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FERNALD ENVIRONMENTAL MANAGEMENT PROJECT BACKGROUND SAMPLING PLAN REVISION 0 OCTOBER 1991

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SAMPLING PLAN

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Revision 0
October 1991

U.S. Department of Energy
Fernald Environmental Management Project
7400 Willey Road
Fernald, Ohio 45030

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EXECUTIVE SUMMARY

This Background Sampling and Analysis Plan provides a method of obtaining data to establish a baseline for background concentrations of naturally occurring metals, radionuclides, and cyanide in native soils in the vicinity of the Fernald Environmental Management Project (FEMP). The background data obtained will be used in support of Resource Conservation and Recovery Act (RCRA) closures and the ongoing Remedial Investigation / Feasibility Study (RI/FS) at the FEMP.

This plan will also provide geologic surveys of the soil types at the sampling locations. The geologic survey information is necessary to determine the appropriate background data based on the lithology encountered during facility clean up and closure activities as compared to the lithology at background sampling locations. This plan discusses sampling depths and locations, sample collection methodology, QA/QC documentation and handling procedures, chemical analyses to be performed, and the statistical evaluations required to evaluate and report findings.

1.0 INTRODUCTION AND BACKGROUND

The Fernald Environmental Management Project (FEMP) is a U.S. Government Owned, Contractor Operated facility formerly named the Feed Materials Production Center (FMPC). The facility was constructed in 1951/1952 and began operation in 1953. The FEMP site is located on 1,050 acres in a rural area approximately 18 miles northwest of Cincinnati, Ohio. The FEMP production areas are limited to an approximate 136 acre tract near the center of the site. The villages of Fernald, New Baltimore, Ross, New Haven, and Shandon are all located within a 5 mile radius of the plant (Attachment 1).

The former FMPC facility was established to produce uranium metals and compounds from natural ore concentrates for use in government defense programs. A wide variety of chemical and metallurgical processes were utilized to support the production of uranium metal products. Production operations began in the early 1950's and continued until July 1989 when production ceased.

In February 1991, DOE formally notified the U.S. Congress that the FEMP is being closed and all production missions have ceased. The closure of the FEMP will involve clean up of production facilities and various waste management facilities being used for the interim storage of low-level radioactive materials and mixed radioactive and RCRA hazardous wastes.

Both the OEPA and the USEPA require the use of natural background concentrations of potential contaminants to determine clean up criteria and evaluate relative risks while remediating contaminated sites. This has been emphasized by the OEPA in a letter dated August 20, 1991 and in the September 30, 1991 approvals with modifications for the Closure Plans submitted for Storage Tanks T5 and T6 and the Pad North of Plant 6 (received by DOE on October 2, 1991). The August 20, 1991 letter requested DOE propose how background concentrations at the FMPC will be determined.

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One of the Closure Plan approval modifications stipulated that a background sampling plan must be submitted within 30 days of the approvals.

The primary objective of this FEMP Background Sampling Plan is to determine the concentration of naturally occurring metals, radionuclides, and cyanide in soils on and around the FEMP site. Table 1 is a list of the specific parameters and analytical methods addressed in this background study.

2.0 SAMPLE LOCATION DETERMINATIONS

2.1 Characterization of Geology and Soils

Historical information on soils was used to identify potential background sampling locations. In addition, historical information concerning subsurface geology was identified and will be used to evaluate the comparability of the geology in background sampling locations with the FEMP production area. The available historical information includes:

- Five (5) subsurface geological cross sectional drawings of the FEMP site in 1951.
- U.S. Department of Agriculture Soil Conservation Service Soil Maps.
- RI/FS Database of Lithologic Logs from Site Drilling.

2.1.1 General Geological Description

The FEMP site and proposed off-site sampling locations are located on an undulating planar surface with an average surface elevation of approximately 625 feet. The plain on which the FEMP is situated is an erosional remnant of glacial interglacial and postglacial till, lacustrine and fluvial unconsolidated deposits. The soils near the FEMP were derived from glacial and glacial-fluvial sediments. Additional soil parent materials include loess and decayed organic matter from vegetation.

The bedrock in this area primarily consists of dense to fractured limestone, and dolomite interbedded with calcareous shales. The glacial sediments that underlie the FEMP site display a wide variability in both rock type and stratigraphy. The subsurface strata ranges from fine grained deposits such as clays to coarse grained deposits such as conglomerates. The strata includes loess, silt, fine sand, coarse sand and fine gravel. Organic sediments expected in the area includes woody plant derived material, peat, freshwater hard shelled fossils (such as

snails and mollusks), and terrestrial skeletal fossils (such as mammals and small burrowing animals).

During initial construction in 1951, twenty-five (25) borings were made to develop five (5) subsurface geological cross section drawings of the FEMP site. Attachment 2 shows the relative locations for which cross section drawings were made. Attachments 3a through 3e provide the summary drawings of the five (5) geological cross sections. Attachments 4a and 4b provide a tabulated summary of the drilling logs maintained for each of the 25 borings taken from which the subsurface geologic cross sections were derived. This information will be used to compare and evaluate the applicability of the background data obtained from this proposed background sampling project.

An experienced Project Geologist will work with the FEMP project manager to implement and evaluate this background sampling project. The project geologist will maintain a drilling log to document the field characterization of subsurface soils and record any pertinent observations or tests made in the field. A sample drilling log is included in Attachment 5.

2.1.2 General Surface Soil Descriptions

Three U.S. Department of Agriculture Soil Conservation Service (USDA/SCS) Soil Survey reports were identified and reviewed to characterize surface soils at the FEMP and surrounding areas. The reports used were:

1.) the 1917 Hamilton County USDA/SCS Soil Survey,

2.) the 1980 Butler County USDA/SCS Soil Survey, and

3.) the 1982 Hamilton County USDA/SCS Soil Survey.

The major surface soil types at the FEMP have been identified as Genesee,

Fincastle, Miamian, and Fox. Each major soil classification is made up of several sub-classifications or soil types. Table 2 provides a listing of the four major soil classifications and soil types found at the FEMP.

2.2 Selection of Background Sample Locations

Pursuant to discussions with the OEPA Southwest District Office, the FEMP proposes to select three off-site sample locations near the FEMP for background sampling. The three proposed background sample locations and three alternate locations are shown in Attachment 6. These locations were proposed based upon a review of the available USDA/SCS soils maps and their relative location to the FEMP.

The entire FEMP site area totals approximately 1050 acres. The area of major disturbance from FEMP site activities is located centrally within the 1050 acres, and it comprises approximately 136 acres (see Attachment 1). The proposed background sample locations are located northwest and west of the FEMP production site in areas that are not likely to have been contaminated from surface runoff or airborne contaminant from the FEMP. Attachments 7a and 7b are topographical maps which show general surface water flow patterns in the vicinity of the FEMP. The prevailing winds are from a westerly direction (as shown in the wind rose diagram in Attachment 8) which minimizes the possibility of airborne contamination of the proposed areas by the FEMP (FMPC) operations.

The predominant use of the areas proposed for background sampling is agricultural, which is consistent with the use of the FEMP site before 1951. In addition, the area west of the FEMP does not contain industrial facilities which could provide a secondary source of contamination.

