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COLLECT UNCONTROLLED PRODUCTION AREA STORMWATER RUNOFF REMOVAL ACTION NO. 16 WORK PLAN MAY 1992

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REMOVAL ACTION NO. 16

WORK PLAN

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

May 1992

REVISION 1

Prepared by

Westinghouse Environmental Management Company of Ohio

Cincinnati, Ohio

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UNITED STATES DEPARTMENT OF ENERGY

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1.0 INTRODUCTION

This removal action Work Plan is being submitted to the U. S. Environmental Protection Agency (U. S. EPA) for approval as required by the September 1991 Amended Consent Agreement as amended under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sections 120 and 106(a) between the U. S. EPA and the Department of Energy. The DOE has conducted a Removal Site Evaluation (RSE) to determine whether the conditions present for the Collect Uncontrolled Production Area Stormwater Runoff project warrant a removal action under CERCLA, consistent with Section 300.410 of the National Contingency Plan (NCP). A copy of the approved RSE ~~is available to the U.S. EPA upon request~~ is provided as Attachment 3. Based upon the information in the RSE, the DOE has determined that a Time Critical Removal Action is appropriate. The proposed removal action is protective of human health and the environment and will be conducted in accordance with all CERCLA requirements. The appropriate relevant and applicable regulations (ARARs) which apply to this removal action are listed in Table 1 and Table 2. These ARARs have been tabulated as either "Action Specific" or "Chemical Specific".

The scope for this removal action can be broadly defined as management of radioactively contaminated stormwater runoff from the production area. It involves intercepting and redirecting to the existing storm sewer/Storm Water Retention Basin (SWRB) system, stormwater which currently leaves the FEMP production area.

The Fernald Environmental Management Project (FEMP) production area includes those facilities previously utilized to produce high-purity uranium metals (for use at other Department of Energy (DOE) facilities) using various chemical and metallurgical processes. Past activities also include thorium processing and recycling fuel materials. The production area is confined within a 136 acre fenced area which is located in approximately the center of the 1050 acre site.

Analytical results (See Attachment 3) indicate that elevated concentrations of uranium are present in the stormwater runoff from the production area. Most production area stormwater runoff is collected in storm sewers and discharged to the SWRB for settling prior to discharge via pumping to the Great Miami River. However, some contaminated stormwater from the perimeter of the production area is currently released to the environment by direct flow to Paddy's Run. The Remedial Investigation/ Feasibility Study (RI/FS) for Operable Unit 5, Environmental Media, has determined that leakage from Paddy's Run infiltrates into the regional aquifer. A removal action entitled "South Groundwater Contamination Plume", which addresses contamination in the aquifer, is currently being prepared.

This removal action is a component of Operable Unit 5. Activities performed under this work plan will be in accordance with the NCP and ~~the FEMP Laboratory Analytical Methods Manual (FLAMM)~~ Appendix L of the CERCLA Sitewide Quality Assurance Project Plan (QAPjP), the FEMP Laboratory Analytical Methods Manual, and consistent with the guidance of Amended OSWER Directive 9360.0-03B, SUPERFUND REMOVAL PROCEDURES, REV. 3. The U.S. EPA is in the process of reviewing a draft of the Sitewide CERCLA Quality Assurance Project Plan ~~(SCQ)~~(QAPjP) which covers all sitewide sampling and analysis activities. Upon approval, remaining sampling and analysis activities will be conducted consistent with the ~~(SCQ)~~ QAPjP. The Consent

Agreement under CERCLA Sections 120 and 106(a) requires a work plan to be submitted for implementation of Removal Action Number 16, the Collect Uncontrolled Production Area Stormwater Runoff Removal Action. This work plan satisfies that commitment.

TABLE 1 - ACTION SPECIFIC ARARs

Action: Training of Personnel

Requirement: 29 CFR 1910.120 ARAR/TBC: Applicable

Employers shall develop and implement a written safety and health program for their employees involved in hazardous waste operations. The program shall be designed to identify, evaluate, and control safety and health hazards, and provide for emergency response for hazardous waste operations.

Strategy for Compliance

All personnel directly involved with the implementation of Removal Action No. 16 will be trained in accordance with the Occupational Safety and Health Administration standards.

Action: Discharge of Treatment System Effluent

Requirement: 40 CFR 122.41 ARAR/TBC: Relevant and
OAC 3745-33-05 Appropriate

Discharges must be monitored to assure compliance. Discharges must be monitored for:

- the mass of each pollutant
- the volume of each pollutant
- frequency of discharge and other measurements as appropriate

40 CFR 136.1 - 136.4 ARAR/TBC: Relevant and Appropriate

Approved test methods must be followed for waste constituents to be monitored. Detailed requirements for analytical procedures and quality controls are provided.

Sample preservation procedures, container materials, and maximum allowable holding times are prescribed.

40 CFR 122.44 ARAR/TBC: Applicable
OAC 3745-33-04

Applicable federally approved state water quality standards must be complied with. These standards may be in addition to or more stringent than other Federal effluent standards under the Clean Water Act.

TABLE 1 CONTINUED

40 CFR 122.44(e) ARAR/TBC: Applicable

Discharge limitations must be established at more stringent levels than technology-based standards for these pollutants.

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Strategy for Compliance

Implementation of this removal action will divert surface runoff to the SWRB. The effluent discharged from the SWRB is monitored for the constituents of concern under the NPDES Permit.

Action: Control of Fugitive Dust

Requirement: OAC 3745-17-08 ARAR/TBC: Applicable

Requires the minimization or elimination of visible emissions of fugitive dust generated during grading, loading, or construction operations and other practices which emit fugitive dust.

Strategy for Compliance

The implementation of Removal Action No. 16 will require the movement of dirt and other material likely to result in fugitive dust emissions. Fugitive dust emissions will be controlled by dampening the area where excavations take place. Accumulated soils will be covered to eliminate the potential for fugitive dust emissions.

Action: Prevention of Air Pollution Nuisance

Requirement: ORC 3704.03(E) ARAR/TBC: Applicable

The Director of Environmental Protection (OEPA) may adopt, modify, and repeal regulations prescribing hazardous or toxic air contaminant limitations and standards for the prevention or control of odors and air pollution nuisances.

Requirement: OAC 3745-15-07 ARAR/TBC: Applicable

The emission or escape into open air from any source whatsoever in such a manner or in such amounts as to endanger the health, safety, or welfare of the public or to cause unreasonable injury or damage to property shall be declared a public nuisance and is prohibited.

TABLE 1 CONTINUED

Strategy for Compliance

The implementation of Removal Action No. 16 will require the movement of dirt and other material likely to result in fugitive dust emissions. Fugitive dust emissions will be controlled by dampening the area where excavations take place. Accumulated soils will be covered to eliminate the potential for fugitive dust emissions.

Action: Hazardous Waste Determinations

Requirement: 40 CFR 260, Appendix I ARAR/TBC: Applicable

Outlines the procedure to be followed under:

40 CFR 261.2 to identify whether a particular material of concern is a "solid waste";

40 CFR 261.4 (a) to identify whether a particular exclusion applies to the material eliminating it from definition as a "solid waste";

40 CFR 261.3 to identify whether a particular solid waste may be classified as a hazardous waste under Subpart C or Subpart D of 40 CFR 261; and

40 CFR 261.4 (b), 40 CFR 260.20, and 40 CFR 260.44 to determine if a material, otherwise classified as a "hazardous waste" under Subpart C or Subpart D, may be excluded from RCRA jurisdiction.

Strategy for Compliance

This removal action may generate soils containing hazardous wastes which must be stored in accordance with RCRA.

Action: Container Storage

Requirement: 40 CFR 264.171 ARAR/TBC: Applicable
OAC 3745-55-70 through -78

Containers of RCRA hazardous waste must be maintained in good condition.

40 CFR 264.172 ARAR/TBC: Applicable

Containers of RCRA hazardous waste must be compatible with hazardous waste to be stored

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TABLE 1 CONTINUED

40 CFR 264.173 ARAR/TBC: Applicable

Containers of RCRA hazardous waste must be closed during storage (except to add or remove waste

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40 CFR 264.174 ARAR/TBC: Applicable

Storage areas which have containers of RCRA hazardous waste must be inspected weekly for deterioration

40 CFR 264.175 ARAR/TBC: Applicable

Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system.

40 CFR 264.177 ARAR/TBC: Applicable

Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.

40 CFR 264.178 ARAR/TBC: Applicable

At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers and liners.

Strategy for Compliance

Hazardous waste generated under this action will be staged and stored in containers. Storage will be at a HWMU as designated on the latest FMPC Part A Permit Application submittal and as required by the proposed amended consent decree with the state of Ohio.

Action: Empty Containers

Requirement: 40 CFR 261.7 ARAR/TBC: Applicable

Containers that have held hazardous wastes are "empty" and exempt from further RCRA regulations if:

- no more that 2.5 cm (one inch) of residue remains on bottom or inner liner;

- less than 3% by weight of total capacity remains (less than 110 gallon container);

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TABLE 1 CONTINUED

- less than .3% by weight of total capacity remains (greater than 110 gallon container).

Containers that have held acutely hazardous ("p" listed) wastes are "empty" and exempt from further RCRA regulation if:

- they or their inner liners have been triple rinsed with an adequate solvent and the inner liner has been removed from the container.

Strategy for Compliance

Containers used to store hazardous waste from this removal action may contain hazardous waste residues which must be removed before the containers may be reused or disposed of. Any containers used under this removal action will be managed in accordance with the empty container provisions in RCRA.

Action: On-Site Solid Non-hazardous Waste Management Facilities

Requirement: 40 CFR 241.200 - 241.201 ARAR/TBC: Applicable
OAC 3745-27

Develop a solid, non-hazardous waste handling plan to determine what waste shall be accepted and identify any special handling required.

Also, determine specific wastes to be excluded and identify them in the plan. An alternative method of disposal for excluded wastes must also be a part of the solid waste handling plan.

Strategy for Compliance

Solid, non-hazardous wastes generated as a result of this removal action will be managed in accordance with Removal Action No. 17, Improved Storage of Soil and Debris.

Action: Generator Recordkeeping & Reporting

Requirement: 40 CFR 262, Subpart D ARAR/TBC: Applicable

Generators must keep copies for three (3) years of the following documents:

- Manifests
- Test results, waste analyses or other determinations made in accordance with 40 CFR 262.11

Generators must submit biennial reports by March 1, of each even numbered years.

Generators must submit exception reports within 35 days of shipment.

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Strategy for Compliance

Hazardous waste removed under this action is subject to the generator requirements and will be listed in the appropriate reports as required under these hazardous waste regulations and the proposed amended consent decree.

Action: Generators Who Treat, Store, or Dispose of Hazardous Waste

Requirement: 40 CFR 262.10 ARAR/TBC: Applicable

Any "generator", as defined by 40 CFR 260.10, who treats, stores, or disposes of hazardous wastes must determine, in accordance with 40 CFR 262.11, whether or not the waste is hazardous.

Strategy for Compliance

Hazardous waste removed under this removal action may be subject to the generator requirements, and will be stored in a HWMU as designated on the latest Part A Permit Application submittal and as required under the proposed amended consent decree with the state of Ohio, if the waste is determined to be hazardous.

Action: Waste Accumulation On-Site by Generator

Requirements: 40 CFR 262.34 ARAR/TBC: Applicable

Generators may accumulate hazardous waste on-site for 90 days or less (without meeting permitting standards for storage facilities) provided that they:

- use appropriate U.S. DOT containers;

- mark accumulation beginning date on tanks/containers;

- label and mark tanks/containers in accordance with U.S. DOT requirements;

- placard transport vehicle or offer appropriate placards to transporter;

-follow interim status standards for less than 90 day storage including:

- weekly container and storage areas inspections
- maintenance of aisle space between containers wide enough for persons to walk carrying emergency equipment

TABLE 1 CONTINUED

- maintain enough space between containers to allow for visual inspection from top and one side of all containers
- put in place appropriate emergency preparedness procedures and equipment
- maintain spill response pillows or absorbent
- conduct RCRA response training for personnel

- put in place a written contingency plan
- avoid storage of incompatible wastes in same containment area

Strategy for Compliance

Hazardous waste removed under this removal action may be stored for 90 days or less pending a determination. If the waste is determined to be hazardous, it will be stored in a HWMU as designated in the latest Part A Permit Application submittal and as required by the proposed amended consent decree with the state of Ohio.

Action: Treatment, Storage, or Disposal Facility Standards

Requirement: 40 CFR 264, Subpart B, General Standards ARAR/TBC: Applicable

Waste Analysis (40 CFR 264.13) - Operators of a facility must obtain a detailed chemical and physical analysis of a representative sample of each hazardous waste to be treated, stored, or disposed of at the facility prior to treatment, storage, or disposal.

Security (40 CFR 264.14) - Security (40 CFR 264.14) - Operators of a facility must prevent the unknowing or unauthorized entry of persons or livestock into the active portions of the facility, maintain a 24-hour surveillance system, or surround the facility with a controlled access barrier and maintain appropriate warning signs at facility approaches.

Inspections (40 CFR 264.15) - Operators of a facility must develop a schedule and regularly inspect monitoring equipment, safety and emergency equipment, security devices and operating and structural equipment that are important to preventing, detecting or responding to environmental or human health hazards,promptly or immediately remedy defects, and maintain an inspection log.

Training (40 CFR 264.16) - Operators must train personnel within 6 months of their assumption of duties at a facility in hazardous waste management procedures relevant to their positions including emergency response training.

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TABLE 1 CONTINUED

Strategy for Compliance

Hazardous waste removed under this removal action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU as designated on the latest Part A Permit Application submittal and the proposed amended consent decree with the state of Ohio.

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Action: Treatment, Storage, or Disposal Facility Reporting

Requirement: 40 CFR 264.75 - 77 ARAR/TBC: Applicable

Facilities must submit to the appropriate authorities the following reports:

- Reports of unmanifested wastes
- Reports of releases, fires, and explosions
- Groundwater monitoring data when contamination is discovered (within 7 days)
- Notice of facility closure

Strategy for Compliance

Hazardous waste removed under this action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU designated on the latest Part A Permit application submittal and the proposed amended consent decree with the state of Ohio.

Action: Treatment, Storage, or Disposal Facility Preparedness and Prevention

Requirement: 40 CFR 264, Subpart C ARAR/TBC: Applicable

TSD operators must design, construct, maintain and operate facilities to minimize the possibility of a fire, explosion or any unplanned sudden or non-sudden release of hazardous waste to air, soil, or surface water which could threaten human health or the environment.

40 CFR 264.32

All facilities must be equipped with an internal communication or alarm system, a telephone, or a two-way radio for calling outside emergency assistance, fir control, spill control, and decontamination equipment and water at an adequate volume and pressure to supply water hose streams, foam producing equipment, and automatic sprinklers or water spray systems.

TABLE 1 CONTINUED

40 CFR 264.33

All fire and spill control and decontamination equipment must be tested and maintained as necessary to assure proper emergency operation.

40 CFR 264.34

All personnel must have immediate access to emergency communication or alarm systems whenever hazardous waste is being handled at the facility.

40 CFR 264.35

Aisle space must be sufficient to allow unobstructed movement of personnel, fir and spill control, and decontamination equipment.

40 CFR 264.37

Operators must attempt to make arrangements, appropriate to the waste handled, for emergency response by local and state fire, police and medical personnel.

Strategy for Compliance

Hazardous waste removed under this removal action must be treated, stored (if more than 90 days), and disposed of in accordance with TSD facility standards and the proposed amended consent decree with the state of Ohio.

Action: Treatment, Storage, or Disposal Facility Contingency Plan and Emergency Procedures

Requirement: 40 CFR 264, Subpart D ARAR/TCB: Applicable

Each facility operator must have a contingency plan designed to minimize hazards to human health or the environment due to fires, explosions, or any unplanned releases of hazardous waste constituents to the air, soil, or surface/ground water.

40 CFR 264.52

Contingency plans should address procedures to implement a response to hazardous substance incidents, internal and external communications, arrangements with local emergency authorities, an emergency coordinator list a facility emergency equipment list indicating equipment descriptions and locations and a facility personnel evacuation plan.

40 CFR 264.55

Each facility must have an emergency coordinator who has responsibility for coordinating all emergency response measures, is on the premises or on call at all times, is thoroughly familiar with all aspects of the contingency plan, facility operations, location and characteristics of waste handled, location of pertinent records, and facility layout, and who has the authority to commit the resources necessary to implement the contingency plan.

Strategy for Compliance

Hazardous waste removed under this removal action will be stored (if more than 90 days), and disposed of in accordance with TSD facility standards at a HWMU as designated on the latest Part A Permit Application submittal and the proposed amended consent decree with the state of Ohio

Action: Treatment (in a Unit)

Requirement: 40 CFR, Subpart L (Waste Piles) ARAR/TBC: Applicable

Design and operating standards for waste piles used to store hazardous waste.

Strategy for Compliance

Design and operating standards for waste piles is applicable for alternatives utilizing storage in a waste pile prior to treatment or disposal.

Table 2 - Chemical Specific ARARs

Chemical: Ohio Water Quality Standards

Requirement: OAC 3745-1-07 (C) - Use Designations and Criteria ARAR/TBC: Applicable

All pollutants or combinations of pollutants shall not exceed (outside the mixing zone as defined in this rule) the established numerical acute aquatic criteria (AAC) or chronic aquatic criteria (CAC) for a particular parameter listed in tables 7-1 through 7-15 of this rule (numerical and narrative criteria for aquatic life habitat and water supply use designations.)

TABLE 2 CONTINUED

Strategy for Compliance

Paddy's Run and the Great Miami River are designated as warm water aquatic life habitats. Implementation of this removal action will direct surface runoff to the Storm Water Retention Basin (SWRB) for discharge under the NPDES Permit.

Chemical: Radiation Dose Limit (All Pathways)

Requirement: DOE Order 5400.5, Chapter II, Section 1.a — ARAR/TBC: To Be Considered

The exposure of members of the public to radiation sources as a consequence of all routine DOE activities shall not cause, in a year, an effective dose equivalent greater than 100 mrem from all exposure pathways.

Strategy for Compliance

Radiation sources at this DOE facility could contribute to the total dose to members of the public. Dampening the working face and covering the soil pile will eliminate the dosages received from the public, covers on soil piles will eliminate this concern.

This removal action will eliminate the potential for runoff from the production area to flow into Paddy's Run, thus eliminating a contribution to the groundwater pathway.

Chemical: Radiation Doses, Levels, and Concentrations in Restricted and Unrestricted Areas

Requirement: 10 CFR 20.101 - 105, OAC 3701-38 — ARAR/TBC: Relevant and Appropriate

Radiation doses, levels, and concentrations for restricted and unrestricted areas shall not exceed specified limits.

Strategy for Compliance

Radioactive materials can contribute radiation doses, levels, and concentrations to individuals in restricted and unrestricted areas, which could exceed the specified limits. The Health & Safety Plan takes appropriate action to minimize exposure by individuals at the work site.

Chemical: Radionuclide Emissions (Except Airborne Radon-222)

Requirement: 40 CFR 61, Subpart II — ARAR/TBC: Applicable

TABLE 2 CONTINUED

Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem per year.

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Strategy for Compliance

Radioactive materials could be generated during implementation of this removal action which could contribute to the dose to members of the public from the air pathway. Dampening of the working face and providing covers on open soil piles will eliminate emissions of radionuclides.

2.0 BACKGROUND

2.1 Summary of Potential Threat

The majority of the stormwater runoff from the 136 acre fenced production area is collected in the existing storm sewer and discharged into the Storm Water Retention Basin for appropriate handling (see Figure 1). However, several perimeter subdrainage areas, collectively about eight acres, of the production area currently do not drain to the existing storm sewer system, but flow naturally away from the production area. This uncontrolled stormwater runoff contains various concentrations of dissolved uranium and other contaminants.

The uncontrolled stormwater runoff from the production area flows to Paddy's Run by means of various drainage ditches and culverts. Upon entering Paddy's Run the potential exists for these contaminants to migrate to the Great Miami Aquifer via infiltration. This aquifer is within the buried valley aquifer of the Great Miami River Basin, which has been designated a Sole-Source Aquifer by the U. S. EPA under Section 1424(e) of the Safe Drinking Water Act. Under this designation, the Regional Administrator of Region V of the U. S. EPA has determined that this aquifer is the sole or principal source of drinking water for this area. Contamination of Paddy's Run and/or the underlying aquifer may pose potential exposure risks to public health and the environment. A removal action entitled "South Groundwater Contamination Plume", which addresses contamination in the aquifer, is currently being prepared.

