ROD. The FEMP hopes that this approach will prevent the invalidation of closure activities if the regulatory requirements or standards change prior to soil remediation and official closure.

CONCLUSIONS

The FEMP site is presently moving toward the remediation stages of the CERCLA process. The approval of the RODs for the OUs represent the initial step in providing the selected remedy to remediate the site. While the site followed the CERCLA investigative processes (Remedial Investigation/Feasibility Study) to arrive at the selected remedy, cleanup activities continued during RI/FS processes. These cleanup activities in the form of CERCLA removal actions and RCRA closures contributed to the FEMP's overall cleanup strategy. At the time of this writing, the FEMP is proposing to remediate the site within ten years.

At the FEMP, the approval of the RODs by USEPA occurred after many meetings with representatives from U.S. EPA, Ohio EPA, and the public. Frequent discussions with the appropriate regulatory agencies and the public allowed the ROD approval process to proceed in a timely manner.

ACKNOWLEDGMENTS

This paper was prepared as an account of work sponsored by an agency of the United States Government. Reference herein to any specific commercial product, process, or service by trade name, trade mark, manufacturer, or otherwise does not constitute or imply its endorsement, recommendation, or favoring by the United States Government, or agency thereof or Fernald Environmental Restoration Management Corporation, its affiliates or its parent companies.