Area and soils at the background locations will be inspected and characterized by a qualified geologist to verify that the soils are similar to FEMP soils. Surface soil profile information will be determined in the field and compared to the published USDA/SCS physical

property ranges typical of the FEMP soil types identified in Table 2. All pertinent field observations and tests will be recorded on a soil characterization field work sheet and will be maintained with the field sampling log book (see Section 4.1).

In addition, property owners will be interviewed to determine if previous activities and uses in the proposed areas may have contaminated the soils with heavy metals. A sample location will be removed from consideration if suspect activities are identified (e.g., heavy pesticide and herbicide applications, areas frequently used for fuel and equipment storage, etc.).

When appropriate soil types have been verified and a review of previous uses indicates the proposed locations are suitable, specific sample collection locations will be selected based on accessibility and isolation from potential sources of contamination (e.g., road beds, farm chemical or petroleum storage areas, sewage disposal systems, etc.). Four sample boring locations will be identified, marked with survey stakes, and located on a map or drawing using fixed reference points (e.g., fence lines, buildings roads, etc.) to clearly designate where soil borings will be made for collection of samples.

The alternate sample locations, identified in Attachment 6, will be used if a primary location is found to be unacceptable. An alternate sampling location may also be used if additional sampling is required to compensate for contaminated sample locations or statistical anomalies identified during evaluations of analytical data. In the unexpected event that additional sample locations are required, the locations will be selected following the same process as described above.

The OEPA will be given one week notice prior to field inspections and selection of sample collection locations so they may observe this process.

3.0 SOIL SAMPLE COLLECTION PROCEDURES

The following sections discuss the procedures that will be used to collect background soil samples for analyses. All soil sample collection procedures and activities will be conducted in a manner consistent with the procedures outlined in the Remedial Investigation / Feasibility Study (RI/FS), FEMP Volume V Quality Assurance Project Plan (QAPP), Revision 3.

Prior to sampling, the laboratory identified to conduct the analyses will be contacted to confirm availability to provide timely analyses. If necessary to meet scheduled completion of the ongoing RCRA closure actions, expedited analyses of the eight metals listed under Toxicity Characteristics in OAC 3745-51-10 (40 CFR 261.10) will be requested.

3.1 Sampling Equipment

The following is a list of sampling equipment and supplies required for collection of soil samples:

- Drilling rig
- Split spoon sampler
- Spatula (stainless steel, glass)
- Scoops or trowels (stainless steel or other suitable material)
- Sample containers for soil samples
- Sample labels
- Waterproof marking pen
- Field sampling log book and field data forms
- Latex gloves
- Disposable coveralls
- Disposable boot covers
- Tape
- Custody seals and custody tape

This is not intended to be a comprehensive list and may be supplemented with appropriate items as judged by a trained, qualified supervisor or manager.

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3.2 Samples to be Collected

Three sample locations are proposed. To provide 12 sampling points, four soil sample borings will be selected at each of the three sample locations (see Attachment 6). A sample set will be collected from each boring at the following three surface soil sampling depths:

1.) 0 to 6 inches
2.) 6 to 18 inches
3.) 18 to 30 inches

In addition, a sample set will be collected from each boring at each lithologic strata or zone encountered between 30 inches from ground surface to the first aquifer encountered or a maximum depth of 20 feet from ground surface. The delineation of lithologic zones will be determined by the project geologist as soil cores are removed.

A sample set will consist of a 20-oz. aliquot of soil placed into two sample containers. A 16-oz. sample will be collected and analyzed for metals and cyanide. A second 4-oz. sample will be collected and analyzed and/or archived for radionuclides. Radionuclide analyses will only be conducted for the 0 to 6 inch soil samples. The remaining soil samples for radionuclide analyses will be collected and retained for possible future analyses. Table 1 lists the parameters to be analyzed in this background study. Table 3 identifies the appropriate sample containers, preservation methods, and required holding time limitations.

3.3 Sample Collection Methodology

Samples will be collected using a drill rig equipped with a split spoon sampler. All soil cores will be collected in accordance with ASTM D-1586-84 as referenced in the RI/FS QAPP.

To prevent cross contamination, all sampling equipment will be cleaned prior to use. Enough duplicate, clean sampling equipment will be provided to continue sample collection while used sampling equipment is being decontaminated (following procedures in Section 3.5). Samples will be collected directly from the split spoon sampler using the following procedures:

1. Set up a drilling rig at the soil sample collection location.

2. Place clean polyethylene sheeting on the ground to protect sampling equipment from potential contamination.

3. Drive the split spoon samplers into the soil in 18 inch increments.

4. After driving the split spoon sampler 18 inches into the sample boring, remove the split spoon sampler from the boring and place it on clean polyethylene sheeting.

5. Open the sample barrel. Characterize the soil in the core. Record the lithologic characterizations in a drilling log (see Attachment 5).

6. Use a clean trowel or spatula (stainless steel or other suitable material) to collect samples from the desired intervals. Delineate sampling interval by vertically cutting the top and bottom of the desired interval(s) of the soil core Use the trowel or spatula to remove the soil and place it into the sample jars. As the soil sample is removed, divide the sample between the sample containers for the parameters listed in Table 1. Table 3 identifies the type and size of containers to be used, preservation methods, and applicable analytical holding time limitations.

If the amount of soils obtained from the original boring does not provide enough sample, make a second soil boring adjacent to the first (allowing sufficient spacing to prevent cave-in) and collect additional soils from the desired interval(s).

NOTE: Place all soils and cuttings removed from the sample boring that are not used for samples into clean labeled 55-gallon drums. Store the drums at the FEMP pending analyses of the soil and sampling equipment decontamination rinseate samples. Appropriate disposal options will be determined based on these analyses.

7. Prepare the sample boring for the next sample by drilling out the hole to the bottom of the hole to remove loose material. Remove all cuttings and loose material from the hole before inserting a clean split spoon sampler to collect the next soil core.

8. Repeat steps 3, 4, 5, 6, and 7, respectively, until reaching a depth of 20 feet or an aquifer is encountered.

9. Label and manage all containers filled with samples following container management procedures in Section 3.4 of this plan.

10. Upon completion of soil sampling, backfill the boring with grout mixed to the manufacturer's specifications. To prevent ponding, pack a small mound of excavated topsoil over the grout plug to fill in depressions that will form as the topsoil settles.

11. Decontaminate all sampling equipment that was used following the procedures in Section 3.5. Collect equipment that cannot be cleaned of visible contamination and store it at the FEMP pending analyses of the soil samples and QC samples of

sampling equipment decontamination rinseates. Appropriate disposal options will be determined based on these analyses.

12. Seal sample coolers and transfer them to the designated sample packing and shipping area.

13. Move to a new location and repeat steps 1 through 12 until all 12 soil borings have been completed and all required samples have been collected.

3.4 Sample Container Management

Filled sample containers will be managed as follows:

1. For all samples, add required preservatives (as specified in Table 3) tightly close the lid, and attach appropriate label (see example in Attachment 9).

2. Document and record sample and container information in the field sampling log book and on a sample Analyses Request/ Custody Record form (see example in Attachment 10). The list of parameters addressed in this plan are provided in Table 1.

3. Immediately place sample containers into a sample cooler that has been chilled to 4° C.

4. Record all transfers of sample custody on the Analyses Request/Custody Record form (see example Attachment 10).

5. To maintain chain-of-custody, insure that access to all samples is controlled. This requires the sample collector or designated sample custodian to:

    - have constant direct physical control,

- use a locked limited access area under his/her control, or
- affix signed container custody seals on samples or sample coolers.