Exposure to the contaminants in the stormwater runoff can occur as a result of the release of these contaminants to Paddy's Run. The contaminants may then be discharged from Paddy's Run to the Great Miami River or the underlying sand and gravel aquifer. Paddy's Run is not used as a drinking water supply. Ingestion of sediment from the stream is considered a potential exposure pathway for children. Ingestion of groundwater from the aquifer underlying Paddy's Run is an additional potential exposure pathway. Other exposure pathways associated with the groundwater include ingestion of crops irrigated by the water, ingestion of beef from cattle exposed to uranium through water and crops and ingestion of milk from cows exposed to uranium through water and crops.

In July 1989, soil samples were collected at 38 sample point locations within the FEMP production area. At each sample point location, soil samples were extracted from the surface and at an approximate total depth of one foot below surface grade. Surface samples were analyzed for Thorium, Thorium-228, and Uranium-228, and Uranium activities, Uranium isotopes, and EP Tox Metals. Soil samples collected at the one-foot depth interval were analyzed for Total Uranium and Total Thorium concentrations. Based on these data, process knowledge, and reviews of site history and spill records, the soils in these areas were determined to be non-RCRA (WMCO:EC(SW):90-227, "RCRA DETERMINATION AND RADIOLOGICAL CHARACTERIZATION OF RUBBLE FROM STORM SEWER IMPROVEMENT PROJECT," June 7, 1990). This report is included in Attachment 3.

2.2 Removal Action

Currently, the storm sewer system from the production area flows by gravity to Manhole (MH) 34. A 14 inch dam in the 60 inch diameter storm sewer downstream of MH 34 diverts normal sewer flow into the wetwell of the Storm Sewer Lift Station (SSLS).

The SSLS pumps the normal dry weather flow in the storm sewer system to the Great Miami River via MH 175. A composite sample is taken of the SSLS discharge to MH 175. In addition, instrumentation provides for direct monitoring of pH, total suspended solids (TSS), and oil and grease. Alarms from the instruments are transmitted to the Water Plant where unusual events at MH 34 can be monitored and actions taken to divert the discharge to the General Sump for treatment. A permit to install has been issued to modify MH 34 which allow all storm sewer water to flow to the Storm Water Retention Basin instead of pumping it to the Great Miami River. In the event of a spill, the MH 34 will still have the ability to be diverted to the General Sump.

During periods of heavy precipitation, the flow collected in the storm sewer system will overflow the 14 inch high dam in the 60 inch storm sewer and flow to the Storm Water Retention Basin. The overflow is directed by sluice gates into one of the two chambers of the SWRB. Under normal conditions, the collected water is allowed to settle in a quiescent condition for 24 hours and then discharged via pumping to the Great Miami River. The SWRB is designed to retain a 10-year/24-hour rainfall event (approximately 10.2 million gallons). This volume includes the flow which will result from the subject project.

In the event of a release, the discharge from the SWRB can be diverted to the General Sump or to the Biodenitrification Surge Lagoon for further treatment, if necessary, by aligning the valving and activating the SWRB pumps.

The DOE is installing a 300 gallons per minute (gpm) trailer mounted interim wastewater treatment system which will treat SWRB/SSLS effluent prior to being discharged to the Great Miami River. This interim trailer mounted treatment unit will remain in operation until the Advanced Wastewater Treatment (AWWT) system comes on-line. The AWWT system will provide permanent treatment for a SWRB/SSLS combined flow of 700 gpm (e.g. the SSLS normal flow to the Great Miami River will be discontinued).

The plan for controlling the stormwater runoff is to collect the stormwater within the production area that currently discharges outside the production area limits and redirect this runoff to the existing storm sewer system (see Figure 1). Methods for redirecting these flows shall include intercepting the runoff with trench drains and curbs ~~and the addition of pipe and catch basin components~~. (Further details are included in Section 4.1, Field Actions).

2.3 Related Actions

The underlying groundwater has been determined to be contaminated with inorganic and organic chemical compounds. To date the following actions have been taken to mitigate this problem:

A Storm Water Retention Basin (SWRB) was constructed and placed into operation in October 1986 to retain contaminated stormwater runoff from the FEMP production area. This runoff had previously flowed to Paddy's Run via the storm sewer outfall ditch. Construction of an additional chamber to the SWRB was completed in December of 1988. The expanded SWRB is designed to retain the runoff from a 10-year/24-hour rainfall event and therefore greatly reduces the volume of contaminated stormwater from the FEMP production area discharged to Paddy's Run. This flow is believed to have been the major source of uranium contamination to the South Groundwater Contamination Plume.

In 1988 a project was completed to control the stormwater runoff from the Plant 1 storage pad area (PA 40-86602-Surface Water Control of Plant 1 Storage Pad). Prior to the completion of this project, stormwater runoff from several portions of the Plant 1 Storage Pad and adjacent areas flowed to Paddy's Run via drainage ditches. The implementation of this project redirected the stormwater flows from these areas of the Plant 1 Storage Pad to the site storm sewer system. This was accomplished via a combination of actions. A portion of the storage pad was modified to include a curb around the periphery to keep stormwater confined to the existing pad drainage system. The existing drainage line from this pad area was redirected from its previous termination point to the Storm Sewer System. Northern perimeter sections of the storage pad that previously flowed outward over grassy areas to the west and north through drainage ditches to Paddy's Run were redirected to the Storm Sewer System. This was accomplished by plugging the culvert that led away from the area and reversing the drainage ditch flow. A new storm sewer inlet was then added to the existing storm sewer system to intercept this flow.

In the past, the DOE disposed of wastes in a series of pits located west of the production area. Most of the surface area stormwater runoff from the pits is collected in a clearwell and treated prior to being pumped to the Great Miami River. A removal action entitled "Waste Pit Area Stormwater Runoff Control" is currently underway to address the contaminated runoff which flows from the Waste Pit perimeter areas to Paddy's Run.

Another project, Storm Sewer Improvements - Plantwide, is a two fold project that addresses stormwater runoff from the production area as defined by the inner security fence line. One aspect of this project will expand the existing storm sewer system so that runoff from all portions of the production area are collected and channeled to the Storm Water Retention Basin. A second portion of this project will provide for the rehabilitation and/or repair several sections of the existing storm sewer system. The portion of this project which involves the expansion of the existing system is being completed as CERCLA Removal Action Number 16, Collect Uncontrolled Production Area Stormwater Runoff, and is the subject of this Removal Action Work Plan.

The objective of this removal action is to protect human health and the environment by collecting the uncontrolled contaminated production area stormwater runoff which currently flows directly to Paddy's Run. This would eliminate the possibility of the migration of uranium-contaminated runoff to the groundwater via infiltration along the stream bed.

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2.4 Integration with the Final Remedial Action

The Collect Uncontrolled Production Area Stormwater Runoff Removal Action is consistent with all final remedial action alternatives for Operable Units 3 and 5. The final remedial action alternatives that are being considered ~~most likely include the following: Soil Removal, Treatment, and On-Site Disposal and Groundwater Extraction and Treatment~~ are those listed in the draft copy of the RI/FS Site - Wide Characterization Report, Part III: Feasibility Study Support.

The final remedial activities will require some degree of stormwater runoff/sediment control and will benefit from the implementation of this removal action.

The Collect Uncontrolled Production Area Stormwater Runoff Removal Action will be implemented in advance of any of the alternatives for final remediation of Operable Unit 5. Therefore, no scheduling conflicts are anticipated. Also, it is not expected that there will be any scheduling conflicts with current or proposed activities within Operable Unit 3.

2.5 Roles of the Participants

The DOE, as the lead agency, will coordinate and execute this removal action. The U.S. EPA and the Ohio Environmental Protection Agency (Ohio EPA) roles have been one of providing guidance and participation in the preparation of the CERCLA 120 Consent Agreement and technical information exchanges.

The U.S. EPA has approval authority for this Work Plan.

The Ohio EPA will provide guidance and participate in the development and review of the Work Plan.

Advanced Sciences, Inc. (ASI), as a contractor to DOE, is conducting the RI/FS program and through their subcontractor, International Technology (IT) Corporation, providing analytical services.

RUST Engineering, as a contractor to WEMCO, will provide construction management for the Removal Action.

Westinghouse Environmental Management Company of Ohio (WEMCO), as the FEMP Management and Operating Contractor, is responsible for implementing this Removal Action in a manner consistent with this U.S. EPA approved work plan and DOE and regulatory guidance. Associated WEMCO departments will oversee and direct quality assurance procedures, safety and health procedures, and necessary compliance issues.

A. M. Kinney, Inc., as the design consultant, is responsible for the preparation of the design plans and specifications.

The contractor for construction and installation will be determined through the DOE bid and award process.

3.0 SUPPORT ACTIVITIES

3.1 Project Planning Activities

Activities that will be undertaken prior to the actual site work are planning, training, design, and management of the removal actions preparatory efforts. These activities are required to render the area reasonably free of hazards to personnel and/or the environment.

The following distinct engineering phases will be performed by WEMCO to provide the necessary definition for development of accurate scope, cost, and schedule documents:

a. Project Planning

Included in this activity will be the preparation of detailed task listings and delineation of responsibilities. Specific items will be made available to the U.S. EPA upon completion of the engineering phases of the scope of work. These items will include a cost estimate and detailed schedule indicating project planning activities.

b. Design of Removal Action

Definitive design documents will be prepared for the removal action construction work.

c. Training of Personnel

WEMCO will provide training for all personnel involved in accordance with the Occupational Safety and Health Administration (OSHA) standards found in 29 CFR 1910.120.

d. Bid and Award/Construction Management

All bid and award documents will be prepared for the removal action construction work along with the procurement of all equipment, materials and subcontractors necessary to complete the removal action construction work.

3.2 Training Requirements

All personnel directly involved with the planning and implementation of this removal action will be trained in accordance with the Occupational Safety and Health Administration standards found in 29 CFR 1910.120, the standard operating procedures for the work involved, and with the requirements of the approved work plan. In addition, all personnel will successfully complete the required safety training

sessions set forth by WEMCO including, but not limited to radiation worker training, nuclear criticality training, respirator training with fit testing, and FEMP procedures developed and approved to implement this removal action.

4.0 FIELD ACTIONS

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4.1 General

Construction of this project will include concrete drainage trenches, curbs, and utilization or modification of existing topographic features to collect the production area perimeter stormwater runoff. Stormwater collected will be redirected to the storm sewer system. The attached drawings are from the preliminary design package illustrating the field actions involved in this removal action. It should be noted that the current design package is not complete and may require modification. The design of this project, to date, has been completed by A. M. Kinney, Inc. with oversight by WEMCO.

Wetlands on the FEMP site have been delineated as part of the RI/FS. This project will not impact any wetlands as currently delineated.

The implementation of this system will consist of separate types of construction activities. These activities and a brief explanation of each are detailed below and are similarly discussed in the Health and Safety Plan:

Installation of Drainage Trenches and Curbs

This ~~portion of the~~ removal action will involve trenching and excavation activities that will facilitate the installation of storm sewer sections, drainage trenches, and curbs.

Excavation activities involve the removal of enough soil to physically install a cast-in-place concrete trench drain with a steel grate.

Trench drains will be installed in certain areas to intercept stormwater runoff before it leaves the FEMP production area. Storm sewer sections will be installed to connect the new trench drains to the existing storm sewer system. In other areas, curbing will be placed in other areas to redirect the runoff to the existing storm sewer system. (See figures C-2, C-3, C-4, and C-5). These field actions are necessary to accomplish the objective of this removal action.

Operations and Maintenance

After construction is complete and after WEMCO completes the start-up testing period, the system will be operated and maintained by WEMCO Site Services. WEMCO Site Services will be responsible for the operation and maintenance of the system. Existing WEMCO utilities operators will control this system. The Utility Engineers will be assigned as the supervisor responsible for this system and will be

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available on site at all times. As the project will be an expansion to the existing system, existing Site Standard Operating Procedures (SOPs) will cover the operation of the system. No new SOPs are envisioned.

4.2 Soil Management

Soil excavated for the installation of trench drains, curbs, storm sewer lines and concrete structures shall be utilized as backfill to the maximum extent possible as specified in the Removal Action Pre-excavation Soil Sampling and Analysis Plan (Attachment 1). Excess material will be handled ~~according to the Removal Act Disposition of Excess Soil (Attachment 2)~~ in accordance with Removal Action No. 17 Work Plan.

5.0 SOIL SAMPLING AND ANALYSIS PLAN

The stormwater runoff from portions of the production area have been determined to have elevated concentrations of uranium, warranting this removal action. In addition, sampling and analysis of the soils in areas that will be involved in construction activities has been performed.

Pre-excavation soil sampling and analysis will be performed to support the implementation of this removal action. A copy of the specific sampling and analysis plan is presented as Attachment 1.

6.0 HEALTH AND SAFETY PLAN

The work to be performed will be consistent with the Health and Safety Plan prepared for this removal action. The plan identifies, evaluates, and controls all identified safety and health hazards. In addition, it provides for emergency response for hazardous operations. The plan is consistent with 29 CFR 1910.120 and the FEMP Site Health and Safety Plan. Safety documentation will be prepared according to FMPC-2116 Topical Manual, "Implementing FMPC Policies and Procedures for System Safety Analysis." FMPC-2116 has been prepared to implement DOE Order 5481.1B "Safety Analysis and Review System" and DOE/OR-901 "Guidance for Preparation of Safety Analysis Reports."

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The specific Health and Safety Plan for this removal action will be available to government agencies and subcontractors upon written request to DOE-FO.

7.0 QUALITY ASSURANCE

The overall quality assurance program at the FEMP is described in the site Quality Assurance Program Plan (QAPP), PL-3014. The Quality Assurance Plan is based on the criteria specified in ASME NQA-1, Federal EPA Guideline QAMS-005/80 and DOE Orders 5700.6 and 5400.1. Detailed requirements are implemented by the WEMCO Site Policies and Procedures Manual, FMPC-2054, by WEMCO Departmental Procedures and Topical Manuals. Sample and analysis activities will be conducted consistent with the RI/FS QAPP. The U. S. EPA is in the process of reviewing a draft Sitewide Quality Assurance Project Plan (QAPjP) covering all sitewide sampling and analysis activities. Upon approval, remaining sampling and analysis activities will be conducted consistent with the Sitewide QAPjP. A project specific Quality Assurance Plan will be provided by the Subcontractor prior to initiating field activities.

8.0 SCHEDULED MILESTONE

Completion of this Removal Action as defined by the installation of curbing and trench drains around the perimeter of the production area and containment of all identified contaminated soils resulting from the excavation and construction activities will be on or before ~~December 31, 1993~~ August 30, 1993. Additional interim non-enforceable milestones used for project progress tracking are also provided in the following chart.

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Milestone	Proposed Start Date	Proposed Finish Date
Design	May 1990	May 1992
Bid & Award	May 1992	August 1992
Pre Excavation Sampling	July 1992	July 1992
Construction Activities	August 1992	August 1993
Final Report	August 1993	June 1994

The FEMP has scheduled a two month period for agency review of this Removal Action Work Plan. The scheduled dates are based on agency approval within this time frame.

REFERENCE LIST

The following documents have been used as a reference in the body and/or the attachments of this work plan:

1991 Amended Consent Agreement, U. S. Environmental Protection Agency Region V In the Matter of U. S. Department of Energy Feed Materials Production Center

Removal Site Evaluation, Collect Uncontrolled Production Area Runoff, Fernald Site Office, U. S. Department of Energy, January 1992.

National Contingency Plan

OSWER Directive 9360.0-03B, Superfund Removal Procedures, Rev. 3

Safe Drinking Water Act

WMCO:EC(SW):90-227, RCRA Determination and Radiological Characterization of Rubble From Storm Sewer Improvement Project, June 7, 1990.

29 CFR 1910.120

FEMP Site Health and Safety Plan

FMPC-2116 Topical Manual, Implementing FMPC Policies and Procedures for System Safety Analysis

FEMP Quality Assurance Program Plan (QAPP), PL-3014

FEMP - "Improved Storage of Soils and Debris" Removal Action #17 Work Plan

ASME NQA-1

QAMS-005/80

DOE Order No. 5700.6

DOE Order No. 5400.1

WEMCO Site Procedures Manual FMPC-2054

EPA Document No. 230/02-89-042, Methods for Evaluating Attainment of Cleanup Standards, Volume 1, Soils and Solid Media

Sitewide CERCLA Quality Assurance Project Plan (QAPjP)

ATTACHMENT 1

PRE-EXCAVATION SOIL SAMPLING AND ANALYSIS PLAN

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PRE-EXCAVATION SOIL SAMPLING AND ANALYSIS PLAN

FEMP COLLECT UNCONTROLLED PRODUCTION AREA STORMWATER RUNOFF PROJECT

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1.0 Introduction

As part of the Storm Sewer Improvements - Plantwide Project (WBS 1.1.2.4.0.3), uncontrolled runoff from the Fernald Environmental Management Project (FEMP) production area will be redirected to the existing storm sewer collection system. Currently, a majority of the fenced production area runoff is collected by the existing storm sewer system and transported by means of catch basins, manholes, drain inlets, and a pipe network to a single 60 inch diameter pipe, which discharges to the Storm Water Retention Basin (SWRB). Several subdrainage areas at the perimeter of the fenced production area exhibit uncontrolled stormwater flows. Methods for redirecting uncontrolled flows include intercepting the flow with trench drains and curbs, and the addition of pipe and catch basin components.

In July 1989, soil samples were collected at 38 sample point locations within the FEMP production area. At each sample point location, soil samples were extracted from the surface and at an approximate total depth of one foot below surface grade. Surface samples were analyzed for Thorium, Thorium-228, and Uranium-228, and Uranium activities, Uranium isotopes, and EP Tox Metals. Soil samples collected at the one-foot depth interval were analyzed for Total Uranium and Total Thorium concentrations. Based on these data, process knowledge, and reviews of site history and spill records, the soils in these areas were determined to be non-RCRA (WMCO:EC(SW):90-227, "RCRA DETERMINATION AND RADIOLOGICAL CHARACTERIZATION OF RUBBLE FROM STORM SEWER IMPROVEMENT PROJECT," June 7, 1990).

2.0 Purpose of Pre-Excavation Sampling

Pre-excavation soil sampling and characterization is required to: 1) identify areas where personnel may be exposed to hazardous substances during construction activities, so that appropriate health and safety measures can be taken to protect the workers; 2) provide data that may be used for RCRA characterization of wastes generated during soil excavation activities; 3) provide data complimentary to the RI/FS database for the FEMP. Soil sampling locations are shown in Figures C-8, C-9, and C-10.

PRE-EXCAVATION SOIL SAMPLING AND ANALYSIS PLAN (Cont.)

3.0 Identification of Contaminants

Based on the July 1989 soil analytical data, the following radiological characterizations were made:

- Soils in the northwest quadrant of the FEMP production area are generally Category I*, with the exception of surface soil samples collected at sample point locations SSI-30 and SSI-26, which were determined to be Category II*.

- Soils in the southwest quadrant of the FEMP production area are generally Category I*, with the exception of surface soil samples collected at sample point location SSI-21 and SSI-22, which were determined to be Category II*.

- Soils in the northeast quadrant of he FEMP production area were determined to be Category II* (SSI-1, SSI-3, SSI-5, and SSI-6) and Low Level Wastes (SSI-2, SSI-7, and SSI-10).

- Soils in the southeast quadrant of the FEMP production area are generally Category II* wastes.

*Note: Category I soils are those that exhibit an average concentration of depleted uranium of < 35 pCi/g or natural thorium of < 10 pCi/g, and determined not to be RCRA hazardous waste.

Category II soils are those that exhibit average concentrations of depleted uranium of < 100 pCi/g or natural thorium of < 50 pCi/g,and determined not to be RCRA hazardous waste.

Low Level Waste soils are those that exhibit an average concentration of depleted uranium of > 100 pCi/g or natural thorium of > 50 pCi/g, and determined not to be RCRA hazardous waste.