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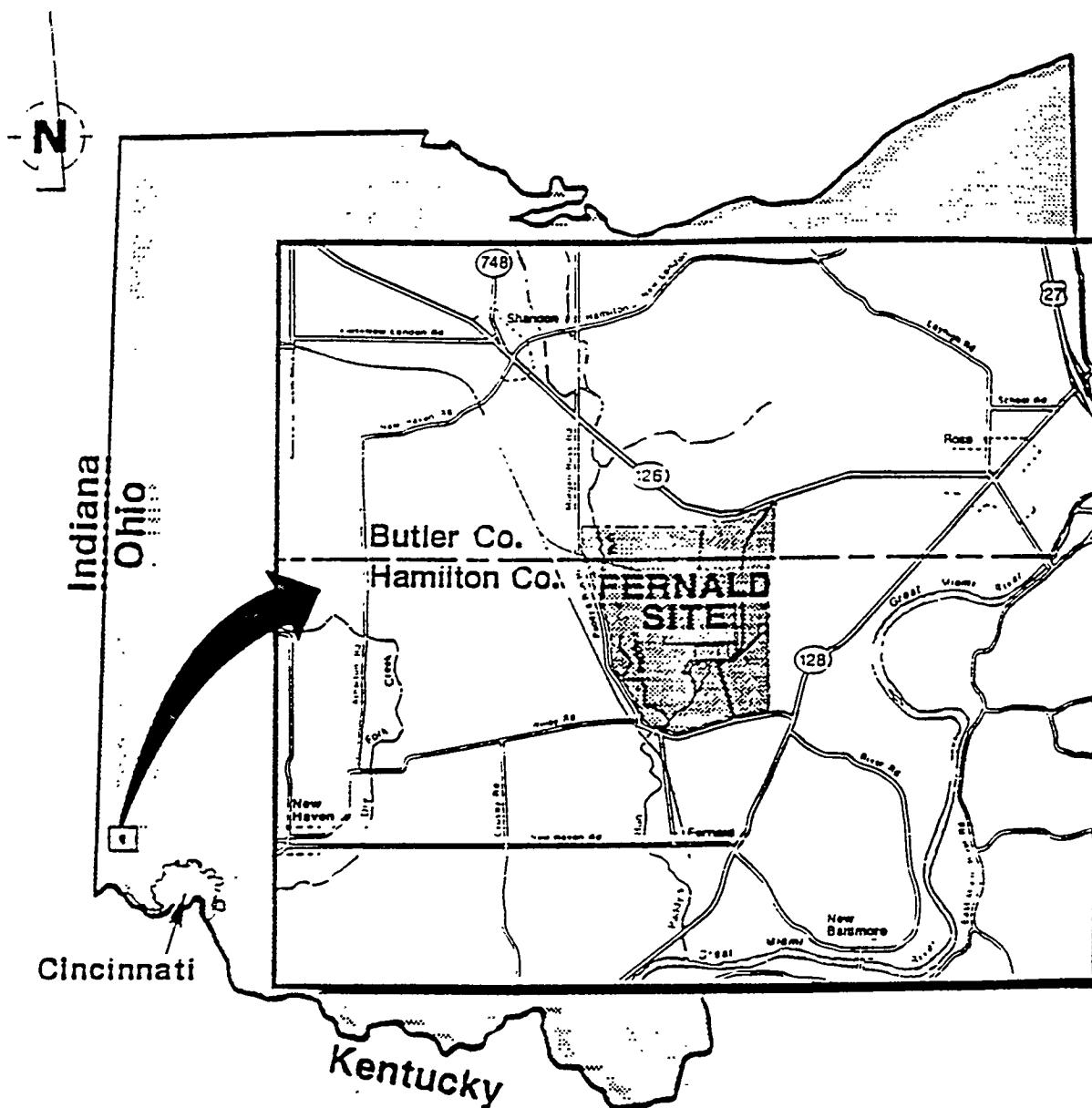
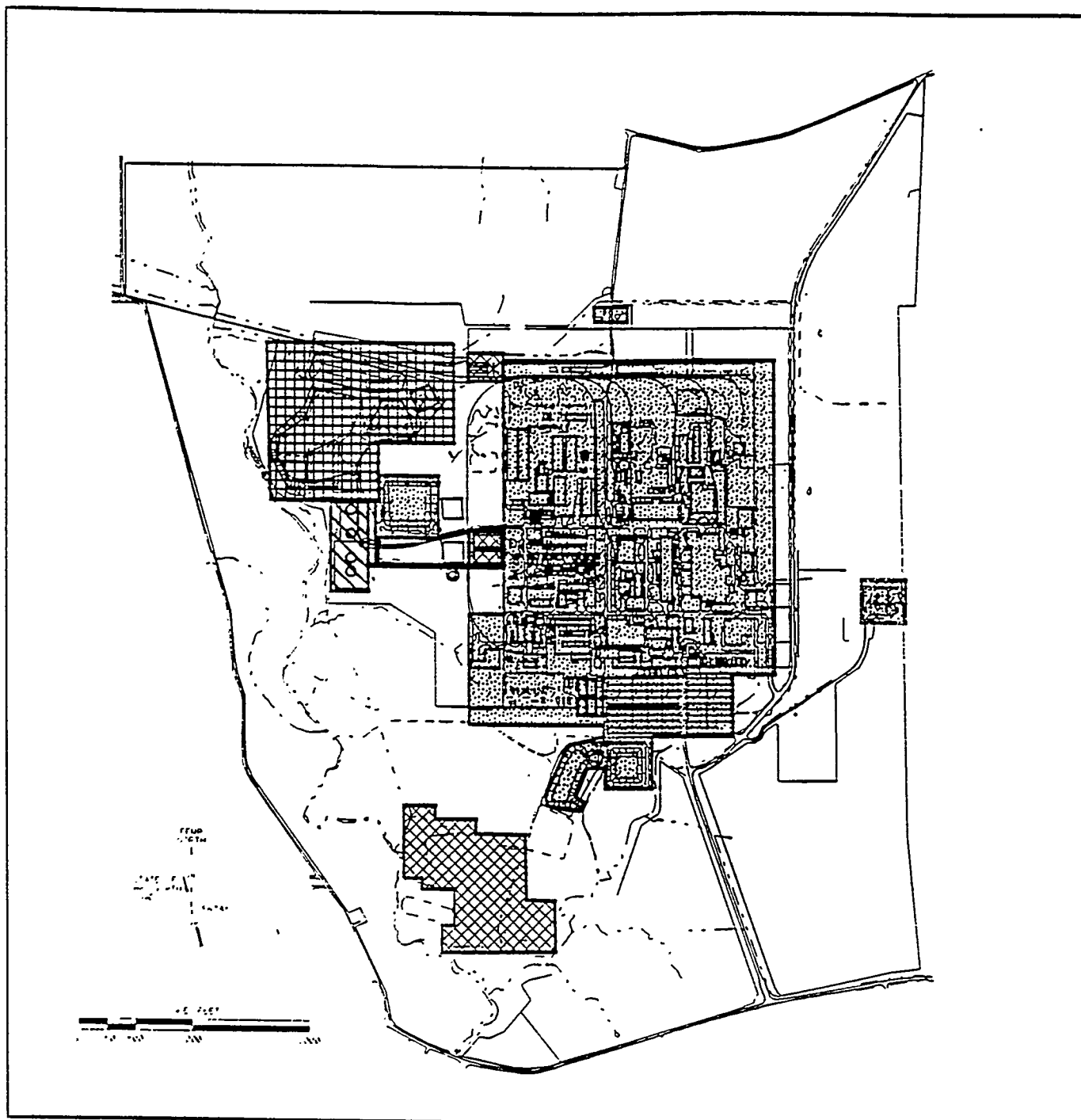