3.5 Sampling Equipment Decontamination

All sampling equipment used must be clean. Before beginning any decontamination procedures, all personnel will inspect their clothing to insure that clean clothing or clean disposable outer coveralls are used. Clean chemical resistant gloves will be used during the decontamination process and when handling any clean equipment. Sampling equipment decontamination procedures are discussed in the following sections.

3.5.1 Decontamination Supplies

The following is a list of common supplies used:

- Laboratory grade non-phosphate detergent solutions
- Long-handled scrapers (stainless steel, glass)
- Long-handled, soft bristled brushes
- Portable low-pressure water sprayers
- Potable tap water
- Deionized water
- Polyethylene or other suitable plastic sheeting
- Waste drums, cans, and heavy duty plastic bags
- Absorbent materials, socks, and pads
- Wash/Rinse tubs, buckets, or other suitable containers

This list is not intended to be a comprehensive listing of all supplies that may be used. Decontamination supplies will be specified by a trained, qualified supervisor or manager based upon field conditions encountered. The decontamination supplies and procedures will be documented in the sample field sampling log book.

3.5.2 Decontamination Procedures

All sampling equipment will be decontaminated after each use. If decontamination is not practical, the sampling equipment will be placed into a suitable container and stored at the FEMP pending analyses of the soil and sampling equipment decontamination rinseate samples. Appropriate disposal options will be determined based on these analyses.

The following procedures will be used to decontaminate sampling equipment:

1. Establish a decontamination area in a location that is protected from potential contamination. Use a double thickness of 6-mil polyethylene or other suitable sheeting to line the decontamination area. Provide a supporting frame (e.g., a wooden box, plastic pool, etc.) to elevate the edges of the sheet and contain any decontamination wash or rinse waters that may be spilled.

2. Provide appropriate containers for containment, handling, and collection of wastes. Non-liquid wastes will be collected in a heavy duty plastic bag, 55-gallon drum, or other suitable container. Liquid wastes will be collected in buckets and/or placed into 55-gallon drums or other suitable liquid storage containers.

3. Remove visible residues and stains by scraping, scrubbing, and washing with an aqueous detergent solution.

4. Rinse three times with deionized water.

5. When collecting QC samples of the final rinse, follow procedures in Section 5.1.

6. After the equipment has been properly decontaminated, place it on a clean sheet of polyethylene or other suitable material to air dry. To keep the equipment clean while air drying, loosely cover the equipment with another clean piece of sheeting.

4.0 FIELD SAMPLE DOCUMENTATION AND HANDLING PROCEDURES

Sample documentation and handling procedures will conform to FEMP procedures. The information in the following sections presents the basic field sample handling procedures to be followed.

4.1 Field Sampling Log Book

An up-to-date field sampling log book will be maintained to document all information and observations pertinent to the background sampling activities. The log book will be bound with consecutively numbered pages. At a minimum, the entries in the log book will include the following:

- Name of property owner(s)
- Name of FEMP Project Manager
- Maps, drawings, or photographs of the sampling site
- Description and location of sampling points
- Documentation of deviations from the approved sampling plan.
- Description of sampling methods and field sampling activities
- Weather conditions at the time samples are collected
- Number, type, and volume of sample taken
- Date and time of collection
- Collector's sample identification number(s)
- Names of sampling personnel
- Date, time, and carrier for sample shipments
- Field observations (e.g., spills or other activities nearby)
- Signatures of persons responsible for maintaining the log book
- Description of decontamination procedures and methods used

The log book will record sufficient information to allow reconstruction of the sampling activities without reliance on the collector's memory. Also, the log book will be stored in accordance with FEMP document control procedures.

A copy of the sample drilling logs (see Attachment 5 and Section 2.1.1 of this plan) will be maintained with the field sampling log book information. The copy will be signed and dated by the geologist who completed the drilling log.

4.2 Sample Processing and Shipping Procedures

Sample coolers, along with the signed and completed sample Analyses Request/Custody Record form will be taken to a designated sample packing and shipping location. To eliminate any possibility for cross-contamination, the sample packing and shipping area will not be located on the FEMP site. Each person who takes possession of the samples or sample coolers will sign the Custody Record and record the date and time of transfer. Samples will be shipped using the following procedures:

1. Prepare all samples for shipment following DOT packing and shipping procedures.

2. If samples are to be delivered by a carrier service, contact the carrier to confirm pick up can be made within 24 hours.

3. Indicate the name of the carrier and date of shipment on the accompanying sample Analyses Request/Custody Record form (see Attachment 10).

4. Before packaging for shipment, seal the form inside a waterproof plastic bag and tape the bag to the inside lid of the sample shipping containers.

NOTE: All shipping papers (e.g., bill of lading and carrier shipping forms) become part of the Custody Record. The FEMP Project Manager will instruct the laboratory to attach the signed shipping papers to the sample Analyses Request/Custody Record form. The signed custody forms and shipping papers will be returned to the FEMP as part of the analytical report package.

5. Seal sample shipping container lids with a custody seal. Sign and date all custody seals.

6. Confirm that the designated carrier has been contacted and hold sample shipments (along with all required paper work) for pick up.

7. The analytical laboratory conducting the analyses will contact the Project Manager to confirm receipt of the shipment. If the laboratory does not call within 24 hours of shipment, the Project Manager will call and confirm receipt of shipment.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

Quality Assurance/Quality Control (QA/QC) procedures are required to identify, evaluate, and control conditions and activities that can affect the quality and validity of the analytical data obtained from sampling and analyses. Validation of data collection requires accurate records to document activities and conditions. At a minimum, this will include:

- a field sampling log book,
- sample labels,
- collection of field and laboratory QA/QC samples, and
- completed sample Analyses Request/Custody Record forms

The field sampling log book is discussed in Section 4.1. An example of the sample labels to be used is provided in Attachment 9.

Sampling activities conducted for the background study will be consistent with the procedures outlined in the RI/FS, FEMP Volume V QAPP, Rev. 3. The following sections discuss field QA/QC, laboratory QA/QC, and sample Analyses Request/Custody Record forms.

5.1 Field QA/QC Procedures

To prevent cross-contamination between samples, only clean sampling equipment will be used. When sampling equipment is decontaminated, a periodic grab sample of the final rinse from equipment decontamination will be collected to confirm that decontamination is effective and to evaluate the potential for cross-contamination. At least one (1) sample of sampling equipment final rinseate will be collected for every 20 samples or each day sampling is conducted using the following procedure:

1. Take a piece of sampling equipment that has been decontaminated following the procedures in Section 3.5.2 and pour deionized water over the cleaned surface.

2. Collect the deionized water rinse into a clean glass beaker or stainless steel bowl.

3. Use a glass pipette to transfer samples to the appropriate sample containers. See Table 3 to identify the appropriate sample containers, preservation methods, and holding times applicable for the sample analyses required.