Based on process knowledge, EP Tox Metals data, and reviews of site history and spill records, the soils were determined to be non-RCRA. EP Tox Metals data were found to be below regulatory limits for all sample point locations. However, since the EP Tox analytical methods have been replaced by the Toxicity Characteristics Leachate Procedure (TCLP), additional soil samples should be collected and analyzed by TCLP methods to confirm or negate the previous RCRA determinations.

4.0 Sample Field Site

A total of 42 discrete sample point locations are proposed for this project. Sample point locations SP-1 through SP-14 are located within the proposed trench drain excavation area parallel to the northern fenced boundary of the FEMP production area. Sampling point location SP-15 through SP-26 are located within the proposed trench drain excavation area

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parallel to the western boundary of the FEMP production area adjacent to Building 67. Sample point location SP-27 through SP-38 are located within the proposed trench drain area parallel to the eastern boundary of the FEMP production area adjacent to Buildings 77, 79, and 82. Lastly, sample point locations SP-39 through SP-42 are located ~~within the proposed trench drain excavation~~ in the area of the proposed curbing parallel to the fenceline between the RUST Trailer Complex and Buildings 46 and 316A.

The sample point locations, illustrated by Figures C-8, C-9, and C-10 and listed in Table 1, were derived using guidelines provided in EPA Document No. 230/02-89-042, "Methods for Evaluating Attainment of Cleanup Standards, Volume 1, Soils and Solid Media." The number of sample points per sample are calculated using the test of percentile methods (normallized data) contained in Chapter 2 of the EPA document. Values corresponding to an alpha rate of 20%, a beta rate of 20%, and a PI of 10% were entered into the computer algorithm to determine the number of sample points. Subsequent to calculating the number of sample points required, the computer algorithm generated the location and spacing of sample points using random selection methods contained in Chapter 5 of the EPA document. Sample point locations for Hazardous Substance List (HSL) analysis were selected based on their geographical proximity to and topographical relationship with known or suspected Hazardous Waste Management Units/Solid Waste Management Units (HWMU/SWMU). Table 2 shows the sampling analytical parameters.

5.0 Sample Collection And Analysis

Soil samples, at each sample point location, will be collected using a stainless steel hand auger or coring device (with Lexan core inserts) at one foot interval from the ground surface to an approximate total depth of three feet below surface grade or the total depth of the storm sewer trench drain excavation, whichever is greater. A portion of each soil sample will be retained in clean glass jars sealed with aluminum foil lids for field screening of volatile organic compounds using a photoionization detector (PID). This will be accomplished by placing the soil material in the jar at a capacity of approximately one-half of the bottle volume. A piece of aluminum foil is placed over the mouth of the bottle. The bottle lid is gently emplaced over the aluminum foil to ensure that the aluminum foil is not punctured. The soil samples will be retained between 60-80 degrees Fahrenheit for a period of 15 minutes for volatilization of the organic compounds prior to PID measurement. Subsequent to equilibrium of the volatile compounds in the bottle headspace, the bottle lid is removed and the probe of the PID device is inserted through the aluminum sheet to evacuate the headspace contents. This procedure will remain consistent for all samples. ~~stored at room temperature for a period of at least 15 minutes to allow for volatilization of the organic compounds prior to PID measurement.~~

The sample exhibiting the greatest PID reading at each sample point location will be retained in glass jars sealed with Teflon-lined Closures (TLC) and will be analyzed for TCLP - Full List analyses. The soil sample

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exhibiting the greatest PID reading at sample point locations SP-3, SP-6, SP-10, SP-11, SP-15, SP-23, SP-27, SP-29, SP-30, SP-38, and SP-42 will also be retained in glass jars sealed with TLC for Hazardous Substance List (HSL) - Plan analyses. If PID readings are equivalent for each soil sample within a given sample point location, then a soil sample will be collected at the randomized depth indicated in Table 1 and retained for TCLP - Full List and/or HSL - Plus analyses.

Each soil sample will also be field screened for radiological contaminants using a portable radiation detection device. The soil sample exhibiting the greatest radiation detection reading at each sample point location will be retained in glass or plastic jars for total uranium and thorium analysis. If radiation detection readings are equivalent for each soil sample within a given sample point location, then a soil sample will be collected at the randomized depth indicated in Table 1 and retained for the previously mentioned radiological analyses.

For Quality Assurance/Quality Control (QA/QC) purposes, trip, field and rinseate blanks will be collected on a daily basis. The QA/QC samples will be analyzed for ~~TCLP - Full List and/or HSL - Plus and radiological constituents.~~ volatile organic compounds and radiological constituents.

The work to be performed and outlined in the pre-excavation sampling and analysis plan will be accomplished in accordance with the Health and Safety Plan for the Storm Sewer Improvements Project and ~~the FEMP laboratory Analytical Methods Manual (FLAMM)~~ Appendix L of the QAP.P.

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PRE-EXCAVATION SOIL SAMPLING AND ANALYSIS PLAN (Cont.)

TABLE 1
Sample Point Locations for Pre-Excavation Sampling and Analysis Plan
Collect Uncontrolled Production Area Stormwater Runoff Project

Phase I Sample Point	Area	Distance From Origin	Rand. Depth	Sample Point Description
1	North	303'	2.6'	----------
2	North	323'	0.2'	----------
3	North	393'	1.6'	Northwest of Bldg. 24A.
4	North	728'	2.8'	North of Bldg. 60
5	North	909'	3.0'	----------
6	North	953'	2.4'	----------
7	North	1067'	2.3'	South of Fire Training Facility.
8	North	1229'	0.3'	North of Bldg. 63
9	North	1288'	2.2'	North of Bldg. 63
10	North	1671'	1.0	Northeast of Decontamination Pad
11	North	1829'	0.2'	----------
12	North	2342'	1.7'	----------
13	North	2381'	1.6'	----------
14	North	2433'	2.9'	----------
15	West	21'	2.3'	Northwest of Bldg. 20E
16	West	87'	1.4'	----------
17	West	120'	2.9'	----------
18	West	171'	0.3'	West of Bldg. 67
19	West	182'	0.2'	West of Bldg. 67.
20	West	201'	1.7'	West of Bldg. 67
21	West	212'	2.2'	Northwest of Bldg. 67

Notes:

1. The origin for the North sample area is assumed to be the intersection of the fenceline indicating the north-northwestern boundary of the FEMP Process Area and the southernmost fork of the west-southwestern railroad line.

2. The origin for the West sample area is assumed to be the intersection of the fenceline indicating the western boundary of the FEMP Process Area and the East Gate (entrance) to the K-65 area.

3. Randomized sample depths were calculated using EPA guidance protocol. In reality, samples with randomized depths of 0.1 to 0.9 feet will be collected from the 0'-1' soil core materials, randomized depths of 1.1 to 1.9 feet will be collected from the 1'-2' soil core materials, and randomized depths of 2.1 to 2.9 feet will be collected from the 2'-3' soil core materials.

PRE-EXCAVATION SOIL SAMPLING AND ANALYSIS PLAN (Cont.)

TABLE 1 CONT.
Sample Point Locations for Pre-Excavation Sampling and Analysis Plan
Collect Uncontrolled Production Area Stormwater Runoff Project

Phase I Sample Point	Area	Distance From Origin	Rand. Depth	Sample Point Description
22	West	215'	3.0'	Northwest of Bldg. 67
23	West	245'	2.6'	Northwest of Bldg. 67
24	West	264'	1.6'	----------
25	West	276'	1.6'	----------
26	West	300'	0.2'	----------
27	East	66'	2.3'	Southeast of East Water Tower
28	East	278'	1.4'	East of Bldg. 79
29	East	386'	2.9	Northeast of Bldg. 79
30	East	546'	0.3'	East of Bldg. 77
31	East	582'	0.2'	East of Bldg. 77
32	East	642'	1.7'	----------
33	East	677'	2.2'	----------
34	East	686'	3.0'	----------
35	East	782'	2.6'	----------
36	East	845'	1.6'	----------
37	East	884'	1.6'	----------
38	East	959'	0.2'	----------
39	South	12'	2.6'	----------
40	South	51'	0.3'	----------
41	South	77'	0.2'	----------
42	South	101'	1.6'	----------

Notes:

1. The origin for the West sample area is assumed to be the intersection of the fenceline indicating the western boundary of the FEMP Process Area and the East Gate (entrance) to the K-65 area.

2. The origin for the East sample area is assumed to be the intersection of the fenceline indicating the eastern boundary of the FEMP Process Area and the northeast corner of the RIMIA Bldg. (Bldg. 82)

3. The origin for the South sample area is assumed to be the intersection of the fenceline (separating the RUST Trailer Complex and Buildings 46 and 16A) and a point parallel to the northeast corner of the access road between Buildings 46 and 16A.

4. Randomized sample depths were calculated using EPA guidance protocol. In reality, samples with randomized depths of 0.1 to 0.9 feet will be collected from the 0'-1' soil core materials, randomized depths of 1.1 to 1.9 feet will be collected from the 1'-2' soil core materials, and randomized depths of 2.1 to 2.9 feet will be collected from the 2'-3' soil core materials.

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PRE-EXCAVATION SOIL SAMPLING AND ANALYSIS PLAN (Cont.)

Table 2
Analytical Parameters for Collect Uncontrolled Production Area
Stormwater Runoff Removal Action Work Plan

Analysis Requested	Sample Matrix	# of Samples	Sample Type
TCLP Full List	Soil	42	Grab
TCLP Full List	Soil	4	Duplicate
TCLP Volatiles	Water	7*	Trip Blank
TCLP Volatiles	Water	7*	Field Blank
TCLP Full List	Water	7*	Rinseate Blank
HSL Plus	Soil	11	Grab
HSL Plus	Soil	1	Duplicate
HSL Volatiles	Water	2*	Trip Blank
HSL Volatiles	Water	2*	Field Blank
HSL Plus	Water	2*	Rinseate Blank
Total U/Th	Soil	42	Grab
Total U/Th	Soil	4	Duplicate
Total U/Th	Water	7*	Trip Blank
Total U/Th	Water	7*	Field Blank
Total U/Th	Water	7*	Rinseate
Alpha/Beta Screen	Soil	104	Grab & Duplicate
Alpha/Beta Screen	Water	48*	QA/QC Blanks

* Trip, field and rinseate blanks will be collected for each sampling interval (daily basis). It is estimated that sampling activities will require a total of 7 working days. The number of QA/QC samples and Alpha/Beta screen samples will be modified in agreement with the actual number of working days to complete the sampling activities.

ATTACHMENT 2

POST-EXCAVATION SOIL MANAGEMENT AND DISPOSITION PLAN

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POST-EXCAVATION SOIL MANAGEMENT AND DISPOSITION PLAN

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1.0 Post-Excavation Activities

1.1 Excavated Soil Management

All excavated soil materials and excess soil will be managed in accordance with the Removal Action No. 17 Work Plan. Excavated soil materials and excess soil materials will be stockpiled at a site located in close proximity to the trench drain excavation until a RCRA and/or radiological determination has been made. A total of ~~four (4)~~ five (5) unique soil stockpiles (as depicted in section 1.2) will be created. Excavated soils from a given trench drain excavation area (areas listed in Table 1) will not be combined with soils from another excavation area. Soil stockpile segregation will eliminate the need for post-excavation sampling.

In order to allow for drainage of runoff away from the soil stockpiles, area with the greatest relative elevation will be selected for soil stockpile sites.

A chain-link fence will be erected at the perimeter of each soil stockpile in accordance with FEMP waste management plans. Each soil stockpile will be managed by FEMP Operations personnel placing a heavy, nonpermeable tarpaulin on the ground in the area where the soil will be stockpiled. The perimeter of the tarpaulin will be fastened to the ground by stakes or other appropriate means. Soil will be piled radially from the center of the tarpaulin, with a maximum lateral extent to no less than 3 feet from the edge of the tarpaulin. Each soil stockpile will be completely covered using a heavy, nonpermeable tarpaulin. The tarpaulin cover will be weighted at its perimeter and intermittently over its surface area to avoid disturbance by wind. The tarpaulins (ground cover and soil pile cover) will be disposed of in accordance with the disposition or determination for each soil stockpile as indicated in Section 1.2.

1.2 Disposition of Soil Stockpiles

The disposal requirements for each soil stockpile will be evaluated separately. Stockpiled soil will be dispositioned as follows:

- Category I - A stockpile exhibiting average concentrations of depleted uranium of < 35 pCi/g or natural thorium of < 10 pCi/g, and determined not to be RCRA hazardous waste and non-radioactive shall be handled in accordance with Removal Action No. 17.

POST-EXCAVATION SOIL MANAGEMENT AND DISPOSITION PLAN (Cont.)

- Category II - A stockpile exhibiting an average concentration of depleted uranium of < 100 pCi/g or natural thorium of < 50 pCi/g, and determined not to be RCRA hazardous waste shall be managed in accordance with Removal Action #17 Work Plan.~~returned to an uncontrolled state and made available for unrestricted use within the FEMP Controlled Area. In order to prevent wind and runoff erosion, the entire stockpile will be covered with sod or other suitable ground cover vegetation.~~

- Low Level Waste - A stockpile exhibiting an average concentration of depleted uranium of > 100 pCi/g or natural thorium of > 50 pCi/g, and determined not to be RCRA hazardous waste shall be containerized and dispositioned as low-level radioactive waste in accordance with Removal Action #17 Work Plan.

- Mixed Hazardous Waste - A stockpile exhibiting average concentration of depleted uranium of > 100 pCi/g or natural thorium of > 50 pCi/g, and determined to be RCRA hazardous waste shall be containerized, stored and managed as mixed waste in accordance with Removal Action #17 Work Plan.

- RCRA Hazardous Waste - Soils that are classified as RCRA wastes and have depleted uranium concentrations of less than 100 pCi/g or thorium concentrations less than 50 pCi/g will be managed in accordance with Removal Action #17 Work Plan.

ATTACHMENT 3

REMOVAL SITE EVALUATION

3301

REMOVAL SITE EVALUATION

COLLECT UNCONTROLLED PRODUCTION AREA RUNOFF

Fernald Environmental Management Project
U.S. Department of Energy

January 1992

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Introduction

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The Fernald Environmental Management Project (FEMP) is a U.S. Government owned, Contractor Operated facility formerly known as the Feed Materials Production Center (FMPC). The FEMP site is located on 1050 acres in a rural area approximately 18 miles northwest of Cincinnati, Ohio (see Figure 1). The FEMP production area is limited to an approximate 136 acre tract near the center of the site (see Figures 1 and 2).

Since the former FMPC facility was established in the early 1950's, various chemical and metallurgical processes were used to manufacture uranium products from natural ore concentrates for use in government defense programs. A substantial quantity and variety of wastes have been generated.

Since 1985, wastes have been processed and stored in drums for either future disposal or reprocessing. Prior to 1985, solid wastes were transferred (by various means) for disposal in pits and silos in a waste storage area located west of the production area (see Figure 2). Production operations were suspended on July 10, 1989. In February 1991, DOE formally notified the U.S. Congress that the FEMP would be closed and that all production missions were terminated. The primary mission of the FEMP is now focussed upon the restoration of the FEMP site environment.

As part of an ongoing Remedial Investigation and Feasibility Study (RI/FS) of the FEMP, the DOE is investigating the effects of past and current FEMP operations upon the liquid exposure pathway by sampling the Great Miami River, Paddy's Run, and groundwater. Some contaminants in these bodies of water may have originated from the FEMP.

Uranium-contaminated runoff to Paddy's Run is believed to migrate to the groundwater via infiltration along the stream bed. While the majority of the uranium-contaminated stormwater originating at the FEMP is controlled by collection systems, and particulates are allowed to settle prior to being discharged to the Great Miami River, some contaminated stormwater is uncontrolled, and runs directly off the FEMP property to Paddy's Run.

There are two routes by which uncontrolled liquid discharge from the FEMP can enter Paddy's Run. The first of these is through overflow of the Stormwater Retention Basin (SWRB), where stormwater is normally collected for settling before discharge to the Great Miami River. In the event of a very large storm, or a series of smaller storms, the SWRB can fill to capacity. Overflow is then discharged to Paddy's Run via the SWRB outfall ditch. The SWRB outfall ditch is one of two National Pollutant Discharge Elimination System (NPDES) permitted discharge points at the FEMP. The permit specifies sample locations, sampling and reporting schedules, discharge limitations, water quality standards, and other restrictions on FEMP discharges to Paddy's Run and the Great Miami River.

A second route is via uncontrolled stormwater surface runoff directly to Paddy's Run. This uncontrolled runoff is produced from rain falling on areas outside the controlled waste pit and production areas shown as the shaded areas in Figures 2 and 3. Although there is no known direct use of the stormwater runoff by members of the nearby community, (e.g., for irrigation), the stormwater runoff to Paddy's Run is considered to be a contributor to the contamination of the underlying aquifer.