Figure 1. Fernald Site and Vicinity.




LEGEND

 OU-1 (WASTE PIT AREAS)

 OU-2 (OTHER WASTE UNITS)

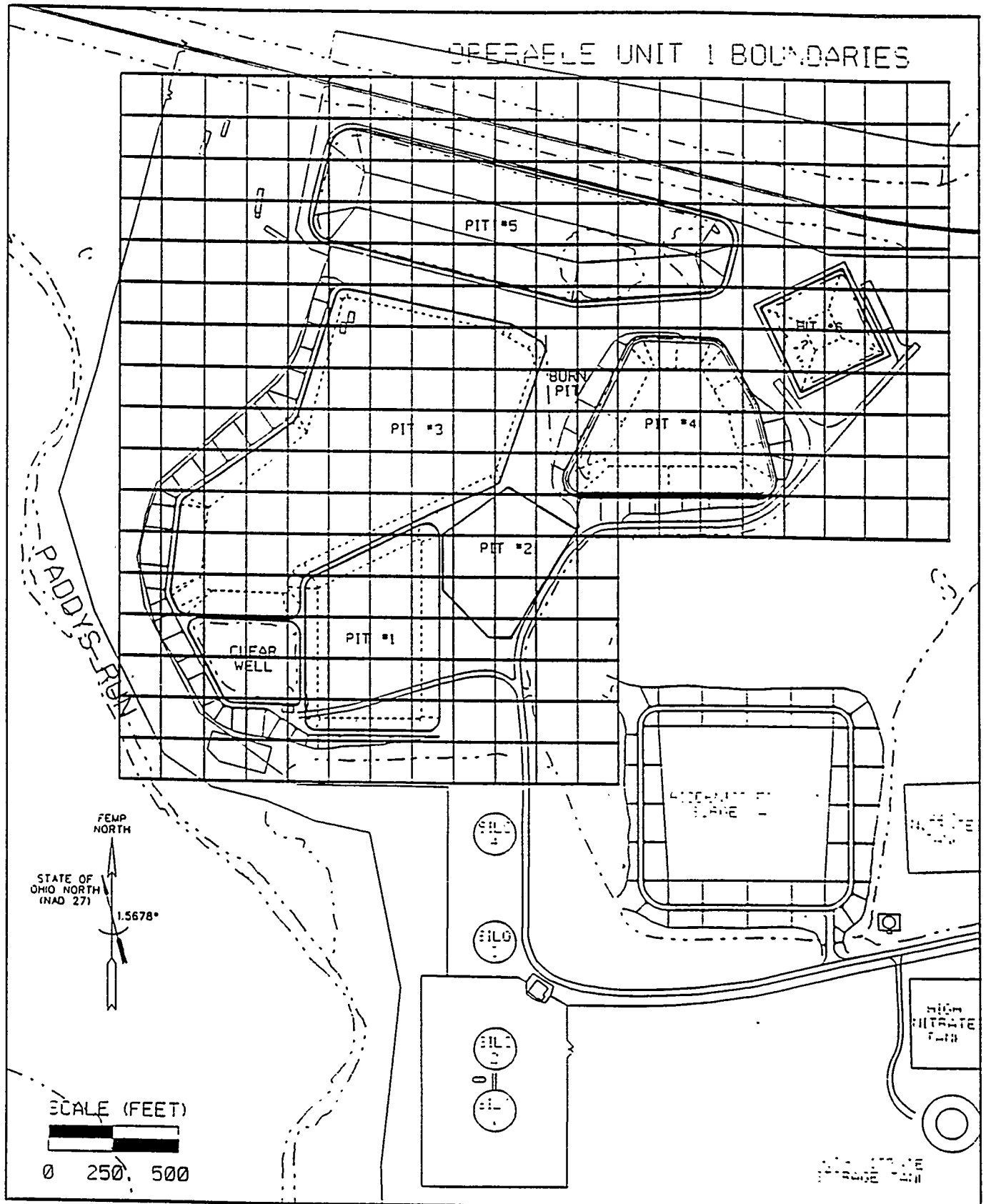
 OU-3 (PRODUCTION AREA)