4. Follow container management procedures in Section 3.4.

In addition to equipment decontamination rinseate samples, the following field quality control samples will be collected:

- Field Blanks (1 per 20 samples or 1 per sampling round, whichever is more frequent) - organic-free or deionized water poured into a clean sample container by sampling personnel at the sample location. These samples will be used to determine whether the sample collection process or conditions at the site have affected sample quality.
- Preservative Blanks (1 per batch of preservative or 1 per sampling round, whichever is more frequent) - a sample of the preservative in an organic-free or deionized water sample. The sample will be prepared in a controlled environment by sampling personnel. These samples will be used to evaluate the potential for introducing contamination into the sampling process from contaminated preservatives.
- Container Blanks (1 per batch of sample containers) - an unpreserved sample container filled with organic-free or deionized water adjusted to a pH of 2 using nitric acid. The sample shall be prepared in a controlled environment by the field sampling team. These samples will be used to evaluate the potential for contamination of soil and decontamination rinseate samples by unclean containers or leaching of contaminants from the containers.

- Duplicate Samples (1 per 20 samples of each matrix, i.e., decontamination rinseates and soils, or 1 per sampling round, whichever is more frequent) - a sample collected by distribution of one soil or rinseate sample into sample containers for 2 sample sets using the same sample collection methods specified above for decontamination rinseates and in Section 3.3 for soil sampling. These samples are used to determine the precision of laboratory analyses and sample collection procedures.
- Performance Evaluation Samples (1 every 60 days or 1 per project, whichever is more frequent) - samples spiked with a known quantity of analytes. This sample is not the same as a laboratory spike sample used for internal laboratory QC. The sample will be prepared in a laboratory environment and transported to the sample site to be labeled, logged, and shipped with samples collected in the field. These samples will be used to evaluate the accuracy of laboratory analyses.
- Material Blanks (1 per batch of cleaning solution) - an unused sample of the decontamination cleaning solution collected in a clean, unpreserved sample container. The sample will be prepared in a controlled environment by sampling personnel. These samples will be used to evaluate the potential for introducing contamination into the sampling process from contaminated cleaning solutions.

If requested, additional split samples of soils or decontamination rinseates may be collected for QC confirmation by an independent laboratory. Field duplicate samples will not be identifiable from labels or sample numbering.

The following field quality assurance procedures will be used:

1. Certified, clean sample containers will be obtained from the analytical laboratory.

2. Clean chemical resistant gloves will be used whenever contact is made with a sample or the sampling equipment.

3. Sampling containers and collection equipment will be handled, stored, and maintained in a manner that prevents cross-contamination.

4. Any field conditions, events, or activities that may affect analytical results will be documented in the field sampling log book (see Section 4.1 of this plan).

5. Consistent with requirements of the RI/FS QAPP a record of all samples will be kept in the field logbook and chain-of-custody will be maintained for all samples (see Section 5.3 of this document).

6. Field sample duplicates will be noted in the field sampling log book for use in FEMP QA/QC review of analytical reports.

5.2 Laboratory QA/QC Procedures

The laboratory used by the FEMP for analyses of background samples will use analytical methods listed in Table 1. In addition, the laboratory will demonstrate that it has a quality assurance/quality control plan for all parameters, consistent with the Contract Laboratory Program (CLP) and the RI/FS QAPP requirements.

The laboratory conducting the analyses will document the use and results of laboratory quality control samples and analyses (to be included in the laboratory analytical report). Laboratory samples for quality control (QC) include:

- laboratory equipment blanks to detect residual contamination of analytical equipment that may affect results,

- matrix spike, matrix spike duplicates and method surrogate compounds to evaluate the accuracy (i.e., the efficiency of the methods used to recover and detect analytes) and precision,
- duplicate samples prepared in the laboratory to evaluate the precision (i.e., the ability to reproduce analytical results) achieved by the methods used.

All pertinent information concerning problems and conditions which may affect the validity of the analytical data must be clearly identified for each sample. In addition to laboratory QC samples and analyses, the laboratory conducting the analyses will document and maintain a record of the following information as part of sample and analyses chain-of-custody records:

- the name of person receiving the sample(s)
- the date and time of sample receipt
- laboratory sample number
- date and time of sample analyses
- signature of the laboratory supervisor
- Discrepancies between sample shipping records, sample analytical requests, custody records, and the sample shipments as received by the laboratory
- Sample containers and packaging problems, such as broken containers, loose lids, and broken custody seals.

The laboratory shall notify the FEMP Project Manager of any sample shipment problems or discrepancies by the end of the next working day after receipt of samples with a written follow up notice as soon as possible.

5.3 Sample Analyses Request / Chain-Of-Custody Procedures

An Analyses Request/Custody Record form will be filled out and will accompany every shipment. Every sample in the shipment will be accounted for on the Analyses Request/Custody Record form for that shipment (see Attachment 10). The Custody Record (including any shipping papers) documents sample possession from the time of collection through receipt by the off-site analytical lab conducting the analyses.

Each sample container will be labeled (see Attachment 9) with the sample number and identification that is consistent with the sample Analyses Request/Custody Record form (see Attachment 10). A sample Analyses Request/Custody Record form and sample label will accompany all samples throughout the sample handling and analytical process.

Records of any custody seals used on shipping containers will also be maintained. The laboratory will be instructed to document in writing the condition of any custody seals on containers that they receive.

The laboratory representative who receives the sample shipment will record receipt in the custody record section of the sample Analyses Request/ Custody Record form and initiate the laboratory chain-of-custody for the samples. Reports of sample analyses shall include the laboratory chain-of-custody records and the completed sample Analyses Request/Custody Record form(s) for every sample being reported. The laboratory will submit reports of sample analyses to the FEMP Project Manager.

5.4 Disposition of Analytical Samples

Where applicable, the FEMP Project Manager will instruct the laboratory to retain samples for further reference or use. The FEMP reserves the right to have the samples shipped to another laboratory (with the proper chain-of-custody) for confirmation analyses. Prior to final disposal/disposition of samples, the analytical laboratory will contact the FEMP Project Manager for concurrence with waste disposal or treatment methods and facilities to be used.

6.0 ANALYTICAL REQUIREMENTS

This sampling project will support activities in response to RCRA and other DOE environmental assessment activities. The following sections discuss the rationale for the requested analyses and a summary of how the data obtained will be evaluated, reported and used.

6.1 Sample Analyses Requested

In May 1991 OEPA Closure Guidance, evaluation of inorganic contamination in soils is based on comparison of total concentrations in the potentially contaminated area to total concentrations in background samples. However, organic hazardous contaminants are evaluated differently. The acceptable levels of organics are not evaluated by comparison to background samples. Rather, concentrations of organics are not to exceed the detection limits of the analytical method. Consequently, there is no need for comparison to background samples and this FEMP Background Sampling Plan does not address organic compounds. All FEMP background sample analyses will use the methods specified for the parameters listed in Table 1.

6.2 Report on Findings

The background sampling report will provide:

- soil and lithology characterizations and comparisons,
- results of laboratory analyses of samples collected,
- a statistical evaluation of the data to provide a range of background concentrations of metals, radionuclides and cyanide in soils at various depths in the vicinity of the FEMP

6.2.1 Soil Characterizations and Comparisons

The project geologist will prepare a report which summarizes and discusses the initial soil characterizations made to verify appropriate soil types at the selected sampling locations. The drilling logs maintained during sample collection will also be summarized. The report will discuss variations in lithology and identify comparable lithologic zones from the 12 sample boring locations.

The report will also include a comparison of the current surface soils and subsurface lithology information with the historical information available from the 1951 soil borings (see Section 2.1.1 and Attachments 2, 3a through 3e, 4a, and 4b).