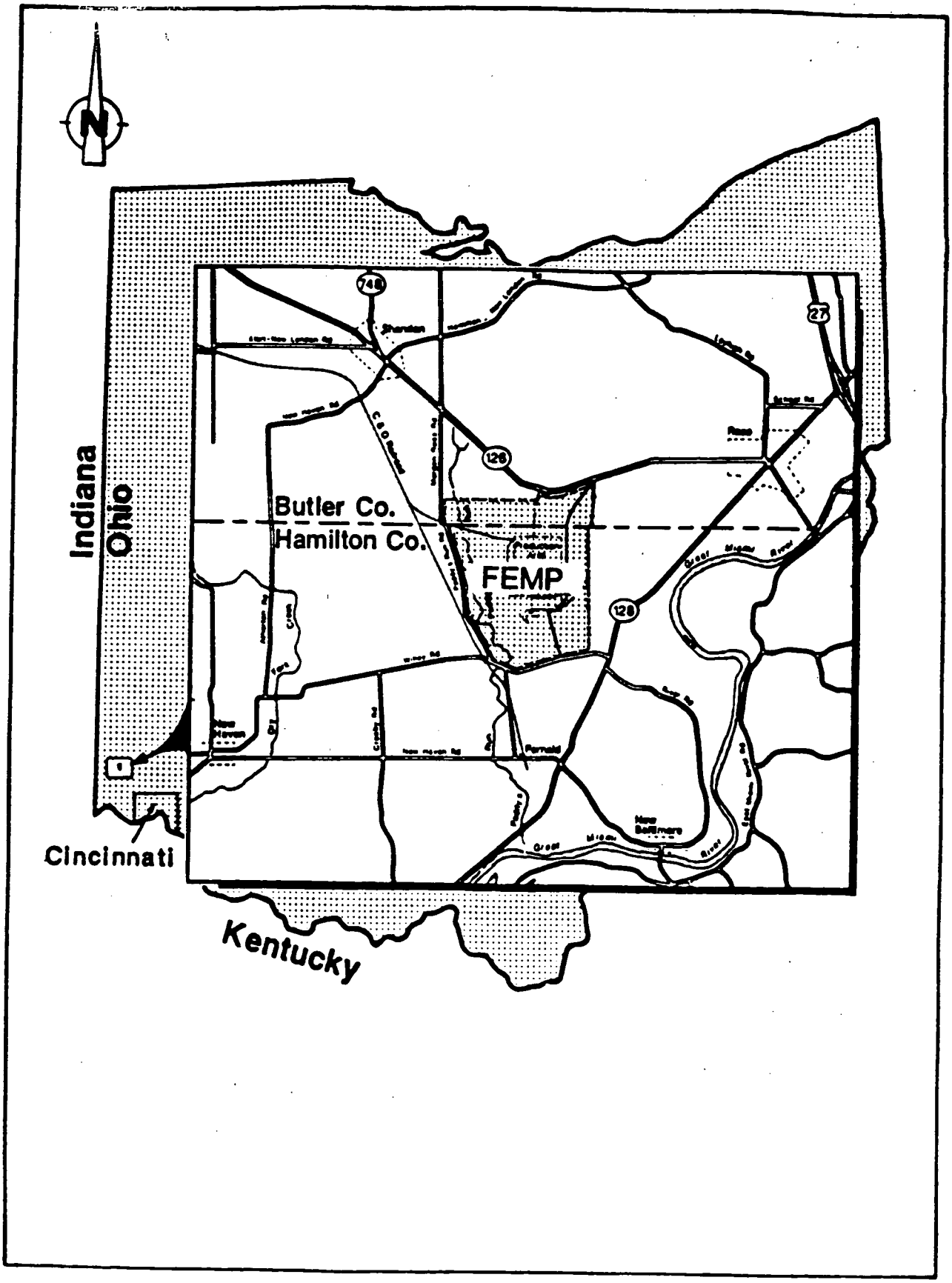
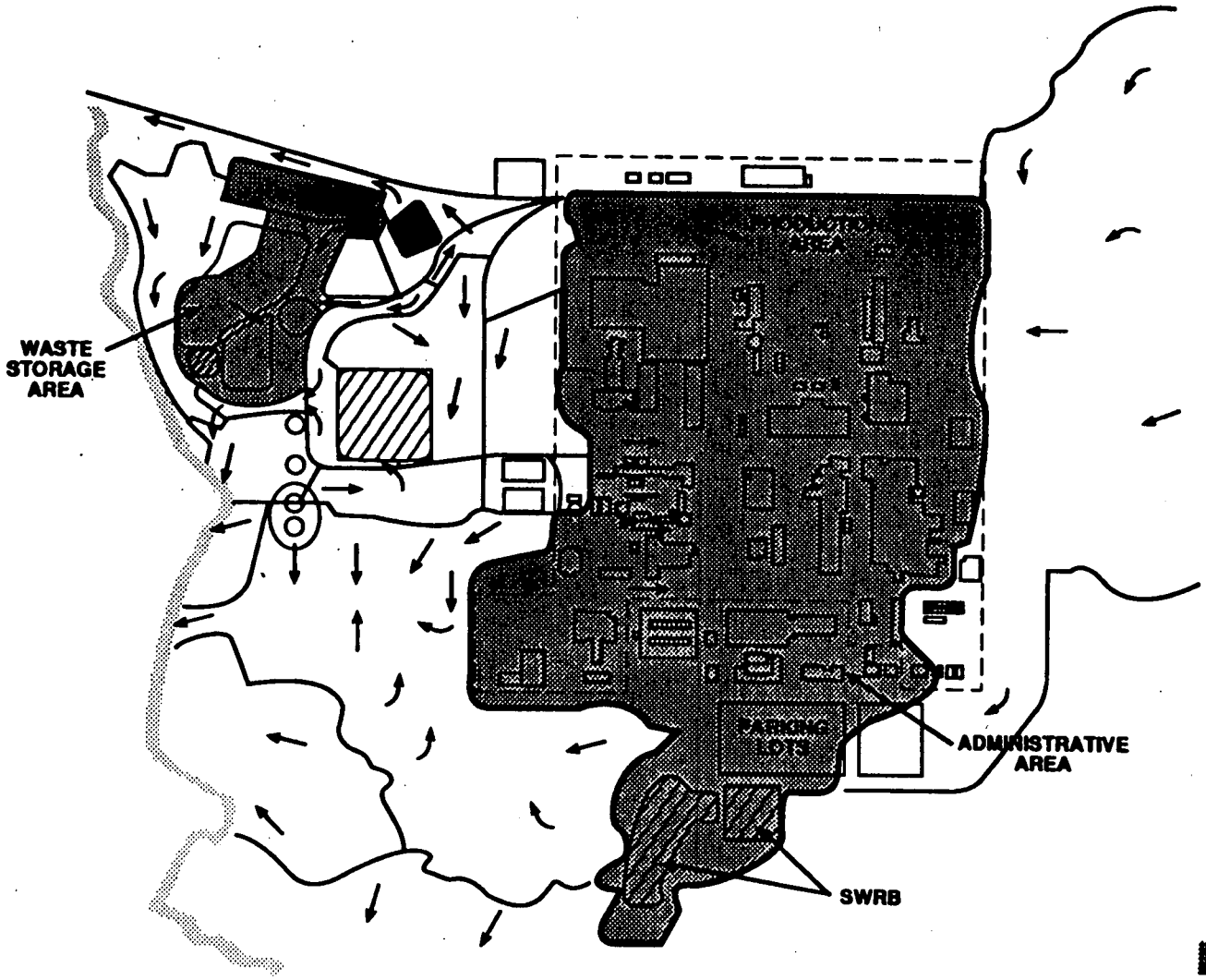


Figure 1 FEMP and Vicinity

EXISTING STORMWATER CONTROLS



Approximate Site Drainage Divides

Limit of Area Draining to Existing Stormwater Retention Basin (SWRB)

Limit of Production Area

Arrows Indicate General Stormwater Flow Within and Between Drainage Basins

Shaded Areas are Collected and Eventually Discharged to the Great Miami River

Defines Boundaries of Clearwell, Surge Lagoon and SWRB

FIGURE 2

STORM SEWER IMPROVEMENTS PROJECT

Approximate Site Drainage Divides

Limit of Area Draining to Existing Stormwater Retention Basin

Arrows Indicate General Stormwater Flow Within and Between Drainage Basins

Shaded Areas are Collected in the Stormwater Retention Basin and Eventually Discharged to the Great Miami River

Shaded Areas Represent Areas to be Collected by the Storm Sewers Improvements Project

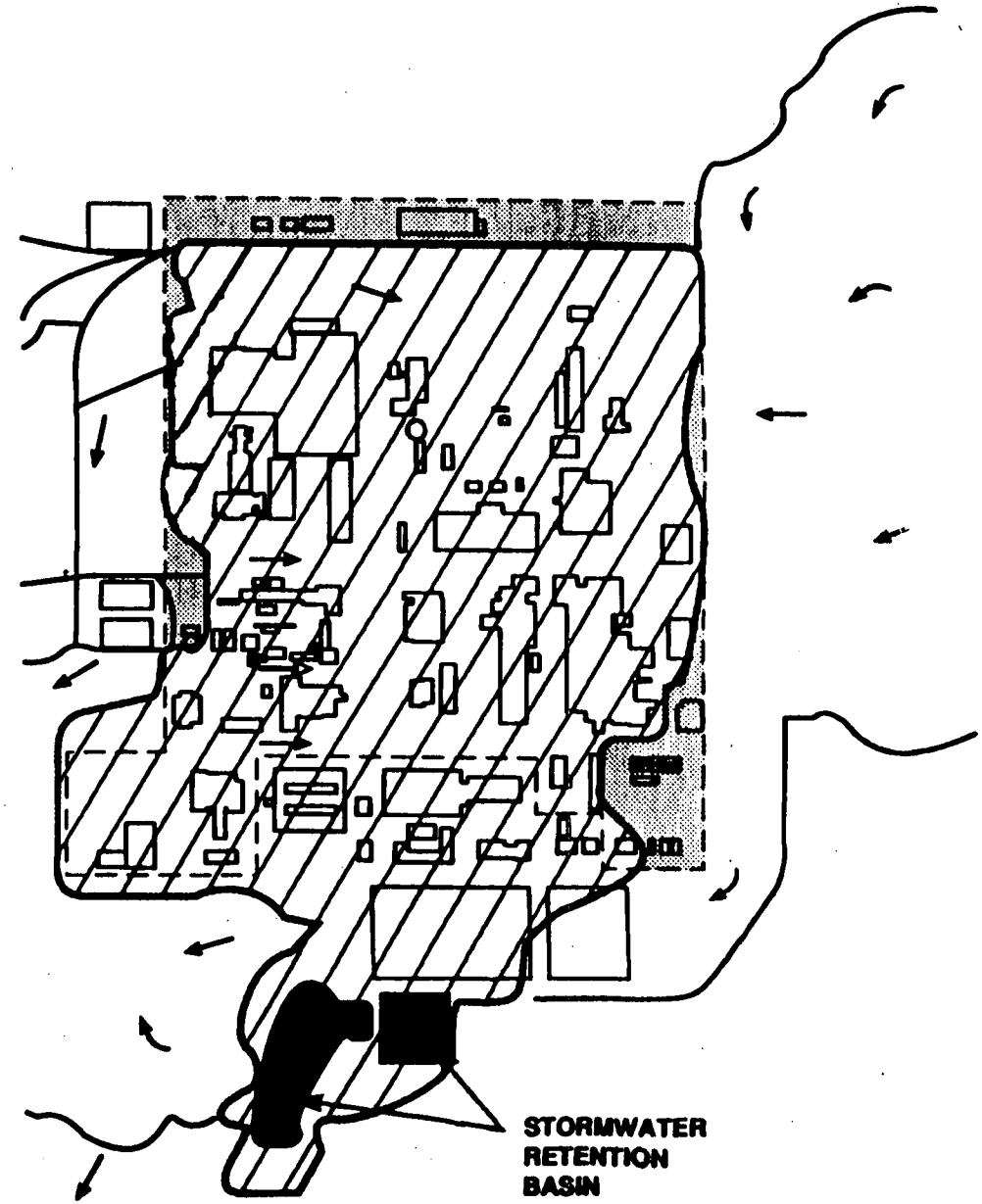


Figure 3

This Removal Site Evaluation (RSE) is being initiated by the Department of Energy under authorities delegated by Executive Order 12580 under Section 300.410 of the National Contingency Plan (NCP), to determine if drainage conditions from the production area warrant the implementation of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Removal Action.

3301

Consistent with regulatory guidance, this preliminary assessment is an evaluation related to the eight factors provided in Section 300.415 of the National Contingency Plan and is conducted under authority delegated through Executive Order 12580 for Section 104 of CERCLA.

Previous Investigations

Collection and analysis of surface water and soil samples from areas surrounding the FEMP Production Area has been ongoing since 1985. Some of this work has been performed by Weston, Inc., in conjunction with the development of the Best Management Practices (BMP) Plan for the FEMP, formerly known as the Feed Materials Production Center (FMPC). Sheet flow (overland flow) of runoff from the controlled production areas makes direct sampling difficult. However, stormwater runoff downstream from these locations, at a point where mixing of uncontrolled flow with flows from other areas has occurred, has been sampled. Sample locations are identified in Figure 4, and analytical results for drainage ditch samples collected by Weston, Inc. in July 1988 are shown in Appendix A, Table 1. Examination of the data presented in Appendix A, Table 1 reflect similar results as those taken since 1987, as part of the Environmental Monitoring Program performed by WEMCO. The results have been reported in the FEMP Annual Environmental Monitoring Report issued pursuant to DOE Order 54001.1. These results consistently indicate elevated levels of uranium when compared to upstream or background samples.

The relevant regulatory limits against which these analytical data can be evaluated are summarized in Appendix A, Table 2. In accordance with 40 CFR 300.400 (g)(3), DOE Orders which provide guidance or criteria for radionuclides, such as Derived Concentration Guide (DCG) limits, can be used as "to be considered (TBC)" requirements for public health protection standards.

A summary evaluation of the Table 1 data against the limits or criteria of Table 2 is presented in Appendix A, Table 3. For purposes of comparison, the DCG limits given in Table 3 correspond to the combined DCGs for U-234 and U-238. The concentrations of these isotopes in samples collected and analyzed by WEMCO have been estimated from the observed data for total uranium. Use of the DOE (DCG) limit for discharge to the environment in evaluating these data is conservative, based on the assumption that the ultimate risk to public health is most likely to occur through the potential ingestion of groundwater and food products which might eventually receive the effluent.

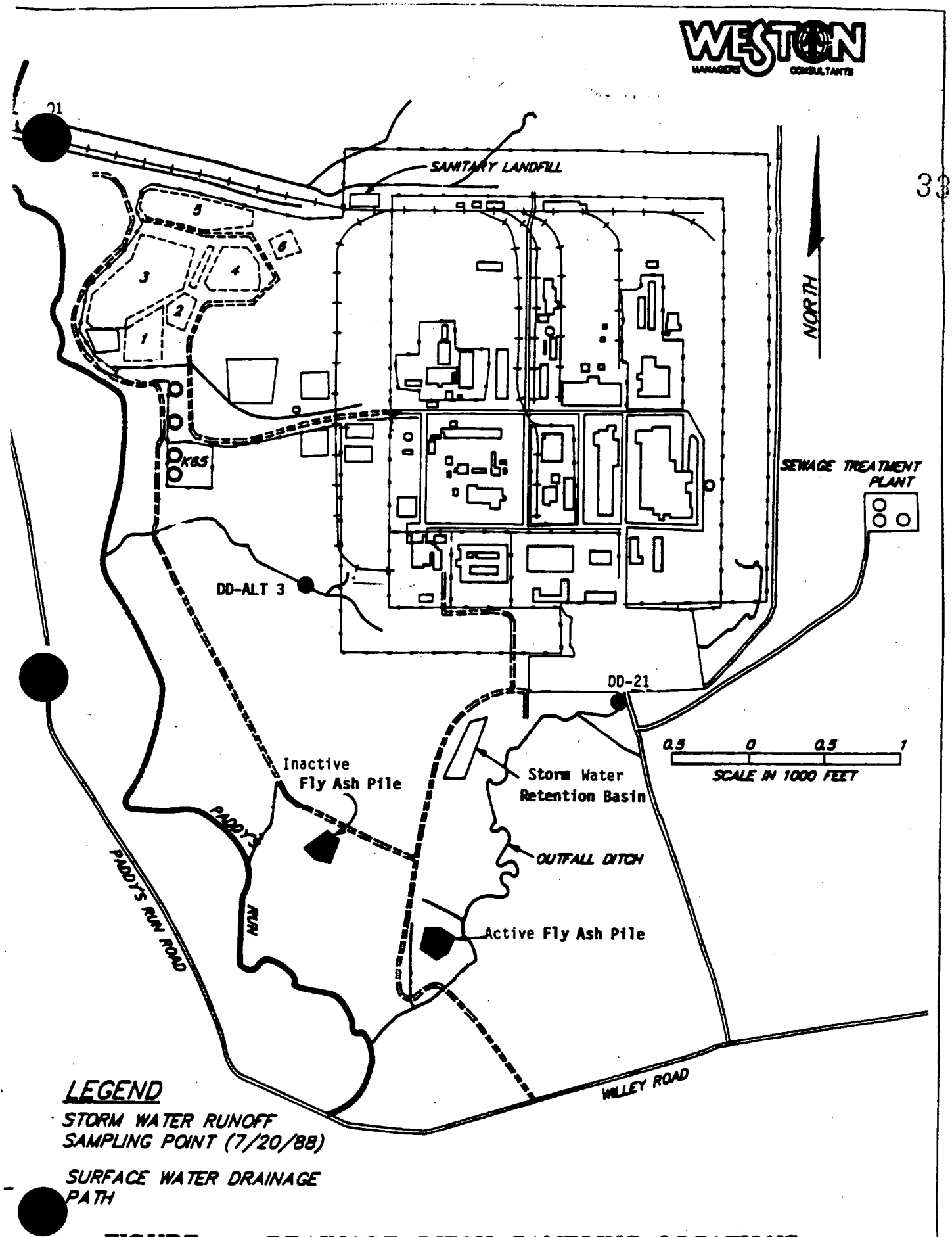


FIGURE 4 DRAINAGE DITCH SAMPLING LOCATIONS

Source Term

The most significant contaminants of concern among the materials handled in the production area were designated for analysis in samples of soil (Appendix B) and runoff surface water collected in the FEMP production area drainage ditches. The non-radiological contaminants were compared to contaminant specific Applicable or Relevant and Appropriate Requirements (ARARs) such as State of Ohio primary and secondary drinking water maximum contaminant levels (MCL) parameters. As stated above, radiological contaminants were compared to TBCs.

Certain standards, such as the Ohio secondary standard for total dissolved solids (TDS), were not expected to be achieved since the samples were collected from drainage areas. Appendix A, Table 1 summarizes for comparison the concentrations of non-radiological contaminants in surface water to the MCL of the State of Ohio primary and secondary drinking water standards as noted in Appendix A, Table 2.

The principal contaminant of concern in stormwater runoff from the FEMP is uranium. Due to its much longer half-life and relatively low specific activity, most of the uranium mass derived through total U analysis is due to U-238. The uranium that has been processed at FEMP has included natural, enriched (in U-234 and U-235), and depleted uranium. The isotopic composition of uranium in effluent, through routine (proportionate continuous sampling) monitoring at Manhole 175, has shown approximately equal activity concentrations of U-234 and U-238 with negligible U-235. Through a Federal Facilities Compliance Agreement (July 18, 1986), and pursuant to the CERCLA, Advanced Sciences, Inc. (ASI) and its subcontractor International Technology (IT), are currently conducting a Remedial Investigation/Feasibility Study (RI/FS) for five operable units at the FEMP. Additional sampling has been performed by ASI/IT as part of their investigation around the waste pit perimeter area. A representative number of samples from the waste pit surface water runoff samples showed a preponderance of uranium-238. While the ratio is variable, the average 238/234 ratio was 3.7:1 ($\pm$ 33% with 68 percent confidence). This ratio was calculated to estimate the concentration of U-234 and U-238 in samples analyzed for total uranium.[1]

Risk Evaluation

Uranium is a potential radiocarcinogen and a chemical toxin. Insoluble uranium compounds primarily pose a radiological hazard resulting from inhalation. Soluble uranium compounds pose both chemical and radiological hazards from ingestion. If ingested at sufficiently high rates, these compounds can lead to kidney damage and arterial lesions. Other potential adverse health effects that can result from ingestion of soluble uranium compounds are damage to the cardiovascular, hematopoietic, endocrine, and immunological systems.

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[1]Removal Site Evaluation for the Waste Pit Area Storm Water Runoff Control, page 9. DOE Letter DOE-1063-90, G. W. Westerbeck to M. B. Boswell, "Removal Site Evaluations for the South Plume and the Waste Pit Area Storm Water Runoff Control Removal Actions," dated May 21, 1991.

From the analytical data herein and from the attendant guidelines for ingestion, the risk can be evaluated on the basis of observed U-234 and U-238 concentrations. 3301

The Derived Concentration Guides for ingestion (from DOE Order 5400.5) are based upon a committed effective dose equivalent limit of 100 mrem/yr. These limits correspond to:

U-238	600 pCi/l	(1.8 mg/l)
U-234	500 pCi/l	(9.7×10^{-5} mg/l)

This forms the basis for the comparison in Table 3 when combined with the analytical data.

Even though U-234 is somewhat more dose limiting, the total uranium mass analysis primarily represents U-238. The mass of U-234 and U-235 will contribute little, if any, to the Total U measurement. An estimate of the relative U-238 to U-234 concentrations by activity is made on the basis of other isotope specific analyses performed by Weston. That basis was described earlier, and the activity ratio used is 3.7:1 for 238 to 234. Table 3 lists the analytical results with either estimated or actual concentrations of these two uranium isotopes along with the multiple of the respective DCG. The sparse and lower level concentrations of other radionuclides were not utilized because their relative contribution to estimated dose is minuscule.

It should be pointed out that the DCGs used in this discussion and in Table 3 represent, if ingested at the normal annual water consumption rate, of 730 liters, intakes of uranium which would result in a committed effective dose equivalent of 100 mrem/yr. The DOE dose standard for drinking water is 4 mrem/yr (from DOE Order 5400.5), which corresponds to a DCG for U-238 and U-234 of 24 pCi/l and 20 pCi/l, respectively. These are compared with TBC public health standards for uranium in drinking water, proposed in 40 CFR Parts 141 and 142 dated July 18, 1991 (MCLG - zero, MCL - 30 pCi/l (or 20 ppb)). Therefore, the risk associated with consumption of water represented by Sample No. DD-ALT3 in Table 3 would be about 25 times greater than water containing U-238 and U-234 at respective concentrations of 24 pCi/l and 20 pCi/l (the DOE drinking water dose standard) and about 20 times greater than the proposed 30 pCi/l EPA drinking water standard.

Magnitude of Potential Risk

3301

It is recognized that the production area and its stormwater runoff will ultimately be restored and/or stabilized based on the Record of Decisions (ROD) for Operable Unit Nos. 3 and 5 of the RI/FS. However, this removal site evaluation addresses the potential need for a removal action. The conservative assumption for pathways to off-site receptors include, but are not limited to, surface water runoff (ingestion) and infiltration of the underlying aquifer with migration to the South Plume (ingestion and irrigation). Potential exposure paths also include resuspension of radionuclides in sediments, which will be addressed in the RI/FS. Groundwater monitoring has shown a uranium contaminated plume south of the site. This is the subject of another removal action.

The analytical data in Appendix B indicates that the soils of the production area, from the surface to a depth of one foot, contain levels of uranium activity which exceed levels currently found in the South Plume groundwater monitoring wells. Coupled with uranium activity levels found at sampling points DD-01, DD-21, and DD-Alt 3 suggests that migration of radionuclides from the production area has occurred. Best management practices demand that this liquid pathway to offsite receptors be controlled in order to prevent the recharge and subsequent infiltration of radionuclides to the underlying aquifer.