 OU-4 (SILOS 1-4)

NOTE: OU-5 (ENVIRONMENTAL MEDIA) NOT SHOWN

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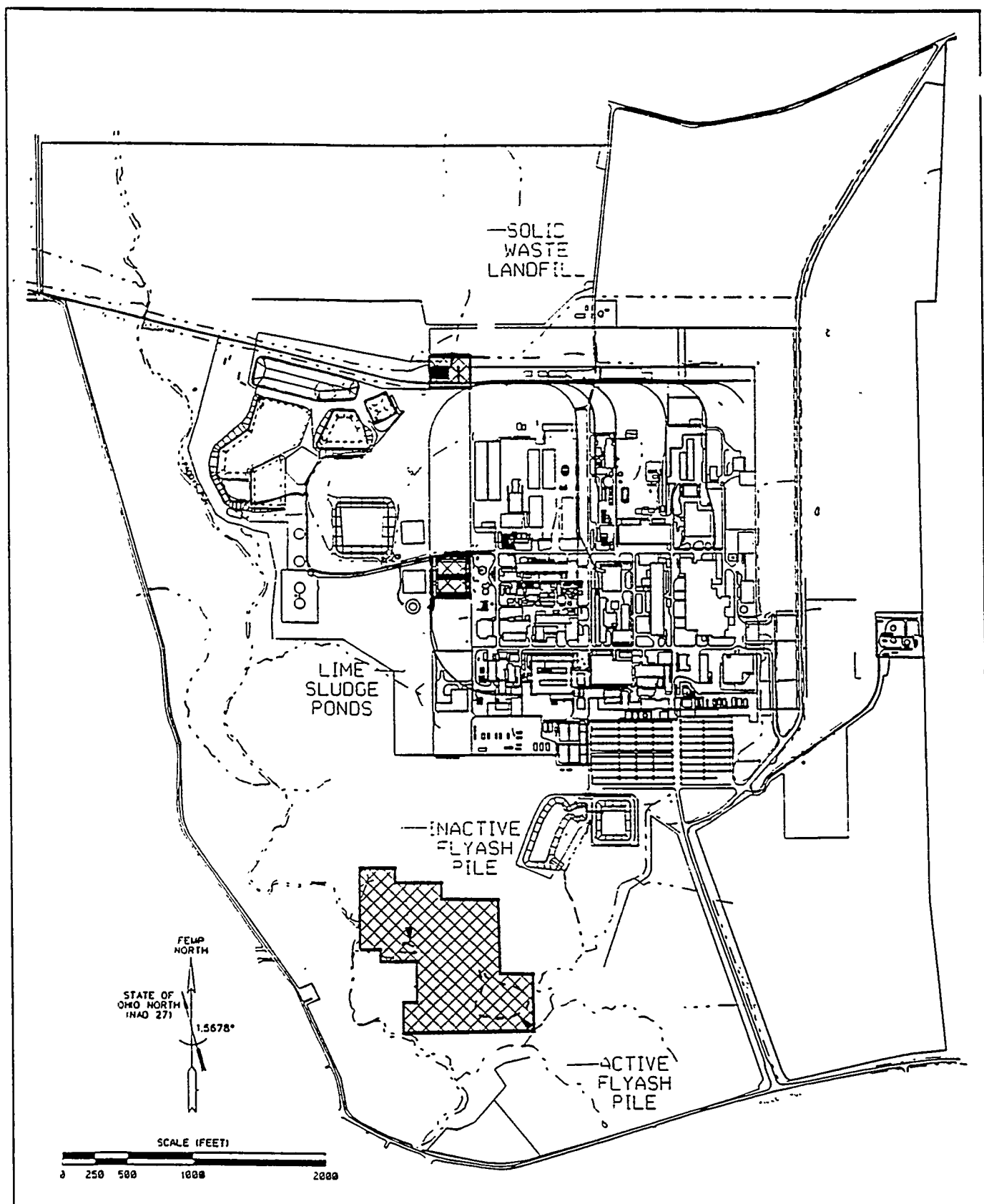
Figure .2 - Location of OUs