Additional information available from the CERCLA RI/FS being conducted at the FEMP may also be used to assist in evaluation of the representative nature and applicability of the background information obtained from this background study.

6.2.2 Report of Analyses

A report of findings, including the laboratory analyses data and the statistical assessment, will be prepared for the OEPA. This report will include the following information:

- The total number of samples taken
- The location coordinates and depth of each sample taken
- The date and time each sample was obtained
- The type of analyses performed on each sample (see Table 1)
- The concentration of each analyte in each sample

Sample analytical results will be tabulated for each sample boring location. In addition, results will be tabulated to show analytical results of all samples collected from each surface soil depth and lithologic zone/strata sampled.

All QA/QC data will be tabulated and related to the applicable sample analyses. A data validation assessment of the sampling and analyses will be conducted to identify and discuss any problems that may effect data quality and/or limit the use of the analytical results. The data validation process will include a complete review of field activity logs and laboratory data and records to confirm that appropriate QA/QC procedures were followed in the collection and handling of samples in the field and in handling and analyses of samples in the laboratory.

6.2.3 Statistical Analyses to Determine Background Concentrations

Statistical analyses will be performed to evaluate the analytical results. Based on the analytical results, natural background concentrations of cyanide and the metals and radionuclides listed in Table 1 will be calculated and evaluated. The information obtained from this study will be used to compare the concentration of the metals, radionuclides and cyanide in soils at the FEMP with the natural background concentrations in area soils.

The mean and standard deviation of each constituent concentration will be calculated for comparable lithologic zones/strata from all twelve sample boring locations. If the distribution of analytical data is not statistically normal, a method will be identified and used to normalize the background data for statistical comparisons. If statistical normalization is required, comparison to background will require that all subsequent analytical data from closure and remedial response activities at the FEMP be statistically normalized using the same method. The statistical evaluation will also address variations of analytical data between borings and lithologic zones and strata.

The data will be analyzed to identify and evaluate statistical indications of anomalies or interferences that may limit the use of the sample analytical results. No data will be eliminated unless there is reason to suspect that the analytical results are incorrect. Results approaching the

extremes of the ranges of concentrations reported will be of particular interest. As needed, additional data validation, field investigations, literature searches, and confirmation sampling and analyses will be conducted to determine if there is reason to question the reported values.

7.0 HEALTH AND SAFETY

A Project/Task Specific Health and Safety Plan will be prepared for the background sampling project. All sampling activities will be conducted in accordance with the Project/Task Specific Health and Safety Plan. Attachment 11 is a copy of the FEMP requirements for preparation of a Project/Task Specific Health and Safety Plan.

TABLE 1: ANALYTICAL PARAMETERS AND METHODS

CAS NO.	Inorganic Parameters	Methods [1]
7429-90-5	Aluminum	6010
7440-36-0	Antimony	6010
7440-38-2	Arsenic [2]	7060
7440-39-3	Barium [2]	6010
7440-41-7	Beryllium	6010
7440-42-8	Boron	6010
7440-43-9	Cadmium [2]	6010
7440-70-2	Calcium	6010
7440-47-3	Chromium [2]	6010
7400-48-4	Cobalt	6010
7440-50-8	Copper	6010
57-12-5	Cyanide	9010
7439-89-6	Iron	6010
7439-92-1	Lead [2]	7421
7439-95-4	Magnesium	6010
7439-96-5	Manganese	6010
7439-97-6	Mercury [2]	7471
7439-98-7	Molybdenum	6010
7440-02-0	Nickel	6010
7440-09-7	Potassium	7610
7782-49-2	Selenium [2]	7740
7440-21-3	Silicon	6010
7440-22-4	Silver [2]	6010
7440-23-5	Sodium	6010
7440-28-0	Thallium	7841
7440-62-2	Vanadium	6010
7440-66-6	Zinc	6010

[1] Test Methods for Evaluating Solid Wastes, USEPA SW-846 Third Edition - as referenced for Data Quality Level 4 (CLP protocol) in RI/FS QAPP.

[2] Listed Toxicity Characteristic Metals, OAC 3745-51-10 and 40 CFR 261.10.

TABLE 1: ANALYTICAL PARAMETERS AND METHODS
(continued)

CAS NO.	Radionuclides	Methods [3]
NA	Total and Isotopic Uranium	RSL-304 and RSL-201
13233-32-4	Radium-226	RSL-201 and RSL-309
15262-20-1	Radium-228	RSL-201 and RSL-309
14255-04-0	Lead-210	RSL-315
NA	Total and Isotopic Thorium	RSL-304 and RSL-201
14133-76-7	Technetium-99	RSL-201 and RSL-310
10045-97-3	Cesium-137	RSL-201 and RSL-112
10098-97-2	Strontium-90	RSL-201 and RSL-305
13967-48-1	Ruthenium-106	RSL-201 and RSL-112
NA	Gross Alpha	RSL-308
NA	Gross Beta	RSL-308

[3] Methods as referenced from RI/FS QAPP. Initially, only the surface soils samples from 0 to 6 inches will be analyzed. The remaining samples will be archived, up to 6 months, for possible future analyses.

TABLE 2: CLASSIFICATIONS OF SOIL TYPES IDENTIFIED AT THE FEMP

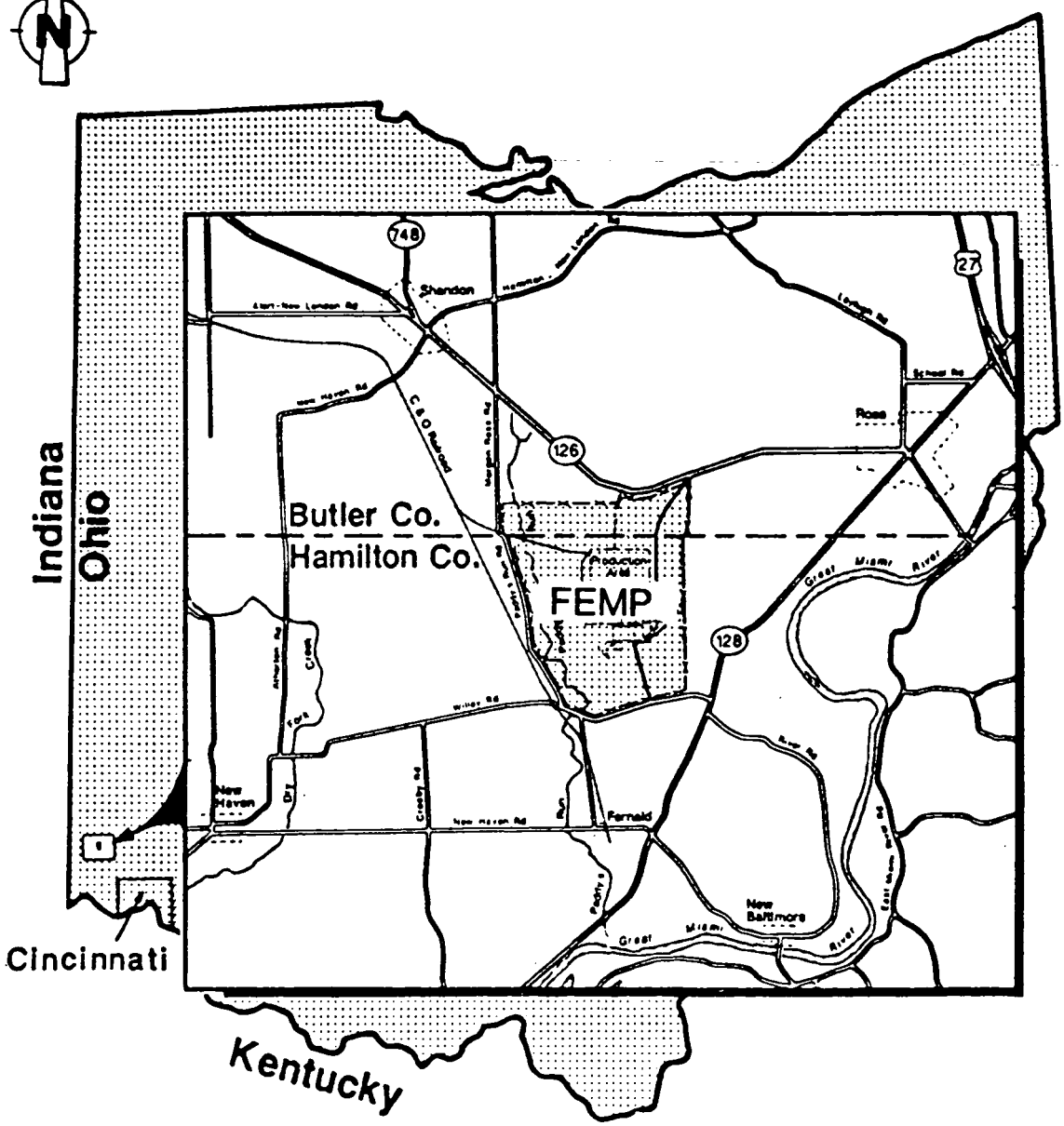
Genesee Loam	Fincastle Silt Loam
Ross soils	Xenia soils
Hunington soils	Russell soils
Jules soils	Avonburg soils
	Raub soils
Fox Silt Loam	Miamian Silt Loam
Casco soils	Hennepin soils
Martinsville soils	Eldean soils
Warsaw Variant soils	