Assessment for Need for Removal

There is no apparent or measurable evidence of actual transport to the nearby population, animals, and their food chains; however, due to the observed condition of the stream bed of Paddy's Run, migration to the underlying aquifer and to the South Plume is probable during stream flow. Uranium in the South Plume is measurable, and with components attributable to the FEMP. This could result in the contamination of water for agricultural and wildlife use. Without additional controls the potential for this transport will continue. DOE-FO has approved the implementation of a removal action to pump the uranium contaminated groundwater, defined by the South Plume. In order to be successful, all uranium contaminated sources which feed Paddy's Run and ultimately recharge the South Plume must be addressed.

Precipitation averages 40.0 in/yr (at Greater Cincinnati Airport) with typical monthly rainfall ranging from one to seven inches. This amount of precipitation can result in the migration of surface contamination to off-site areas.

Recently enacted National Pollutant Discharge Elimination System (NPDES) stormwater regulations require monitoring and permitting of all stormwater discharges associated with industrial activities. A stormwater permit application is currently being prepared for the FEMP site. The preparation of this permit is proceeding under the assumption that controls will be placed on the process area stormwater runoff, so that all runoff associated with the process area "industrial activities" will be directed to the Stormwater Retention Basin and therefore be discharged through a currently permitted NPDES monitoring station. This removal action will serve that purpose.

Appropriateness of Response

It is probable that a response can control production area runoff and deter the release of contaminants of concern (uranium) that exceed a specific ARAR (National Primary Drinking Water regulation for radiation dose (4 mrem/yr) as stated in 40 CFR 141.16(b)). 3301

If a planning period of less than six months exists prior to initiation of a response, DOE will prepare an Action Memorandum. The Action Memorandum will describe the selected response and supporting documentation for the decision. This will serve as a decision document for the Administrative Record.

If it is determined that there is a planning period greater than six months before a response is initiated; DOE will prepare an Engineering Evaluation/Cost Analysis (EE/CA) Approval Memorandum. This memorandum is to be used to document the threat to public health and environment. It would then serve as the decision document for the Administrative Record File.

If it is determined that the removal action activities will extend beyond 120 days from the date of initiation, DOE shall pursue community relations activities as per the National Contingency Plan Section 300.415(m)(3)(i).

APPENDIX A

SUMMARY OF SURFACE WATER SAMPLES
FOR
UNCONTROLLED PRODUCTION AREA RUNOFF

TABLE 1
ANALYTICAL RESULTS FOR DRAINAGE DITCH SAMPLES COLLECTED 7-20-88

ANALYTE	UNITS	DD-01 (7-20-88)	DD-21 (7-20-88)	DD-ALT3 (7-20-88)
ALUMINUM	ug/l	869	200u	404
BARIUM	ug/l	217	200u	200u
CALCIUM	ug/l	153000	5000u	70700
CHROMIUM	ug/l	10.0u	10.0u	10.0u
COPPER	ug/l	25.0u	25.0u	25.0u
IRON	ug/l	1080	170	369
LEAD	ug/l	5.0u	5.0u	5.0u
MAGNESIUM	ug/l	31500	5000u	15300
MANGANESE	ug/l	143	20.0	102
SODIUM	ug/l	10100	5000u	15500
ZINC	ug/l	84.4	20.0u	108
TOC	mg/l	14.4	2.8	5.6
TOX	mg/l	41	35	10.0u
TDS	mg/l	692	42.0	370
TSS	mg/l	266	21.0	11.0
OIL & GREASE	mg/l	1.0u	1.1	1.0u
CHLORIDE	mg/l	11.3	2.5	12.6
FLUORIDE	mg/l	0.24	0.10u	1.3
SULFATE	mg/l	317	6.2	102
NITRATE	mg/l	1.0u	6.1	0.10u
1,1,1-TCA	ug/l	NR	NR	NR
TCE	ug/l	NR	NR	NR
PERC	ug/l	NR	NR	NR
GROSS ALPHA	pCi/l	8	3	520
GROSS BETA	pCi/l	13	4	190
THORIUM-228	pCi/l	NR	NR	NR
THORIUM-230	pCi/l	NR	NR	NR
THORIUM-232	pCi/l	NR	NR	NR
URANIUM-234	pCi/l	0.6	0.6	270
URANIUM-235	pCi/l	0.3	0.1	12
URANIUM-238	pCi/l	2.4	1.0	310
RADIUM-226	pCi/l	NR	NR	NR
RADIUM-228	pCi/l	NR	NR	NR
FLOW	gpm	p	40	p
pH	std.	7.6	7.3	7.8
CODUCTIVITY	umhos	700	38	490
TEMPERATURE	C.	25	25	26

NOTES:

1. An "u" indicates the parameter was analyzed for, but not detected. The minimum detection limit for the sample, not the method detection, is reported preceding the "u".
2. NR = Not requested.
3. p = ponded water (not measurably flowing).

SOURCE: WESTON ADDENDUM TO BEST MANAGEMENT PRACTICES PLAN: STORM-WATER SAMPLING PROGRAM RESULTS, TABLE 2, PAGE 9, (10-18-88).

TABLE 2

Relevant Regulatory Limits

Metals (ppm)

	MCL	Ohio EPA ORC
Al	-	-
Ba	1.0	1.0
Ca	-	-
Cr	0.05	-
Cu	1.0	0.012 to 0.043[1]
Fe	0.3	-
Pb	0.05	0.05
Mg	-	-
Mn	0.05	-
Na	-	-
Zn	5.0	0.040 to 0.115[1]

Other General Water Quality Parameters (mg/l)

	MCL	Ohio EPA ORC	NPDES 1988 Permit	
			MH-175	Storm Water Retention Basin
TOC	-	-	-	-
TOX	-	-	-	-
TDS	-	750 (trans.) 500 (month avg.)	-	-
TSS	-	-	40 Daily Max. 20 Daily Avg.	100 Daily Max. 30 Daily Avg.
O&G	-	-	15	15 Daily Max.
Cl^-	-	-	0.10	-
Fl^-	-	1.0	-	-
SO_4	-	250	-	-
NO_X	10	10	-	-

Volatile Organics (ppm)

	MCL
1,1,1-TCA	0.200
TCE	0.005

ERC

Table 2 (continued)

Radionuclides (pCi/l)	DOE Guidelines (MH-175)
Gross Alpha	-
Gross Beta	-
Thorium-228	400
Thorium-230	300
Thorium-232	50
Uranium-234	500
Uranium-235	600
Uranium-238	600
Radium-226	30
Radium-228	30

Physical Parameters	Ohio EPA ORC	NPDES 1988 Permit (MH-175)
pH	6.0 to 9.0	6.5 to 9.0
Conductivity (umhos)	1200 trans 800 month avg.	-

NOTE:

1) Variable depending on water hardness.

TABLE 3

Summary of Tables 1 and 2

1.0 Metals

1.1 Calcium levels for DD-01 and DD-ALT3 were 153 ppm and 70.7 ppm, respectively. No MCL or applicable standard for calcium exists.

1.2 Iron and Manganese have maximum concentration levels (MCLS) of 0.3 ppm and 0.05 ppm, respectively. Both of these elements, however, occur naturally in the groundwater in the area of the FEMP at levels exceeding these MCLs[1]. Drainage ditch samples at DD-01 and DD-ALT3 exceeded the MCL for iron and all three samples exceed the MCL for manganese.

1.3 Magnesium concentrations in all three drainage ditch samples exceeded 15 ppm at every location with the high being 31.5 ppm. There are no applicable regulatory data or MCLs for magnesium to which these concentrations can be compared.

2.0 Other Water Quality Parameters

2.1 Results of total dissolved solids (TDS) can be compared to the Secondary Maximum concentration level (SMCL), set at 500 mg/l, and to the Ohio EPA ORC Standard for TDS, which is set at 500 mg/l (monthly average) and 700 mg/l (transient). The sample at DD-01 exceeded the SMCL and the ORC monthly average at 692 mg/l.

2.2 Sample DD-01 exceeded the Ohio EPA ORC Standard for sulfate (SO_4) of 250 mg/l with a reported level of 317 mg/l.

Uranium Concentrations in Water Samples

Sample	U-238 (pCi/l)	Multiple of U-238 DCG[2]	U-234 (pCi/l)	Multiple of U-234 DCG[3]	Total Multiple DCG
DD-ALT3	310	0.517	270	0.540	1.057
DD-01	2.4	0.004	0.6	0.001	0.005
DD-21	1.0	0.001	0.6	0.001	0.002

[1] "Addendum to Best Management Practices Plan: Stormwater Sampling Program Results," prepared by Roy F. Weston, Inc., October 18, 1991, page 14.
[2] 600 pCi/l (1.8mg/l)
[3] 500 pCi/l (9.7xE-5mg/l)

APPENDIX B

SUMMARY OF SOIL SAMPLES
FOR
UNCONTROLLED PRODUCTION AREA RUNOFF

3301

From: S. G. Schneider

WMCO:EC(SW):90-227

Date: June 7, 1990

Subject: RCRA DETERMINATION AND RADIOLOGICAL CHARACTERIZATION OF RUBBLE FROM STORM SEWER IMPROVEMENT PROJECT

To : S. M. Peterman

Reference:
1. WMCO Facility Task Force Final Report, WMCO:SR(IA):88-068
2. AEDO Spill Data Base
3. FMPC Site Procedure, FMPC 720, "Control of Construction Waste", issued November 10, 1988

This memo transmits the radiological and RCRA characteristics of the soils and debris which will be generated as a result of the excavation/renovation work for the Plantwide Storm Sewer Project. The rubble to be generated as a result of this project will be soil and concrete debris. The soils generated will be from excavation for the installation of new sections of storm sewer pipe to replace sections of crushed or damaged pipe, waterproofing and plastering damaged manholes. In addition, soil will be generated from the construction of earth berms, shallow ditch grading, catch basins, and ditch reconfigurations. The concrete generated will mainly be from damaged or crushed mainline pipes.

Process Knowledge

The excavated areas are primarily located outside the perimeter of the Process Area. In addition to the 38 soil samples, process knowledge, site history and spill records were researched (Reference 1 and 2) in an effort to determine the possibility of listed wastes and/or hazardous waste characteristics throughout the construction areas. Based upon a review of references 1 and 2, discussions with the project engineer and other FMPC personnel, and usual observations, there were limited or no process activities in the areas of this construction project. There is no reason to suspect storage, transportation, or processing of any solvents, paints, fuels, lubricants, cleaners, or any other chemicals in the construction area. However, based upon the fact that these storm sewer pipes have been in use for a period of 30 plus years, there will be a build-up of sediment in the bottom of these pipes. This sediment material should be segregated, packaged separately, and handled as suspect RCRA material. This material should be sampled and analyzed for Thorium, Thorium 228, Uranium activities, Uranium Isotopes, and EP Tox metals.

Sampling and Analysis

Soil samples were taken at 38 locations throughout the plant (see attachment 1 for locations), representing proposed areas of excavations required for the completion of the project. Two samples were taken at each location - one at the surface, and one at a depth of one foot. Surface samples were analyzed for Thorium, Thorium 228, and Uranium activities, Uranium Isotopes, and EP Tox metals. Samples taken at each depth were analyzed for total Uranium and total Thorium concentrations. These concentrations were converted to estimated specific activities for each locations.

Radiological Characterization

Specific activities for each sample were used to determine the appropriate waste category (I, II, or Low Level Waste). The categories for each sample are shown in Table 1. Attachment 1 shows the distribution of the various categories throughout the project area. From this site plan a few general observations regarding this radiological disposition of the materials can be made:

- Soils in the northwest quadrant are generally Category I, with the exception of surface samples taken from SSI-30 and SSI-26. The material in these areas was determined to be Category II materials.

- Soils in the southwest quadrant are also Category I, for the most part. Some category II material is located on the surface at SSI-22 and SSI-21.

- Much of the soil in the northwest quadrant appears to be Low Level Waste. Areas SSI-1, SSI-3, SSI-5, and SSI-6 all contain Low Level Waste. Areas SSI-2 and SSI-7 through SSI-10 contain Category II material.

- Most samples in the southeast quadrant indicated Category II waste was present. There is no Low Level Material in this area.

Field equipment should be used during excavation to determine the extent of the Low Level and Category II wastes. The attached site plan should be used as a guideline in this effort.

RCRA Determination

The process knowledge, and data from references 1 and 2, the presence of RCRA constituents would not be expected in any of the construction.

In addition, analysis of EP Toxicity for metals was performed on 38 samples (surface and one foot depth) from the construction site in accordance with 40 CFR 261. The results from the samples indicate that the soil does not exhibit the characteristic of EP-Toxicity. Therefore, all available information shows the soil and concrete rubble from the Storm Sewer Improvement Project may be handled as non-RCRA.

The sediment removed from inside the old storm sewer pipe will have to be sampled and analyzed before radiological or RCRA determinations can be made.

S. G. Schneider, Manager
Solid Waste Compliance

Attachments

CGR/bs

c: S. L. Bradley
W. H. Britton
J. E. Clements
J. T. Grumski
S. C. Hoskins
G. T. Howard
C. G. Rieman
J. M. Sattler
E. D. Savage
J. L. Trujillo
C. S. Waugh
P. C. Weddle
W. A. Weinreich
Central Files
SWC File

TABLE 4

COORDINATE LOCATIONS OF SAMPLING STATIONS

Drainage Ditch	Northing[1]	Easting[1]
DD-01	482,622	1,377,511
DD-21	478,857	1,381,315
DD-ALT3	479,759	1,378,252

[1]Units are in feet and tied in with the Ohio coordinate system, south zone, City of Cincinnati datum.

Source: Table 4, "Map Coordinate Locations of Sampling Stations for FMPC Stormwater Sampling Events of April 27, 1988, July 20, and July 21, 1988," taken from the "Addendum to Best Management Practices Plan: Stormwater Sampling Program Results," prepared by Roy F. Weston, Inc., October 18, 1988.

TABLE 1. ANALYTICAL DATA

MPLE MBER	SAMPLE LOCATION	SAMPLE DEPTH	THORIUM TOTAL (ppm)	CALCULATED THORIUM ACTIVITY (pCi/g)*	THORIUM 228 (pCi/g)	URANIUM TOTAL (ppm)	CALCULATED URANIUM ACTIVITY (pCi/g)	URANIUM WEIGHT PERCENT		RCRA METALS EP-TOXICITY RESULTS**	CATEGORY
. 0169	SSI-1	surface	n/a	7.7	5.7	n/a	290	U-234	0.006	ALL METALS	LLW
								U-235	0.72	BELOW	
								U-236	0.009	REGULATORY	
								U-238	99.26	LIMITS	
:. 0170	SSI-1	1 foot	93	20.2	n/a	30	20				II
:. 0171	SSI-2	surface	n/a	<3.6	2.4	n/a	50	U-234	0.005	ALL METALS	II
								U-235	0.73	BELOW	
								U-236	0.008	REGULATORY	
								U-238	99.27	LIMITS	
:. 0172	SSI-2	1 foot	<23	5	n/a	26	19				I
:. 0173	SSI-3	surface	n/a	4.2	3.2	n/a	130	U-234	0.011	ALL METALS	LLW
								U-235	0.71	BELOW	
								U-236	0.01	REGULATORY	
								U-238	99.27	LIMITS	
:. 0174	SSI-3	1 foot	<23	5	n/a	18	13				I
:. 0175	SSI-4	surface	n/a	<2.9	0.99	n/a	13	U-234	0.004	ALL METALS	I
								U-235	0.68	BELOW	
								U-236	0.009	REGULATORY	
								U-238	99.31	LIMITS	
.. 0176	SSI-4	1 foot	<23	5	n/a	<11	<7				I
.. 0177	SSI-5	surface	n/a	8.7	5.5	n/a	540	U-234	0.003	ALL METALS	LLW
								U-235	0.7	BELOW	
								U-236	<0.001	REGULATORY	
								U-238	99.3	LIMITS	
. 0178	SSI-5	1 foot	24	5	n/a	365	>243				LLW
. 0179	SSI-6	surface	n/a	6.8	6.5	n/a	120	U-234	0.005	ALL METALS	LLW
								U-235	0.47	BELOW	
								U-236	0.12	REGULATORY	
								U-238	99.51	LIMITS	
:. [illegible]	SSI-6	1 foot	29	6.3	n/a	74	40				II

R.C. 0181	SSI-7	surface	n/a	4.2	2.2	n/a	82	U-234	0.005	ALL METALS	II
								U-235	0.72	BELOW	
								U-236	0.007	REGULATORY	
								U-238	99.27	LIMITS	
.C. 0182	SSI-7	1 foot	<23	<5	n/a	37	27				I
.C. 0183	SSI-8	surface	n/a	3.4	2.0	n/a	21	U-234	0.004	ALL METALS	I
								U-235	0.67	BELOW	
								U-236	0.003	REGULATORY	
								U-238	99.33	LIMITS	
.C. 0184	SSI-8	1 foot	24	5	n/a	67	47				II
C. 0185	SSI-9	surface	n/a	<3.5	2.2	n/a	30	U-234	0.005	ALL METALS	I
								U-235	0.61	BELOW	
								U-236	0.007	REGULATORY	
								U-237	99.38	LIMITS	
C. 0186	SSI-9	1 foot	<23	<5	n/a	54	35				II
C. 0187	SSI-10	surface	n/a	<3.3	1.8	n/a	21	U-234	0.006	ALL METALS	I
								U-235	0.58	BELOW	
								U-236	0.005	REGULATORY	
								U-237	99.41	LIMITS	
. [illegible]	SSI-10	1 foot	<23	<5	n/a	68	40				II
. 0189	SSI-11	surface	n/a	<3.8	3.0	n/a	12	U-234	0.003	ALL METALS	I
								U-235	0.68	BELOW	
								U-236	0.01	REGULATORY	
								U-237	99.3	LIMITS	
. 0190	SSI-11	1 foot	<23	<5	n/a	26	20				I
. 0191	SSI-12	surface	n/a	<2.9	0.39	n/a	<6.4	U-234	0.002	ALL METALS	I
								U-235	0.47	BELOW	
								U-236	0.006	REGULATORY	
								U-237	99.52	LIMITS	
0192	SSI-12	1 foot	<23	<5	n/a	24	12				I
0193	SSI-13	surface	n/a	<2.7	0.45	n/a	16	U-234	0.001	ALL METALS	I
								U-235	0.39	BELOW	
								U-236	0.004	REGULATORY	
								U-237	99.61	LIMITS	
0194	SSI-13	1 foot	<23	<5	n/a	83	40				II
0195	SSI-14	surface	n/a	<3.1	1.4	n/a	32	U-234	0.005	ALL METALS	I
								U-235	0.7	BELOW	
								U-236	0.007	REGULATORY	
								U-237	99.28	LIMITS	
0. [illegible]	SI-14	1 foot	<23	<5	n/a	27	20				II

.C. 0197	SSI-15	surface	n/a	3.2	1.6	n/a	59	U-234	0.006	ALL METALS	II
								U-235	0.71	BELOW	
								U-236	0.009	REGULATORY	
								U-237	99.27	LIMITS	
.C. 0198	SSI-15	1 foot	<23	<5	n/a	33	<20				I
C. 0199	SSI-16	surface	n/a	<3.4	2.1	n/a	23	U-234	0.002	ALL METALS	I
								U-235	0.64	BELOW	
								U-236	0.005	REGULATORY	
								U-237	99.35	LIMITS	
:. 0200	SSI-16	1 foot	<23	<5	n/a	23	13				I
:. 0201	SSI-17	surface	n/a	4.8	5.0	n/a	66	U-234	0.002	ALL METALS	II
								U-235	0.42	BELOW	
								U-236	0.005	REGULATORY	
								U-237	99.57	LIMITS	
. 0202	SSI-17	1 foot	<23	<5	n/a	110	60				II
. 0203	SSI-18	surface	23	3.3	1.8	95	63	U-234	0.004	ALL METALS	II
								U-235	0.69	BELOW	
								U-236	0.004	REGULATORY	
								U-2[illegible]	99.31	LIMITS	
0204	SSI-18	1 foot	<23	<5	n/a	33	20				I
	SSI-19	surface	<23	<3.9	1.4	23	12	U-234	0.002	ALL METALS	I
								U-235	0.37	BELOW	
								U-236	0.005	REGULATORY	
								U-237	99.62	LIMITS	
0280	SSI-19	1 foot	<23	<5	n/a	23	12				I
0281	SSI-20	surface	<23	<3.4	0.95	30	20	U-234	0.005	ALL METALS	I
								U-235	0.72	BELOW	
								U-236	0.01	REGULATORY	
								U-237	99.27	LIMITS	
0282	SSI-20	1 foot	<23	<5	n/a	23	13				I
0283	SSI-21	surface	<23	<3.2	0.74	66	45	U-234	0.006	ALL METALS	II
								U-235	0.72	BELOW	
								U-236	0.006	REGULATORY	
								U-237	99.27	LIMITS	
)284	SSI-21	1 foot	<23	<5	n/a	34	24				I
)285	SSI-22	surface	23	4.5	2.0	60	41	U-234	0.006	ALL METALS	II
								U-235	0.75	BELOW	
								U-236	0.011	REGULATORY	
								U-237	99.23	LIMITS	
286	SSI-22	1 foot	<23	<5	n/a	34	24				I