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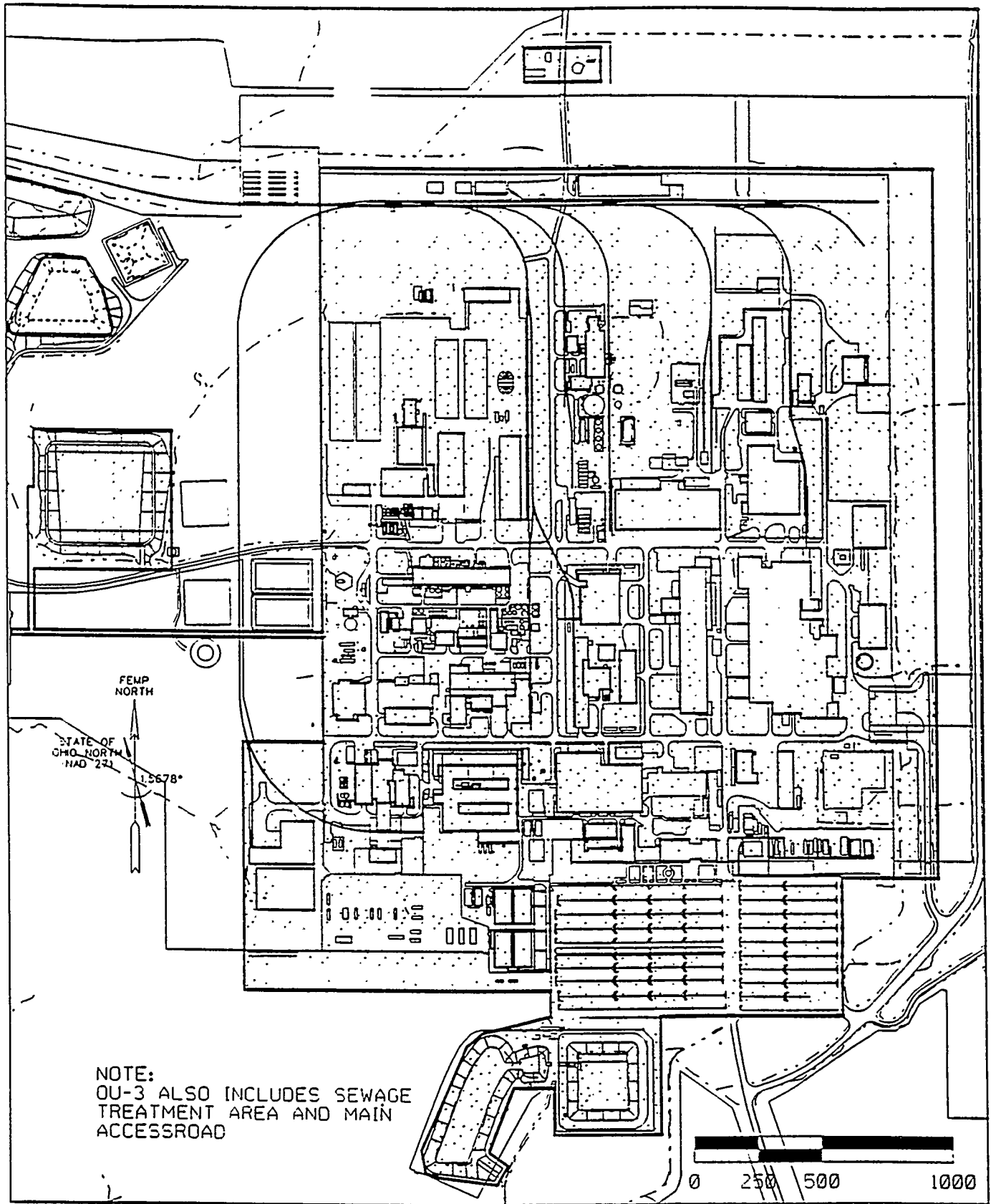
Figure 3 - OU-1