TABLE 3: SUMMARY OF SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS

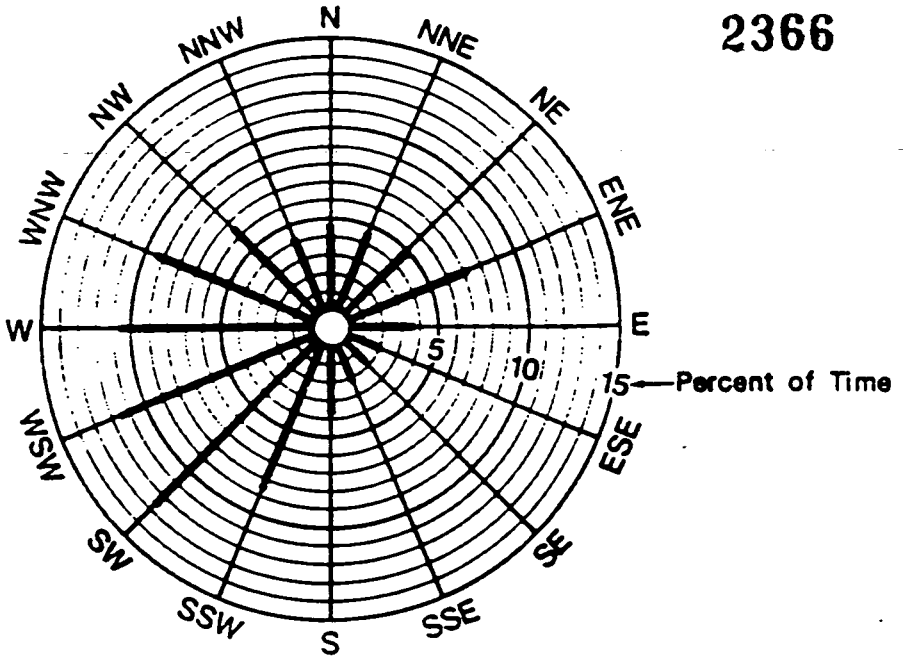
Parameters	Container Type (Glass or Polyethylene)	Number of Containers	Container Size	Matrix	Preservation Methods	Holding Times
Total Metals and Cyanide	Glass or Polyethylene	1	16 oz.	Solids	Cool to 4° C	6 months [1]
Total Metals and Cyanide	Glass or Polyethylene	1	1 liter [2]	Water	Cool to 4° C, HNO_3 to <2 pH	6 months [1]
Radionuclides	Glass or Polyethylene	1	4 oz.	Solids	Cool to 4° C	6 months
Radionuclides	Glass or Polyethylene	1	1 liter [2]	Water	Cool to 4° C	6 months

1. Mercury holding time is 28 days; Hexavalent Chromium holding time is 24 hours

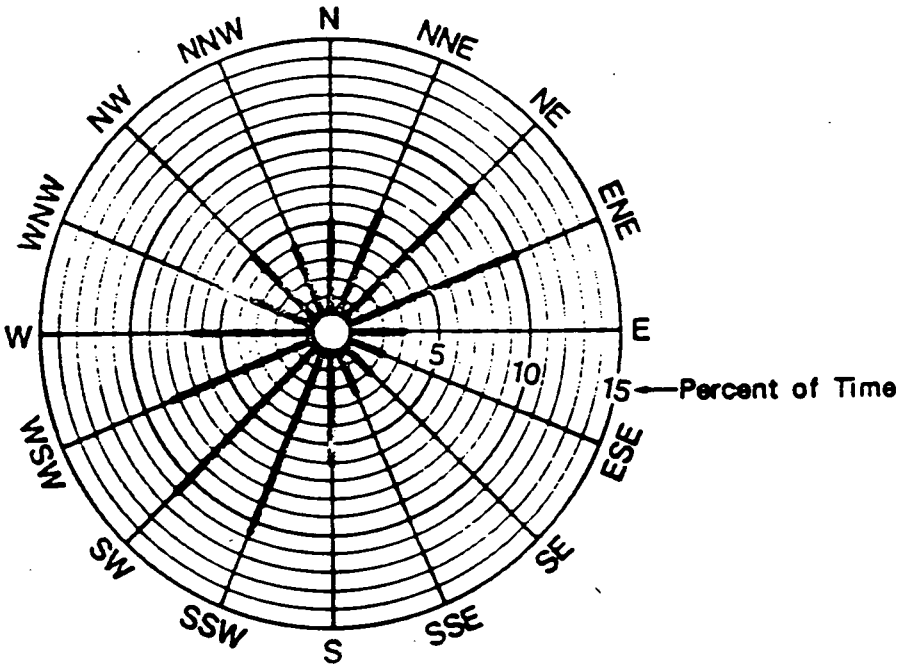
2. The decontamination rinseate QC samples are the only water samples that will be collected. A 1 liter sample is sufficient for all analyses (i.e., total metals, total uranium, and total thorium).