:. 0287	SSI-23	surface	<23	<4.3	1.8	20	14	U-234	0.005	ALL METALS	I
								U-235	0.75	BELOW	
								U-236	0.011	REGULATORY	
								U-237	99.23	LIMITS	
:. 0288	SSI-23	1 foot	<23	<5	n/a	17	13				I
. 0289	SSI-24	surface	<23	<3.7	1.2	12	7.9	U-234	0.005	ALL METALS	I
								U-235	0.68	BELOW	
								U-236	0.006	REGULATORY	
								U-237	99.31	LIMITS	
. 0290	SSI-24	1 foot	<23	<5	n/a	<11	n/a				I
. 0291	SSI-25	surface	<23	<2.9	0.95	27	18	U-234	0.004	ALL METALS	I
								U-235	0.74	BELOW	
								U-236	0.015	REGULATORY	
								U-237	99.24	LIMITS	
. 0292	SSI-25	1 foot	<23	<5	n/a	28	n/a				I
. 0293	SSI-26	surface	n/a	<3.5	1.0	n/a	45	U-234	0.006	ALL METALS	II
								U-235	0.67	BELOW	
								U-236	0.009	REGULATORY	
								U-237	99.32	LIMITS	
.	SSI-26	1 foot	<23	<5	n/a	27	n/a				I
. 0295	SSI-27	surface	n/a	<3.4	0.89	n/a	16	U-234	0.003	ALL METALS	I
								U-235	0.65	BELOW	
								U-236	0.007	REGULATORY	
								U-237	99.34	LIMITS	
. 0296	SSI-27	1 foot	<23	<5	n/a	11	n/a				I
. 0297	SSI-28	surface	n/a	<3.7	1.2	n/a	23	U-234	0.004	ALL METALS	I
								U-235	0.61	BELOW	
								U-236	0.019	REGULATORY	
								U-237	99.37	LIMITS	
0298	SSI-28	1 foot	<23	<5	n/a	19	n/a				I
0299	SSI-29	surface	n/a	<3.3	0.77	n/a	30	U-234	0.003	ALL METALS	I
								U-235	0.5	BELOW	
								U-236	0.006	REGULATORY	
								U-237	99.49	LIMITS	
0300	SSI-29	1 foot	<23	<5	n/a	17	n/a				I
0301	SSI-30	surface	n/a	4.4	1.7	n/a	73	U-234	0.007	ALL METALS	II
								U-235	0.66	BELOW	
								U-236	0.004	REGULATORY	
								U-237	99.33	LIMITS	
[illegible]	SSI-30	1 foot	<23	<5	n/a	39	n/a				I
0[illegible]	SSI-31	surface	n/a	<3.0	1.2	n/a	30	U-234	0.005	ALL METALS	I
								U-235	0.88	BELOW	

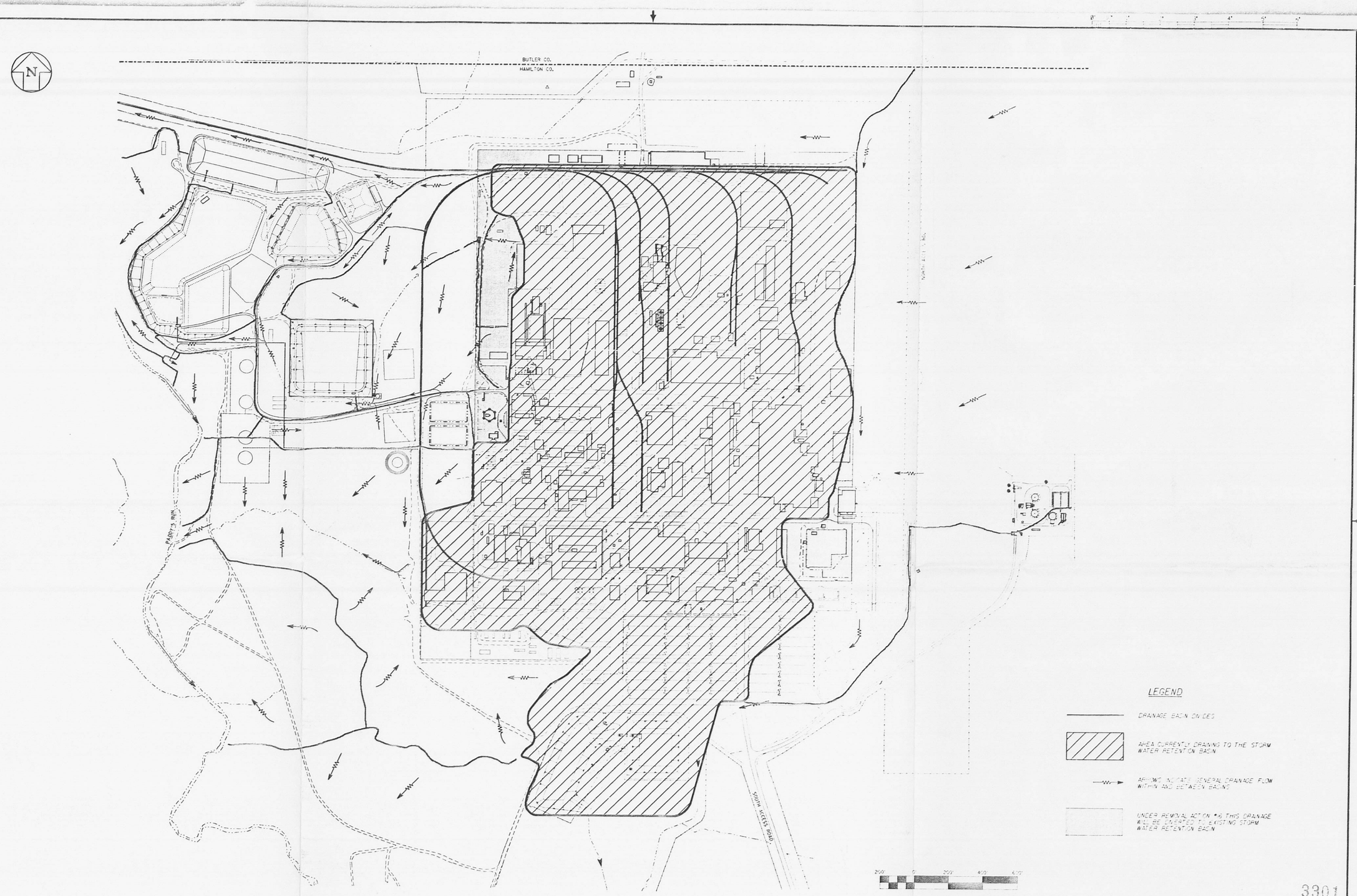
								U-236	0.02	REGULATORY	
								U-238	99.09	LIMITS	
0304	SSI-31	1 foot	<23	<5	n/a	33	n/a				I
0307	SSI-33	surface	n/a	<2.6	0.28	n/a	21	U-234	0.002	ALL METALS	I
								U-235	0.58	BELOW	
								U-236	0.003	REGULATORY	
								U-238	99.41	LIMITS	
0308	SSI-33	1 foot	<23	<5	n/a	22	n/a				I
0309	SSI-34	surface	n/a	2.9	0.98	n/a	24	U-234	0.005	ALL METALS	I
								U-235	0.37	BELOW	
								U-236	0.006	REGULATORY	
								U-238	99.62	LIMITS	
0310	SSI-34	1 foot	<23	<5	n/a	15	n/a				I
0311	SSI-35	surface	n/a	<2.8	0.64	n/a	12	U-234	0.006	ALL METALS	I
								U-235	0.57	BELOW	
								U-236	0.009	REGULATORY	
								U-238	99.42	LIMITS	
0312	SSI-35	1 foot	<23	<5	n/a	16	n/a				I
	SSI-36	surface	n/a	<3.0	1.1	n/a	27	U-234	0.005	ALL METALS	I
								U-235	0.68	BELOW	
								U-236	0.006	REGULATORY	
								U-238	99.31	LIMITS	
0314	SSI-36	1 foot	<23	<5	n/a	28	n/a				I
0315	SSI-37	surface	n/a	<2.8	0.69	n/a	15	U-234	0.004	ALL METALS	I
								U-235	0.6	BELOW	
								U-236	0.007	REGULATORY	
								U-238	99.39	LIMITS	
0317	SSI-38	surface	n/a	<2.9	0.93	n/a	18	U-234	0.005	ALL METALS	I
								U-235	0.67	BELOW	
								U-236	0.006	REGULATORY	
								U-238	99.32	LIMITS	
0318	SSI-38	surface	<23	<5	n/a	16	n/a				I

: All wastes are categorized according to Uranium Specific Activities since all Thorium activities indicate Category I materials (except sample# R.C. 0170.

Uranium Specific Activities for samples at depth are based on isotopic percentages of the surface samples.

Thorium Specific Activities at depth are based on an assumed ratio of [illegible]ppm/10pCi/g.

WESTINGHOUSE
FIELD MATERIALS DIVISION
U.S. DEPARTMENT



NO.	REVISIONS	DATE	DWN. BY	APPD.	NO.	REVISIONS	DATE	DWN. BY	APPD.	REF. DWG. NO.

NOTE:
WEMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS ± 1/16
ANGLES ± 0° 30'
DECIMALS
.X ± .30
.XX ± .010
.XXX ± .005
.XXXX ± .0050
DRG. RELEASE DATE

APPROVALS

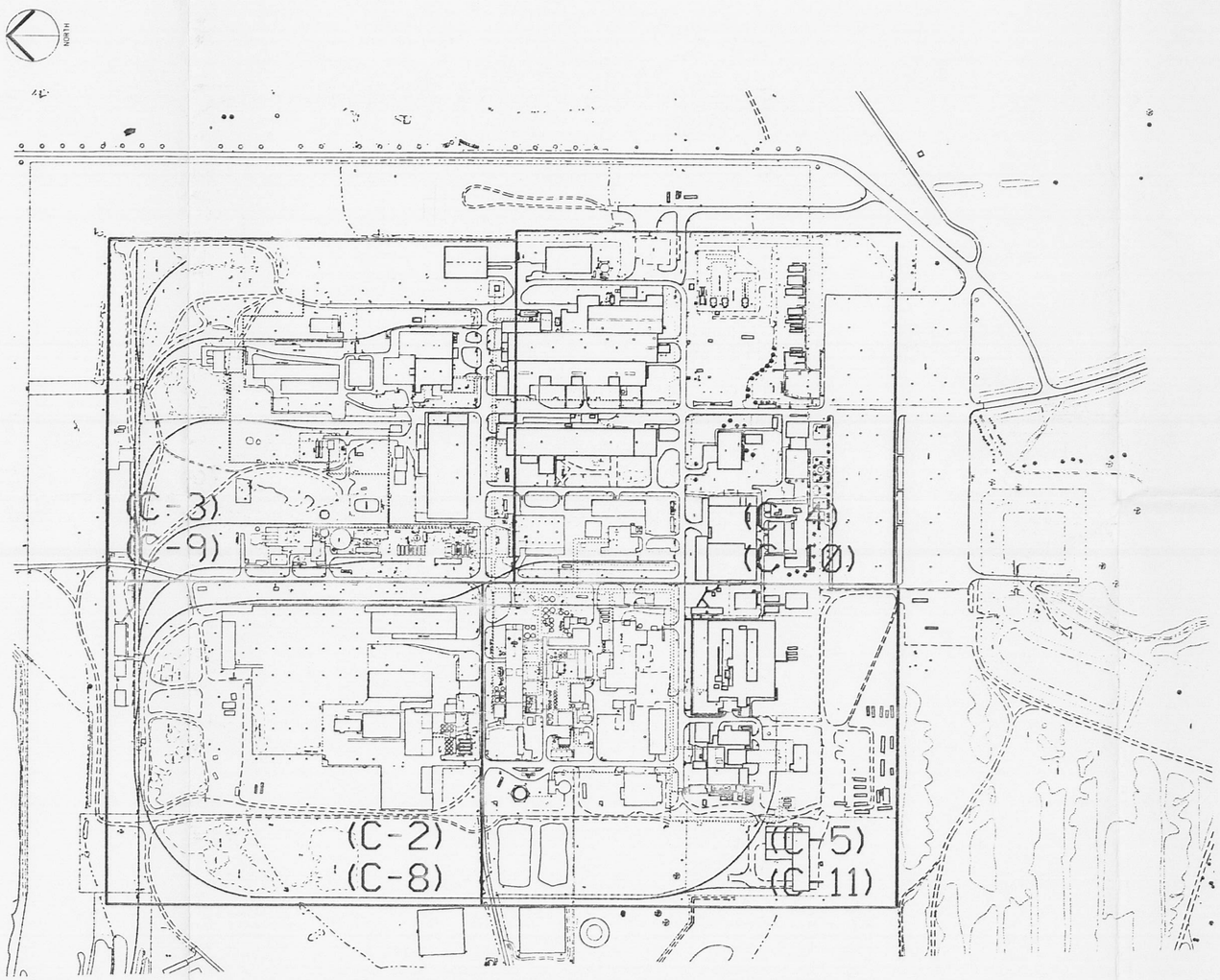
WESTINGHOUSE ENVIRONMENTAL MANAGEMENT CO. OF OHIO
FERNALD, OHIO
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
U.S. DEPARTMENT OF ENERGY

DRAINAGE AREA MAP — FIGURE 1
REMOVAL ACTION #16
COLLECT UNCONTROLLED PRODUCTION AREA STORMWATER RUNOFF
SCALE: 1" = 200'
75X-5500-G-00205 | 0

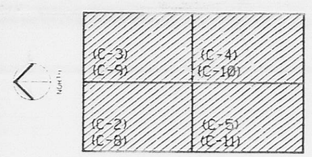
FILE NAME: [illegible]

MAY 26 '92

27



NOTES



0 200 400 600 800 1000
SCALE: 1" = 200'

TO CORRELATE REFERENCED "AMK SHEET No's" TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.: 22-4445-X-00732

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPERATOR	DOE
A	100% REVIEW ISSUE	RPD 5-11-92		
0	CFC FOR SPEC. 02902-3401	RPD 4-13-92		

INITIALS AND DATE

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

PROJECT TITLE
ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS

DRAWING TITLE
STORM SEWER IMPROVEMENTS - PLANTWIDE
KEY PLAN

DRAWN BY	DATE	DESIGNED BY	DATE	PROJECT MGR	DATE
MEC	4-92	RPD	4-92	WGI	4-92

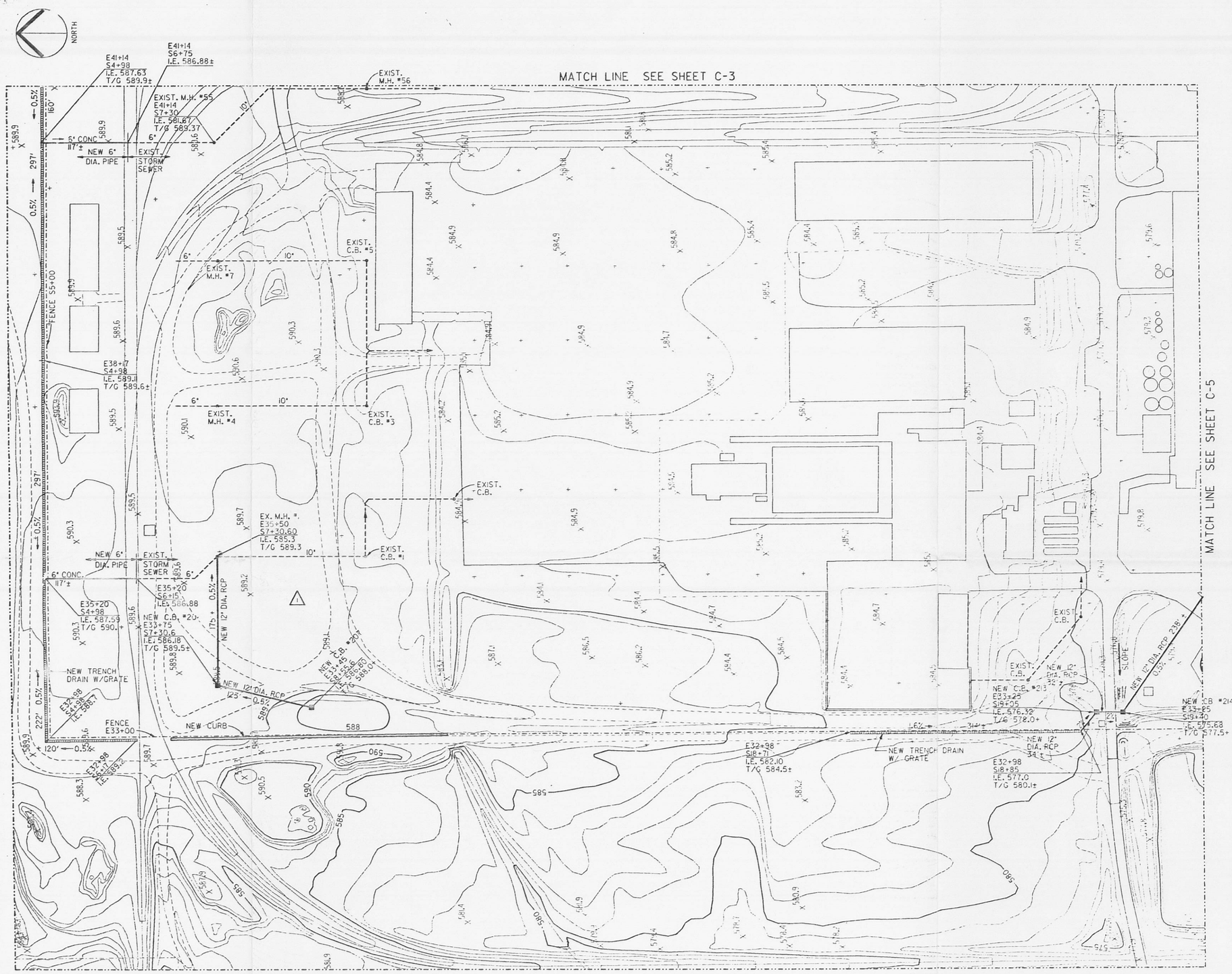
PLANT OR BUILDING: FEMP | FLOOR | SCALE: 1" = 200' | SEALS

PROJECT NO.	DRAWING NO.	SHEET NO.	REV. NO.
87-D-159	0087502 WBS 1.1.2.4.03	22-4445-C-00733	C-1	A

MAY 2 6 '92

330

28

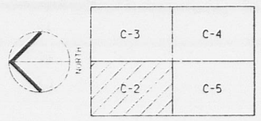


NOTES

1. SEE SHEET NO. C-6 FOR THE FOLLOWING DETAILS:
   - TYPICAL TRENCH DRAIN DETAIL
   - TYPICAL CATCH BASIN DETAIL
   - TYPICAL GRADING AT TRENCH DRAINS
   - TYPICAL CURB DETAIL
   - TYPICAL PIPE BENDING DETAIL
2. ALL DIMENSIONS AND ELEVATIONS PERTAINING TO EXISTING CONSTRUCTION TO BE FIELD VERIFIED BEFORE STARTING ANY WORK OR FABRICATION.