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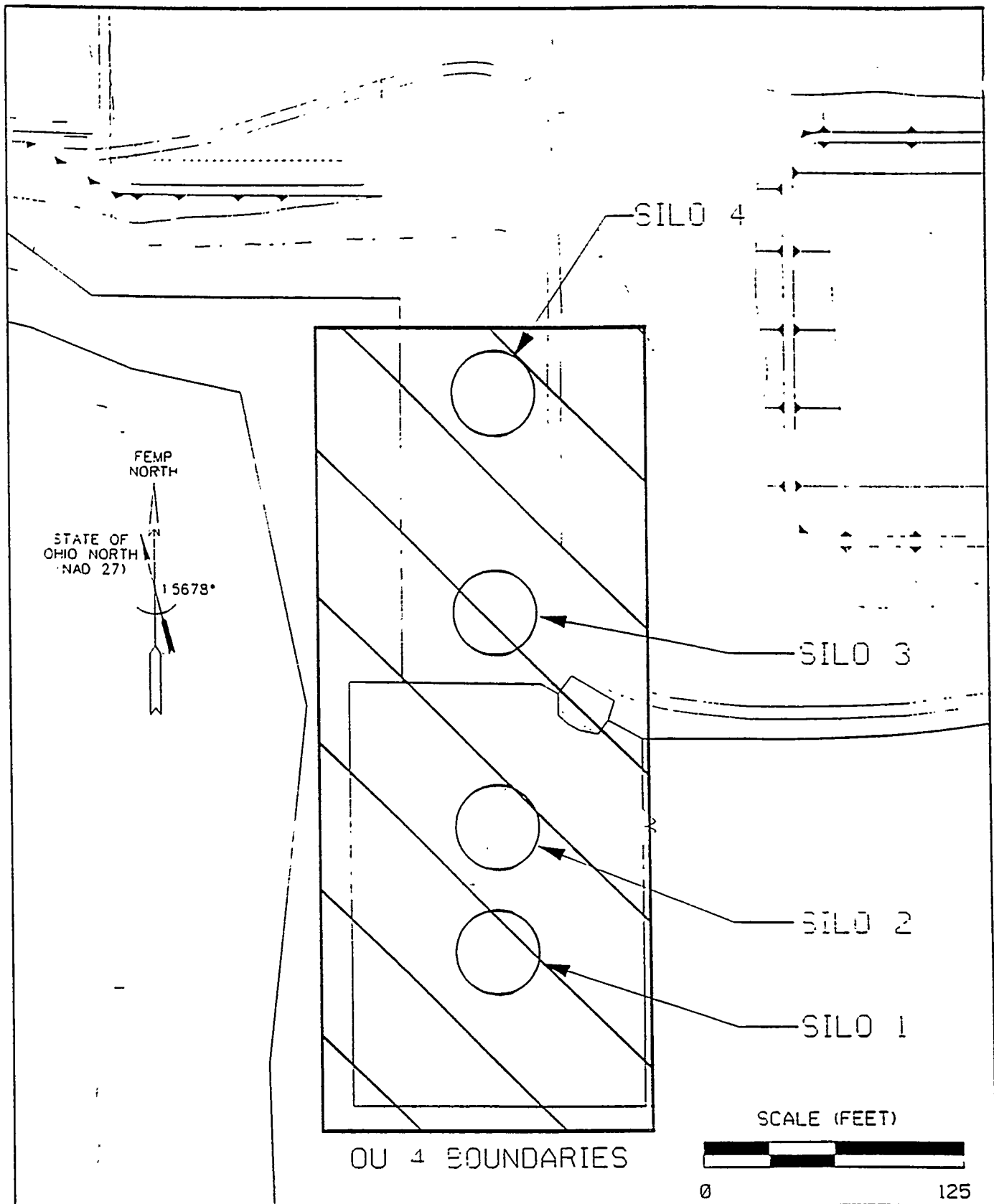
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Figure 4 - OU-2



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Figure 5 . OU-3



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Figure 6 OU-4