ATTACHMENT 1: FEMP FACILITY MAP



60 Meter Height Showing Direction from which the Wind Blows



10 Meter Height Showing Direction from which the Wind Blows

ATTACHMENT 8: FEMP 1989 WIND ROSE DIAGRAM

FEMP ON-SITE ENVIRONMENTAL MEDIA
CHARACTERIZATION & SURVEILLANCE

SAMPLE NUMBER:_____

DATE:_____ TIME:_____

PROJECT NAME:_____

SAMPLE POINT:_____

ATTACHMENT 9: EXAMPLE OF A SAMPLE LABEL

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

P.O. BOX 398704, CINCINNATI, OHIO 45239-8704

Control #:

ANALYSES REQUEST / CUSTODY RECORD

Page of

PROJECT:	CLIENT:	TECHNICIAN/EXT:
PROJECT #:	CLIENT CONTRACT:	CHARGE #:
PE/PM:	PHONE:	LOT MARK CODE:

SAMPLE IDENTIFICATION

SAMPLE NUMBER	CUSTOMER NUMBER	DESCRIPTION	MATRIX	DATE/TIME COLLECTED	CONTAINER PRESERVATIVE	# CONT VOLUME	ANALYSIS REQUESTED

Copy To: 1

ITEM/REASON	RELINQUISHED BY	RECEIVED BY	DATE	TIME	ITEM/REASON	RELINQUISHED BY	RECEIVED BY	DATE	TIME

ATTACHMENT 10: EXAMPLE OF AN ANALYSES REQUEST/CUSTODY RECORD FORM

GUIDELINES FOR THE PREPARATION OF FMPC PROJECT/TASK SPECIFIC HEALTH & SAFETY PLAN

PROJECT/TASK TITLE: _____

PREPARED BY: _____

DATE: _____

REVIEWED BY:

Centralized Training: _____

Radiological Safety: _____

Industrial Hygiene and Safety: _____

NOTE: This plan and associated permits shall be reviewed with each worker and be posted at the work site at all time. Review all of the listed sections is required prior to work start.

INTRODUCTION

A project/task specific health and safety plan is a complimentary program element that aids in the elimination or effective control of anticipated safety and health hazards. The project/task health and safety plan shall include all the basic requirements of the overall health and safety plan, but with close attention given to those characteristics unique to the particular project, task or job. For example, the project/task plan may outline the method of doing work in a confined space area, hazardous waste area, area containing hazardous materials or any area where there is the potential for exposure to employees.

Much of the information required to complete the plan may be provided on FMPC Work Permit Form No. 2939. However, the plan will allow for a complete job evaluation, health evaluation of the employee(s) performing the work and assure that personnel health and safety concerns are addressed prior to the start of the job/task.

The project/task health and safety plan must identify the hazards of each phase of the specific project/task/job and must be kept at the work site. All required permits shall be posted in the immediate work area. A job briefing shall be conducted prior to job start up and at any other time as deemed necessary to ensure that employees are aware of the project/task/job health and safety plan and its implementation. The supervisor in charge and Industrial, Radiological Safety and Training representatives shall perform periodic inspections of the job area to ensure that all known deficiencies are corrected prior to work start and during work performance.
NOTE: Examples are provided after each section, they are not meant to be realistic.

SECTION NO.	TITLE
1	History & Description of Building, Equipment, Area
2	Work Area Description Organization and Control
3	Job Activities/Work Plan
4	Hazard Risk Assessments
5	Standard Operating Procedures
6	Education and Training
7	Medical Surveillance
8	Monitoring
9	Levels of Protection
10	Safety Equipment List
11	Decontamination
12	Emergency Plan
13	Amendments

SECTION NO. 1 History and Description of Building, Equipment, Area

This section in its entirety address all known facts about the area where work will be performed. When completed, this section combined with job activities/work plan, should create an understanding of potential health and safety issues to be addressed at the work area.

A. Description of Building, Equipment, Area

Pertinent information about the building, equipment or area such as current disposition, name, manufacturers, location of work area, building construction, etc.

EXAMPLE: *This is a 1000 gallon fiberglass tank buried approximately three (3) feet beneath the blacktop east of Building 46. The tank currently contains an unknown amount of methyl ethyl something. The tank was constructed in 1978 by Round Up Manufacturers and installed at the FMPC in January 1979. It has been in continuous use since that time and will be taken out of service 10 days before this project starts.*

B. Process Performed or Activities Conducted in the Area

Describe activities performed in the building, use of the equipment, types of material processed, etc.

EXAMPLE: *Building 46 is a vehicle and maintenance supply storage facility. The north bay of this three bay building houses emergency vehicles. No radioactive or hazardous substances have been processed in this building or area.*

C. Unusual Features

Include information pertaining to conditions which may present a hazard to personnel such as powerlines, material storage, equipment location, buried lines/pipes, etc.

EXAMPLE: *There is a drainage ditch approximately 50 feet east of the proposed work site. The flow in the drainage ditch is not controlled.*

An underground high voltage line is believed to be located in this area connecting the electric substation with Building 46.

SECTION NO. 2 Work Area Organization and Site Access Control

This section clearly identifies the designated work area, control zones or restricted areas where work will be performed; name(s) of supervisor personnel; name(s) of personnel performing work/activities; names of support personnel required to complete task. Site entry and exiting protocol should also be identified.

EXAMPLE: *An exclusion zone will be established around the proposed tank excavation area. This area measures approximately 25' x 25'. The exclusion zone shall be marked with barrier tape.*

Jo Smyth, Badge No. 0000, will be the supervisor in charge of this project. Tiny Tim, Badge No. 0000, Chicken Little, Badge No. 000 and Hairy Wolf, Badge No. 0000, will perform the tank sampling, excavation and removal activities.

Entry into the exclusion zone will be limited to the above listed individuals, Industrial Hygiene and Radiological Safety Technicians, Safety and Fire Inspectors and Utility Engineers. Anyone else desiring entry must first be approved by the supervisor in charge.

Personnel existing the area must be monitored to assure they are free of contaminates.

SECTION NO. 3 Task Activities/Work Plan

State task activity that will be performed and anticipated work plan.

EXAMPLE: *The contents of the tank must be sampled, the blacktop and aggregate fill on top and around the tank will be removed and boxed for shipment, all piping will be disconnected and removed, the tank will be removed and the excavation filled with new aggregate materials.*

SECTION NO. 4 Hazard Assessments

General categories of hazards that may be present at the work site should be listed. MSDSs must be included for any identified hazardous substance. It is prudent to assume that any identified hazard is present until a characterization has proven otherwise. Provisions should be made to properly protect all individuals that have the potential for exposure from the suspected or identified hazardous substances. Specific WMCO work permits may be required and should be prepared in accordance with Site Procedure 516.

DISCUSSION: *List each suspected or identified hazardous substance, condition or waste. Attach a copy of the applicable MSDS to the Health and Safety Plan. When*

identified, the appropriate permit should be completed and a copy attached to the Project/Task Specific Health and Safety Plan.

SECTION NO. 5 Standard Operating Procedures (SOP's)

Some project/tasks will require that special SOPs be prepared or existing issued procedures be referenced to conduct the work according to specified guidelines.

DISCUSSION: *If no procedure exists to cover the proposed work, prepare one to address the project/task. If procedures exist, list the applicable document number and full title.*

SECTION NO. 6 Education and Training

Employees shall not engage in field activities until they have been trained to a level commensurate with their job function, responsibilities and with the degree of anticipated hazards. The amount of training is based on worker categories.

A. Worker Category

1. general site worker - 40 hours of SARA/OSHA instruction plus 24 hours of field experience.