LEGEND

NEW	EXISTING	
■	•	CATCH BASINS (C.B.)
		TRENCH DRAINS
		CURB
		STORM SEWER



3301

0 50 100 150 200 250
SCALE: 1" = 50'

TO CORRELATE REFERENCED * AMK SHEET No's * TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.: 22-4445-X-00732

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	RPD 5-92		
A	100% REVIEW ISSUE	A-E	DRAWN	DSE
		METALS AND DATE		

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS

STORM SEWER IMPROVEMENTS
PLAN
REDIRECTION OF SUB-DRAINAGE AREAS SHEET 1 OF 4

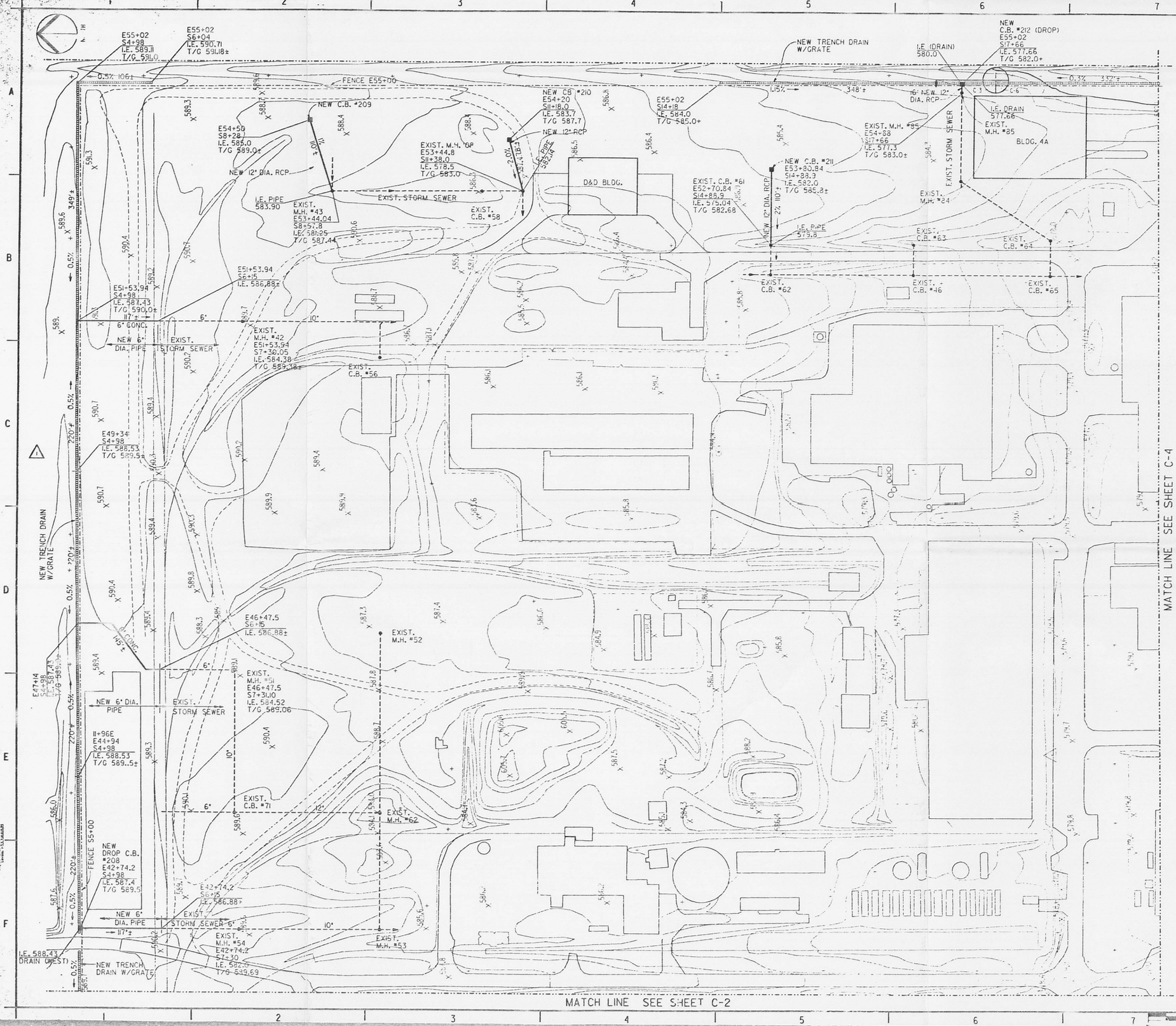
DRAWN BY	DATE	DESIGNED BY	DATE	CHECKED BY	DATE
MEC	4-92	MJL	4-92	LMP	4-92

PLANT SYSTEM NO. FEMP — SCALE 1" = 50'

JOB PROJECT NO.	PROJECT NO.	DRAWING NO.	SHEET NO.	REV. NO.
87-D-159	00875C2 WBS 1.1.2.4.03	22-4445-X-00732	C-2	A

MAY 26 '92

03



NOTES

1. SEE SHEET NO. C-6 FOR THE FOLLOWING DETAILS:
   TYPICAL TRENCH DRAIN DETAIL
   TYPICAL CATCH BASIN DETAIL
   TYPICAL GRADING AT TRENCH DRAINS
   TYPICAL PIPE BENDING DETAIL
2. ALL DIMENSIONS AND ELEVATIONS PERTAINING TO EXISTING CONSTRUCTION TO BE FIELD VERIFIED BEFORE STARTING ANY WORK OR FABRICATION.

LEGEND

NEW	EXISTING	
■	•	CATCH BASINS (C.B.)
▭		TRENCH DRAINS
——	- - - -	STORM SEWER

NUMBER OF SECTION OR LETTER OF DETAIL
DRAWING ON WHICH SECTION OR DETAIL IS TAKEN
DRAWING ON WHICH SECTION OR DETAIL IS SHOWN

SECTION & DETAIL KEY

C-3	C-4
C-2	C-5

3301

0 50 100 150 200 250
SCALE: 1" = 50'

TO CORRELATE REFERENCED "AMK SHEET No's" TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.: 22-4445-X-00732

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPERATOR	DOE
A	100% REVIEW ISSUE	RPG 5-19-92		

INITIALS AND DATE

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS

STORM SEWER IMPROVEMENTS
PLAN
REDIRECTION OF SUB-DRAINAGE AREAS
SHEET 2 OF 4

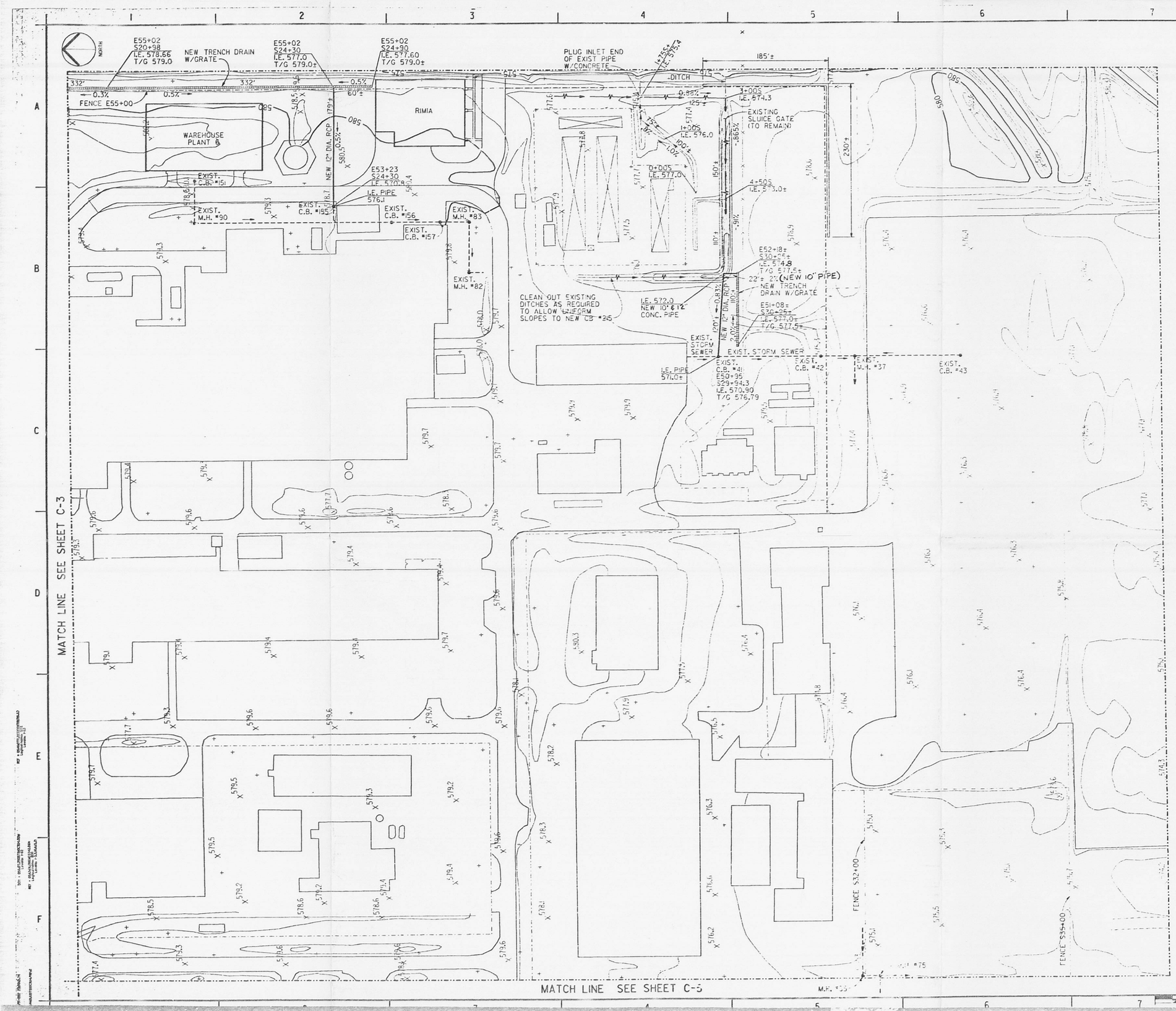
DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
MEC	4-92	RPG	4-92	WGI	4-92

FEMP — SCALE: 1" = 50'

PROJECT NO.	DRAWING NO.	SHEET	REV. NO.
87-D-159	0087502 WBS 1.1.2.4.03	22-4445-C-00735	C-3	A

MAY 26 '92

30



NOTES

1. SEE SHEET NO. C-6 FOR THE FOLLOWING DETAILS:
   - TYPICAL TRENCH DRAIN DETAIL
   - TYPICAL CATCH BASIN DETAIL
   - TYPICAL GRATING AT TRENCH DRAINS
   - TYPICAL CURB DETAIL
   - TYPICAL PIPE BENDING DETAIL
   - TYPICAL DITCH SECTION
2. ALL DIMENSIONS AND ELEVATIONS PERTAINING TO EXISTING CONSTRUCTION TO BE FIELD VERIFIED BEFORE STARTING ANY WORK OR FABRICATION.

LEGEND

NEW	EXISTING	
■	•	CATCH BASINS (C.B.)
▤		TRENCH DRAINS
▭		CURB
—	- - - -	STORM SEWER

C-3	C-4
C-2	C-5

0 50 100 150 200 250
SCALE: 1" = 50'

TO CORRELATE REFERENCED "AMK SHEET NO's" TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.: 22-4445-X-00732

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE			
A	100% REVIEW ISSUE	RPD 5-1-92			

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

330

PROJECT NAME
ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS

DRAWING TITLE
STORM SEWER IMPROVEMENTS
PLAN
REDIRECTION OF SUB-DRAINAGE AREAS SHEET 3 OF 4

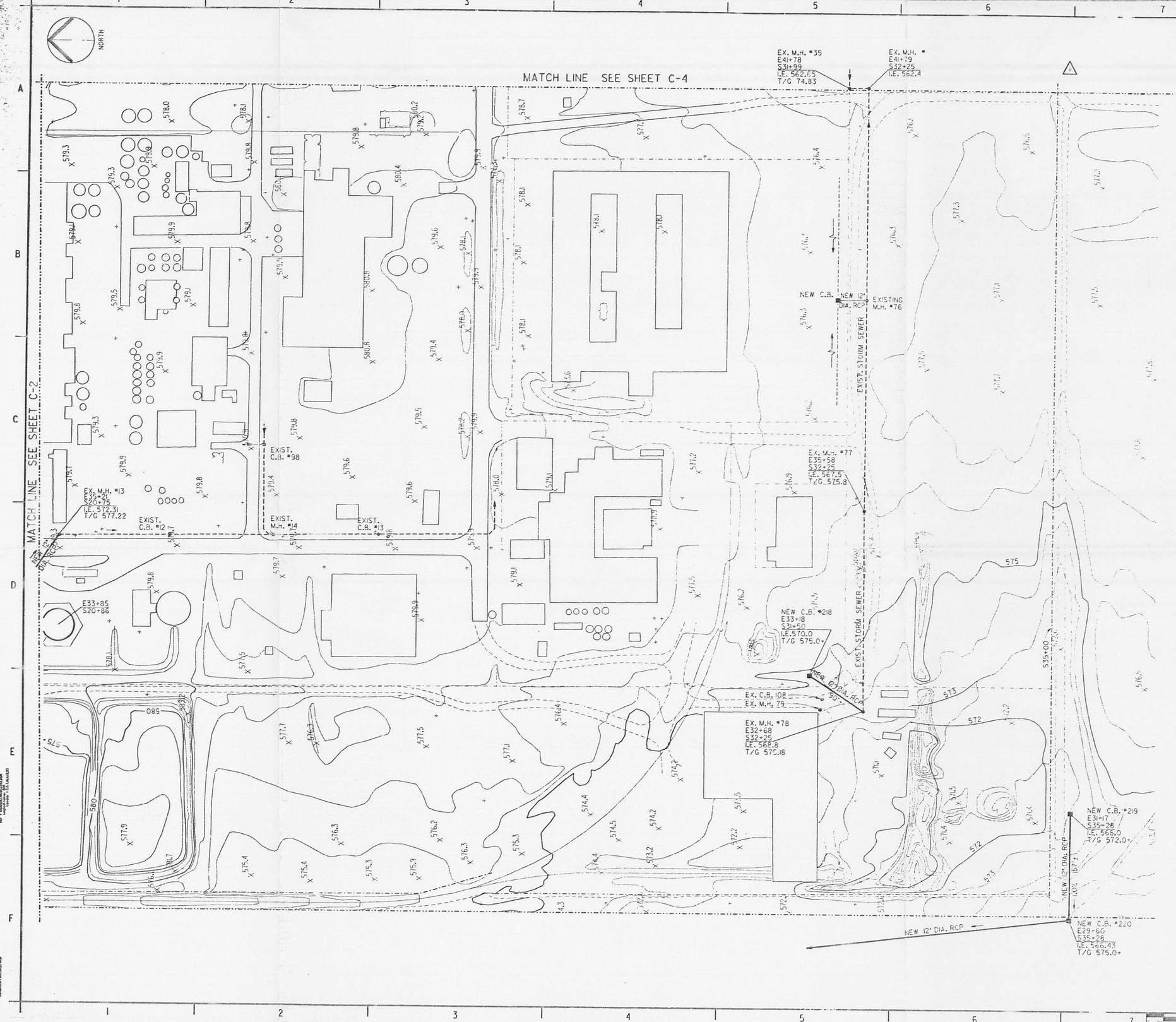
DRAWN BY	DATE	ENGINEERING REVIEW BY	DATE	PREPARED BY	DATE
MEC	4-92	RPD	4-92	WGI	4-92

CONTRACT NO.	SCALE	PLATE
FEMP	1" = 50'	

CONTRACT NO.	DRAWING NO.	SHEET NO.	REV. NO.
87-D-159	0087502 WBS 1.1.2.4.03	22-4445-C-00736	C-4	A

MAY 20 92

31



NOTES

1. SEE SHEET NO. C-6 FOR THE FOLLOWING DETAILS:
   TYPICAL CATCH BASIN DETAIL
   TYPICAL GRADING AT TRENCH DRAINS
   TYPICAL PIPE BENDING DETAIL

2. ALL DIMENSIONS AND ELEVATIONS PERTAINING TO EXISTING CONSTRUCTION TO BE FIELD VERIFIED BEFORE STARTING ANY WORK OR FABRICATION.

LEGEND

NEW	EXISTING	
■	•	CATCH BASINS (C.B.)
——	- - - -	STORM SEWER

C-3	C-4	
C-2	C-5	

SCALE: 1" = 50'

TO CORRELATE REFERENCED 'AMK SHEET No's' TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.: 22-4445-X-00732

MAY 26 '92

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPERATOR	DOE
A	100% REVIEW ISSUE	RPO 5-1-92		

INITIALS AND DATE

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

330

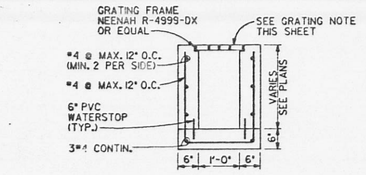
PROJECT NAME: ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS

DRAWING TITLE: STORM SEWER IMPROVEMENTS PLAN
REDIRECTION OF SUB-DRAINAGE AREAS SHEET 4 OF 4

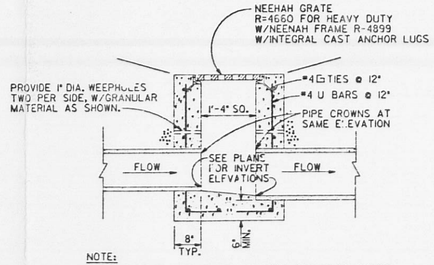
DRAWN BY	DATE	DESIGNED BY	DATE	REVIEWED BY	DATE
MEC	4-92	RPO	4-92	WGI	4-92

CAD DRAWING NO.	SCALE	REV.
FEMP	1" = 50'	

JOB PROJECT NO.	DRAWING NO.	SHEET NO.	REV. NO.
87-D-159	0087502 WBS 1.1.2.4.03	22-4445-C-00737	C-5	A



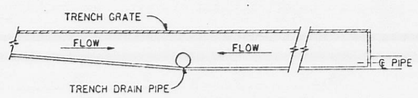
TYP. SECTION OF TRENCH DRAIN
SCALE: 3/4"=1'-0"



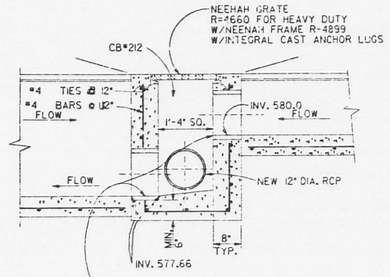
NOTE:
WHERE PIPE OR TRENCH DRAIN INVERT ELEVATION VARIES FROM CATCH BASIN INVERT ELEVATION, PLAN WILL NOTE I.E. (PIPE), OR I.E. (DRAIN)
FOR CATCH BASINS WITH SINGLE PIPES CATCH BASIN INVERT ELEVATION IS SAME AS PIPE INVERT ELEVATION.

SECTION

TYPICAL NEW CATCH BASIN DETAIL
NTS

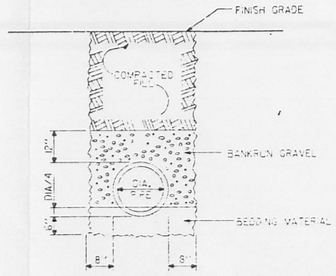


TYPICAL TRENCH OUTLETS



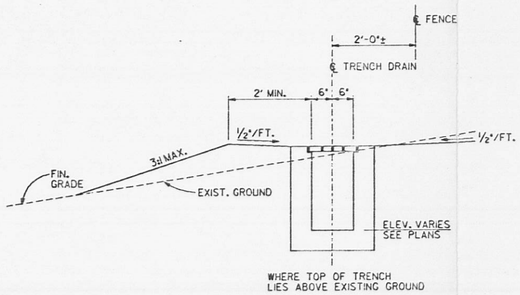
OPENINGS IN CATCH BASIN CAN BE FORMED FROM PIECE OF 12" PIPE AT CONTRACTORS OPTION. SEE PLANS FOR DRAIN INVERT ELEVATIONS. TYPICAL WHERE TRENCH DRAINS ARE TIED IN TO CATCH BASINS. SEE PLANS.

SECTION 1 / C-X-C

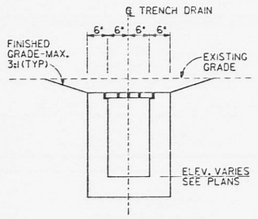


SECTION

TYPICAL PIPE BEDDING DETAIL
NTS

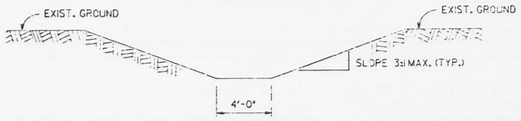


WHERE TOP OF TRENCH LIES ABOVE EXISTING GROUND

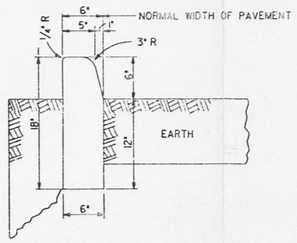


WHERE TOP OF TRENCH LIES BELOW EXISTING GROUND

TYPICAL GRADING AT TRENCH DRAINS
SCALE: 3/4"=1'-0"



TYPICAL DITCH DETAIL
NTS



TYPICAL CURB DETAIL
NTS

NOTES

1. ALL DIMENSIONS PERTAINING TO EXISTING CONSTRUCTION TO BE FIELD VERIFIED BEFORE STARTING ANY WORK OR FABRICATION.
2. ALL CONCRETE HAS BEEN DESIGNED AND THE DETAILING, FABRICATION AND CONSTRUCTION TO BE IN ACCORDANCE WITH THE ACI "MANUAL OF STANDARD PRACTICE" FOR DETAILING REINFORCED CONCRETE STRUCTURES (ACI 315-83) AND "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318-83)
3. UNLESS OTHERWISE NOTED, ALL CONCRETE IS TO BE NORMAL WEIGHT CONCRETE WITH MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3,000 PSI.
4. ALL CONCRETE EXPOSED TO WEATHER SHALL BE AIR ENTRAINED.
5. CHAMFER ALL EXPOSED EDGES OF CONCRETE PADS, ETC. 3/4" UNLESS OTHERWISE SHOWN OR NOTED.
6. ALL REINFORCING STEEL TO BE ASTM A 615 (SI) OR A 616, GRADE 60.
7. TRENCH DRAIN GRATING TO BE EITHER CI SIMILAR TO NEENAH R4999-DX TYPE-C OR GALVANIZED STEEL WITH 1 1/2" X 1/4" BEARING BARS AT 1 1/4" O.C.

MAY 26 '92

TO CORRELATE REFERENCED "AMK SHEET No's" TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.: 22-4445-X-00732

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	OPERATOR	DOE
A	100% REVIEW ISSUE	RPD 5-1-92		

INITIALS AND DATE

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

PRIME CONTRACT NO. DE-AC05-92OR21860 — A-E PROJECT NO. 0291-0

3301

PROJECT NAME
ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS

DRAWING TITLE
STORM SEWER IMPROVEMENTS
DETAILS

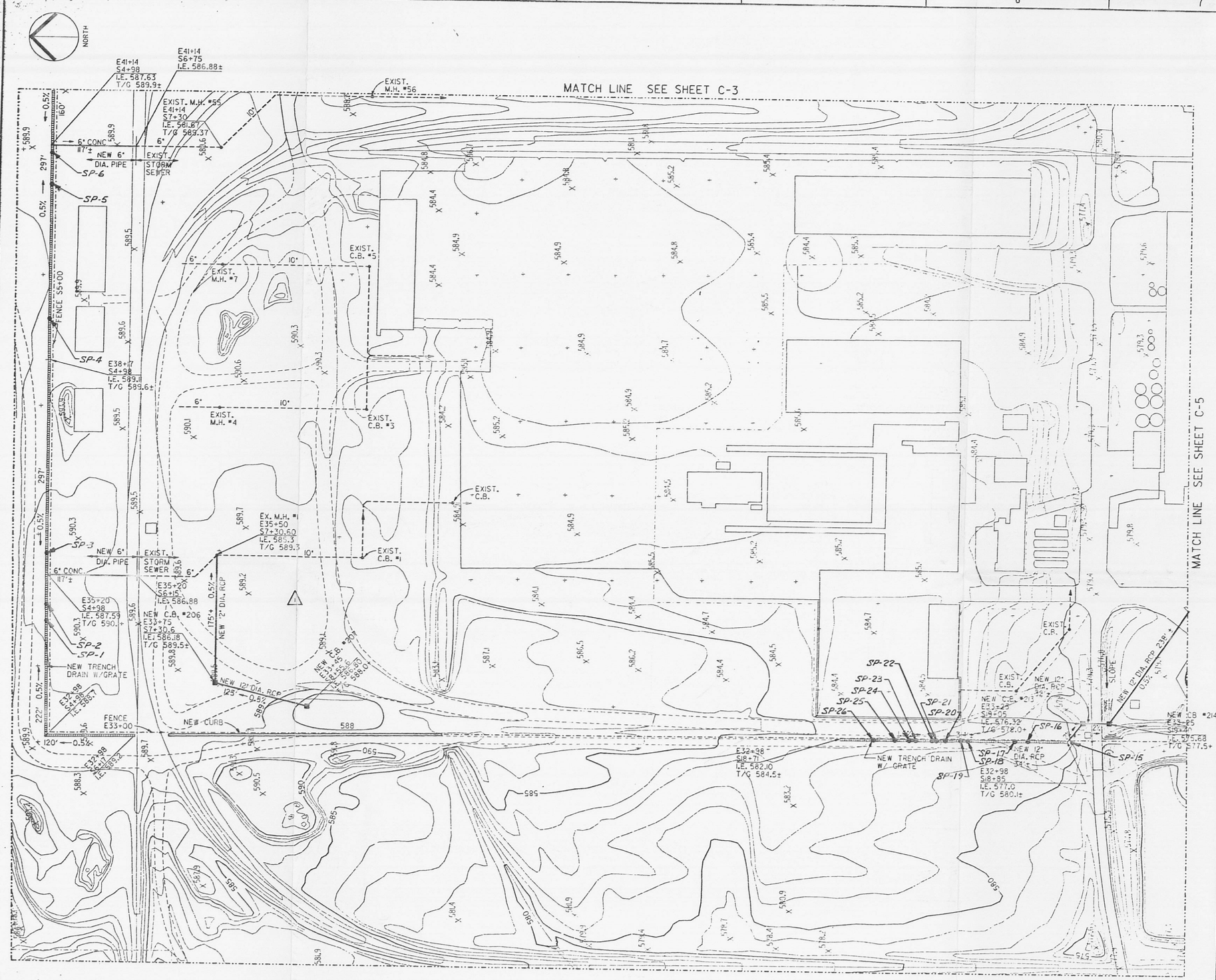
DRAWN BY	DATE	DESIGNED BY	DATE	CHECKED BY	DATE
PGD	4-92	RPD	4-92	WGI	4-92

PLANT BLDG. NO.	FLOOR	SCALE	CLASS
FEMP		AS SHOWN	

SUBMITTED FOR APPROVAL — A-E — DATE
APPROVAL RECOMMENDED — OPERATING CONTRACTOR — DATE
DRAWING APPROVED — DOE — DATE

DOE PROJECT NO.	OPERATIONS PROJECT NO.	DRAWING NO.	SHEET NO.	REV. NO.
87-D-159	0087502 WBS 1.1.2.4.03	22-4445-C-00738	C-6	A

33

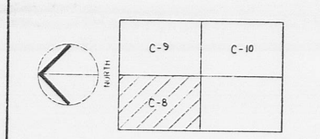


NOTES

1. SEE SHEET NO. C-6 FOR THE FOLLOWING DETAILS:
   - TYPICAL TRENCH DRAIN DETAIL
   - TYPICAL CATCH BASIN DETAIL
   - TYPICAL GRADING AT TRENCH DRAINS
   - TYPICAL CURB DETAIL
   - TYPICAL PIPE BENDING DETAIL
2. ALL DIMENSIONS AND ELEVATIONS PERTAINING TO EXISTING CONSTRUCTION TO BE FIELD VERIFIED BEFORE STARTING ANY WORK OR FABRICATION.

LEGEND

NEW	EXISTING	
■	•	CATCH BASINS (C.B.)
═══		TRENCH DRAINS
═══		CURB
———	- - - -	STORM SEWER



SCALE: 1" = 50'

TO CORRELATE REFERENCED "AMK SHEET NO's" TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.: 22-4445-X-00732

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	DRAWN BY	DGE
A	100% REVIEW ISSUE	RPD 5-1-92		

DATE AND INITIALS

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

A-E PROJECT NO. 3301

PROJECT NAME: ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS

DRAWING TITLE: STORM SEWER IMPROVEMENTS PLAN REDIRECTION OF SUB-DRAINAGE AREAS

DRAWN BY	DATE	DESIGNED BY	DATE	CHECKED BY	DATE
MEC	4-92	MJL	4-92	LMP	4-92

PLANT OR BLDG. NO.: FEMP; FLOW; SCALE: 1" = 50'; CLASS

DRAWING NO.: 87-D-159; 0087502 WBS 1.1.2.4.03; 22-4445-X-00732; SHEET NO.: C-8; REV. NO.: A

MAY 26 '92

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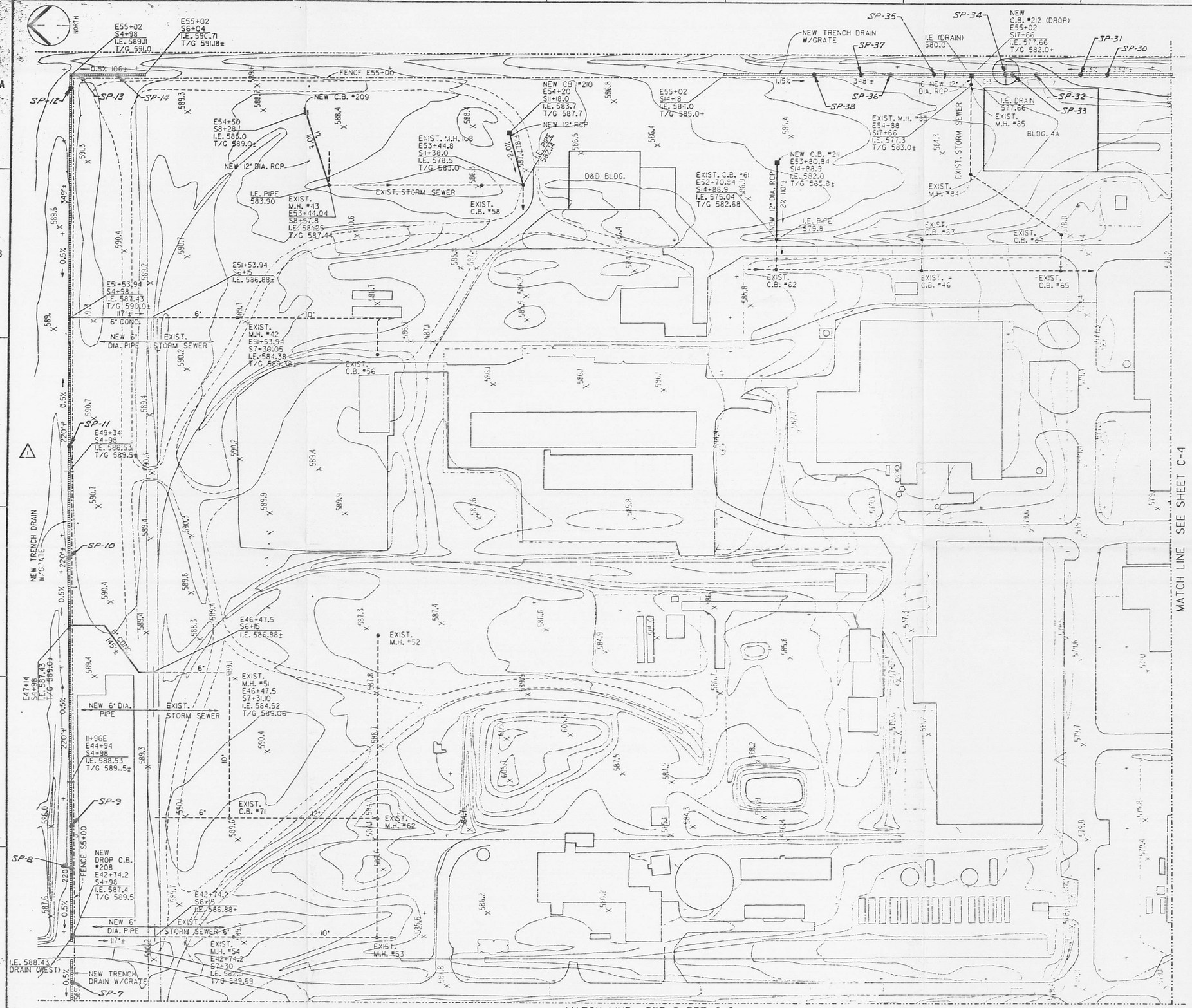


NOTES

1. SEE SHEET NO. C-6 FOR THE FOLLOWING DETAILS:
   TYPICAL TRENCH DRAIN DETAIL
   TYPICAL CATCH BASIN DETAIL
   TYPICAL GRADING AT TRENCH DRAINS
   TYPICAL PIPE BENDING DETAIL

2. ALL DIMENSIONS AND ELEVATIONS PERTAINING TO EXISTING CONSTRUCTION TO BE FIELD VERIFIED BEFORE STARTING ANY WORK OR FABRICATION.

LEGEND

NEW	EXISTING	
■	•	CATCH BASINS (C.B.)
▒		TRENCH DRAINS
——	- - - -	STORM SEWER

NUMBER OF SECTION OR LETTER OF DETAIL
DRAWING ON WHICH SECTION OR DETAIL IS TAKEN
DRAWING ON WHICH SECTION OR DETAIL IS SHOWN

SECTION & DETAIL KEY

C-9 C-10 C-8

MAY 26 '92

0 50 100 150 200 250
SCALE: 1" = 50'

TO CORRELATE REFERENCED "AMK SHEET No.'s" TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.: 22-4445-X-00732

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	DRAWN BY	DOE
A	100% REVIEW ISSUE	RPD 5-11-92		

DETAILS AND DATE

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

3301

PROJECT NAME
ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS

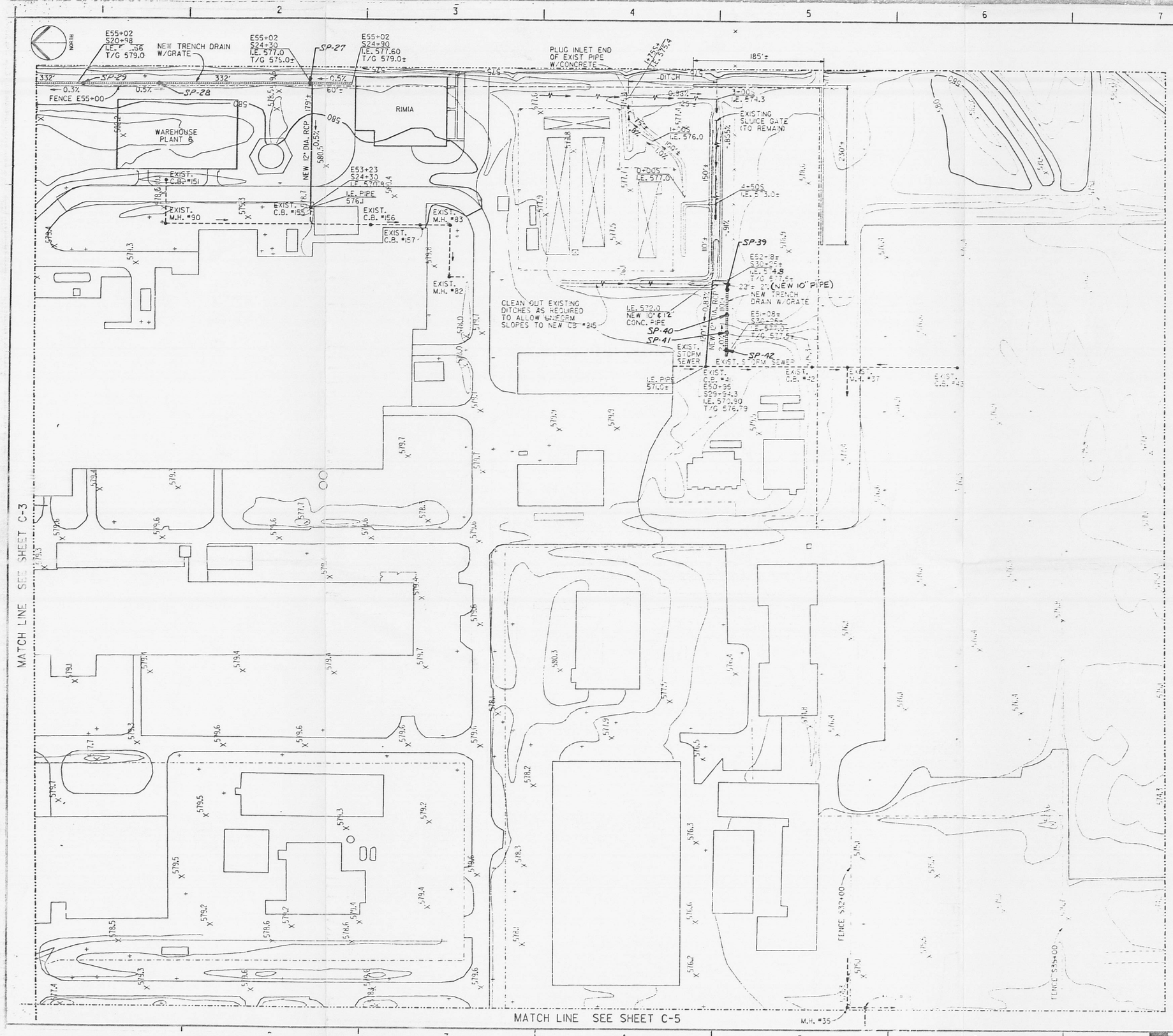
DRAWING TITLE
STORM SEWER IMPROVEMENTS
PLAN
REDIRECTION OF SUB-DRAINAGE AREAS

DRAWN BY	DATE	DESIGNED BY	DATE	CHECKED BY	DATE
MEC	4-92	RPD	4-92	WGI	4-92

PLANT BUILDING: FEMP | FLOOR: | SCALE: 1" = 50' | CLASS:

PROJECT NO.	PROJECT DRAWING NO.	DRAWING NO.	SHEET NO.	REV. NO.
87-D-159	0087502 WBS 1.1.2.4.03	22-4445-C-00735	C-9	A

43

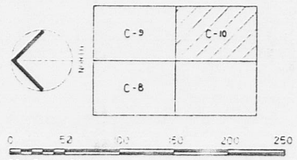


NOTES

1. SEE SHEET NO. C-6 FOR THE FOLLOWING DETAILS:
   TYPICAL TRENCH DRAIN DETAIL
   TYPICAL CATCH BASIN DETAIL
   TYPICAL GRADING AT TRENCH DRAINS
   TYPICAL CURB DETAIL
   TYPICAL PIPE BENDING DETAIL
   TYPICAL DITCH SECTION
2. ALL DIMENSIONS AND ELEVATIONS PERTAINING TO EXISTING CONSTRUCTION TO BE FIELD VERIFIED BEFORE STARTING ANY WORK OR FABRICATION.

LEGEND

NEW	EXISTING	
■	•	CATCH BASINS (C.B.)
		TRENCH DRAINS
		CURB
	----	STORM SEWER



TO CORRELATE REFERENCED "AMK SHEET No's" TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.: 22-4445-X-00732

REV. NO.	ISSUE OR REVISION PURPOSE DESCRIPTION	A-E	DRAWN BY	DOE
A	100% REVIEW ISSUE	RPD 5-1-92		

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

3301

ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS

STORM SEWER IMPROVEMENTS
PLAN
REDIRECTION OF SUB-DRAINAGE AREAS

DRAWN BY	DATE	DESIGNED BY	DATE	CHECKED BY	DATE
MEC	4-92	RPD	4-92	WGI	4-92

CLIENT	SCALE	DATE
FEMP	1" = 50'	

PROJECT NO.	PROJECT TITLE	SHEET NO.	REV. NO.
87-D-159	0087502 WBS 1.1.2.4.03	22-4445-C-00736	C-10	A

MAR 26 '92

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