2. *occasional site worker* - 24 hours of SARA/OSHA instruction plus 8 hours of field experience.

3. workers regularly on site but not in danger of exposure - 24 hours of SARA/OSHA instruction plus 8 hours of field experience.

4. management or supervisory - Same as 1, 2 or 3 depending on category of work being supervised plus 8 hours of specialized training.

5. visitors - are not permitted within exclusion zones unless they have completed the training requirements specified in No. 1 through 4.

B. A safety meeting is required for all employees involved in hazardous material/waste operations. These meetings shall be held prior to task start, daily during work periods, when there is a change in work activities or implementation of safety plan amendments. Meetings shall be documented and will become a permanent element of this task specific health and safety plan. Subjects to be covered shall include:

- o work operations
- o personal protective equipment
- o air monitoring data
- o hazard communication
- o hearing conservation
- o monitoring results

- o decontamination procedures
- o task organization
- o physical stress
- o emergency procedures
- o communications
- o general safety
- o housekeeping

A detailed listing of subjects can be found in the site Health and Safety Plan Appendix II.

SECTION NO. 7 Medical Surveillance (To be completed by Medical Services)

Worker selection is based on an evaluation by a qualified licenced physician having knowledge of the specified tasks to be performed and the exposure potential as it relates to the worker. FMPC form HR 3162 is used for this purpose.

SECTION NO. 8 Monitoring (To be completed by IRS&T)

A. State the monitoring protocol and action levels for the contaminants involved in each work activity.

B. State each type of instrument to be utilized and coordinate with the type of contaminate to be monitored.

SECTION NO. 9 Personal Protective Equipment Requirements

State the required level of protection for each activity, task or hazardous substance as identified in the hazard assessment.

SECTION NO. 10 Safety Equipment List

State each piece of safety equipment and the protocol for utilization. This section should create the "shopping list" of safety supplies or equipment available for use be workers.

Examples: *Personal Protective Equipment (PPE), Fire Extinguishment, Decontaminating Materials, Communication Devices, Barrier Tape, Etc.*

SECTION NO. 11 Decontamination Procedures

Address decontamination of personnel and each piece of equipment as a step by step procedure for both chemical and radiological contaminants.

Include level of protection to be utilized during decontamination process, solutions, stations and dispensation of fluids, disposables and other waste.

SECTION NO. 12 Emergency Plans

Emergency plans shall include methods of reporting emergencies or abnormal conditions; evacuation procedures; accountability; types of alarms, etc.

SECTION NO. 13 Amendments

Statements shall be made as follows:

A. This Project/Task Specific Health and Safety Plan is based on information available at the time of preparation. Unexpected conditions may arise which require reassessment of safety procedures. It is important that personnel protective measures be thoroughly assessed by the supervisor in charge and IRS&T representative prior to and during the planned task activities. Unplanned activities and/or changes in the hazard status shall require a review of and may require changes in this plan.

B. Changes in the anticipated hazard status or unplanned activities are to be submitted as an amendment to this Project/Task Specific Health and Safety Plan.

C. Amendments must be approved by the plan author and IRS&T prior to implementation of the amendment.

VISUAL CLASSIFICATION OF SOILS

2366

PROJECT NUMBER:	PROJECT NAME:	
BORING NUMBER:	COORDINATES:	DATE:
ELEVATION:	GWL: Depth Date/Time	DATE STARTED:
ENGINEER/GEOLOGIST:	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS:		PAGE OF

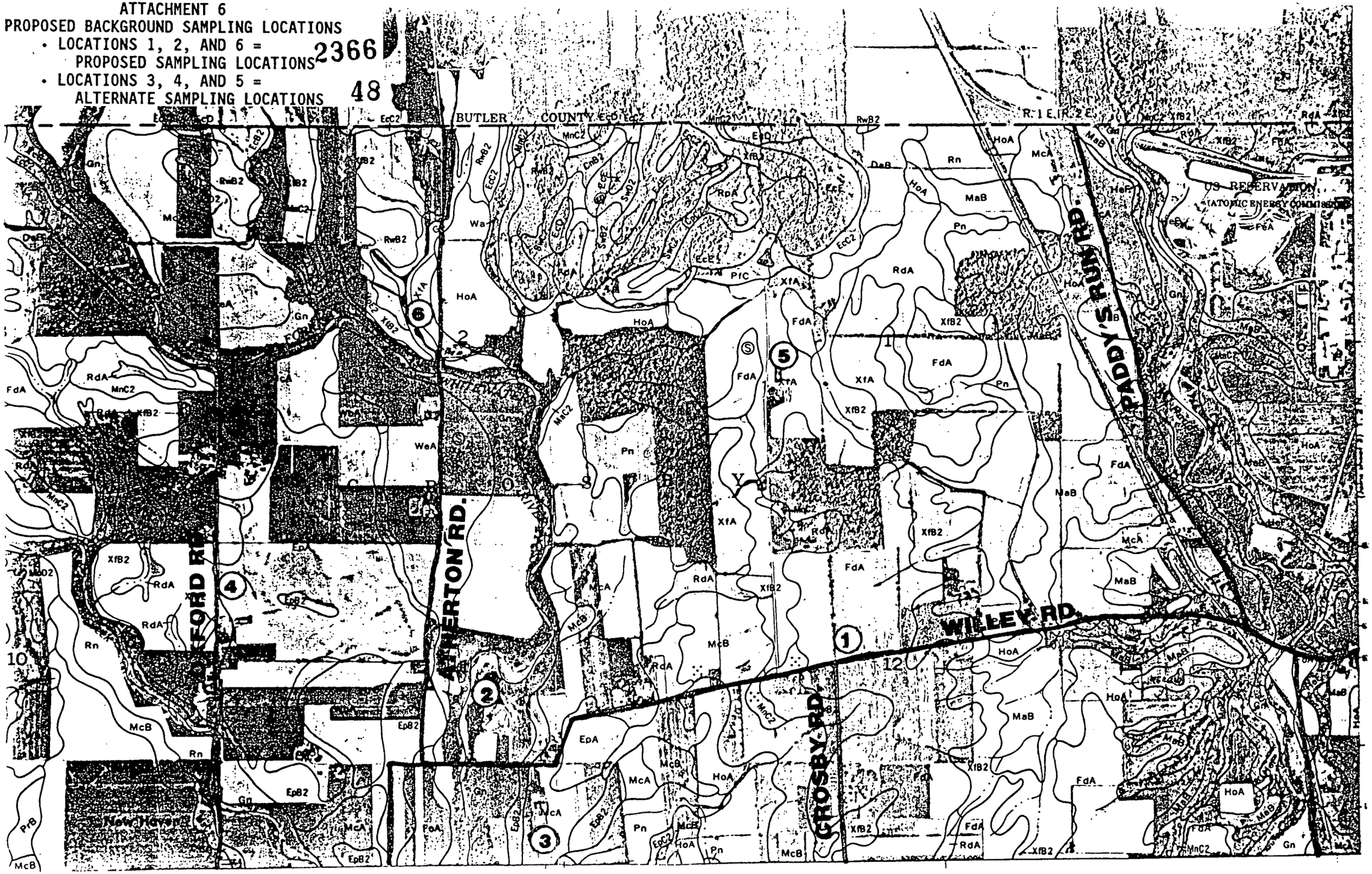
DEPTH (-)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER (-)	RECOVERY ( )	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS

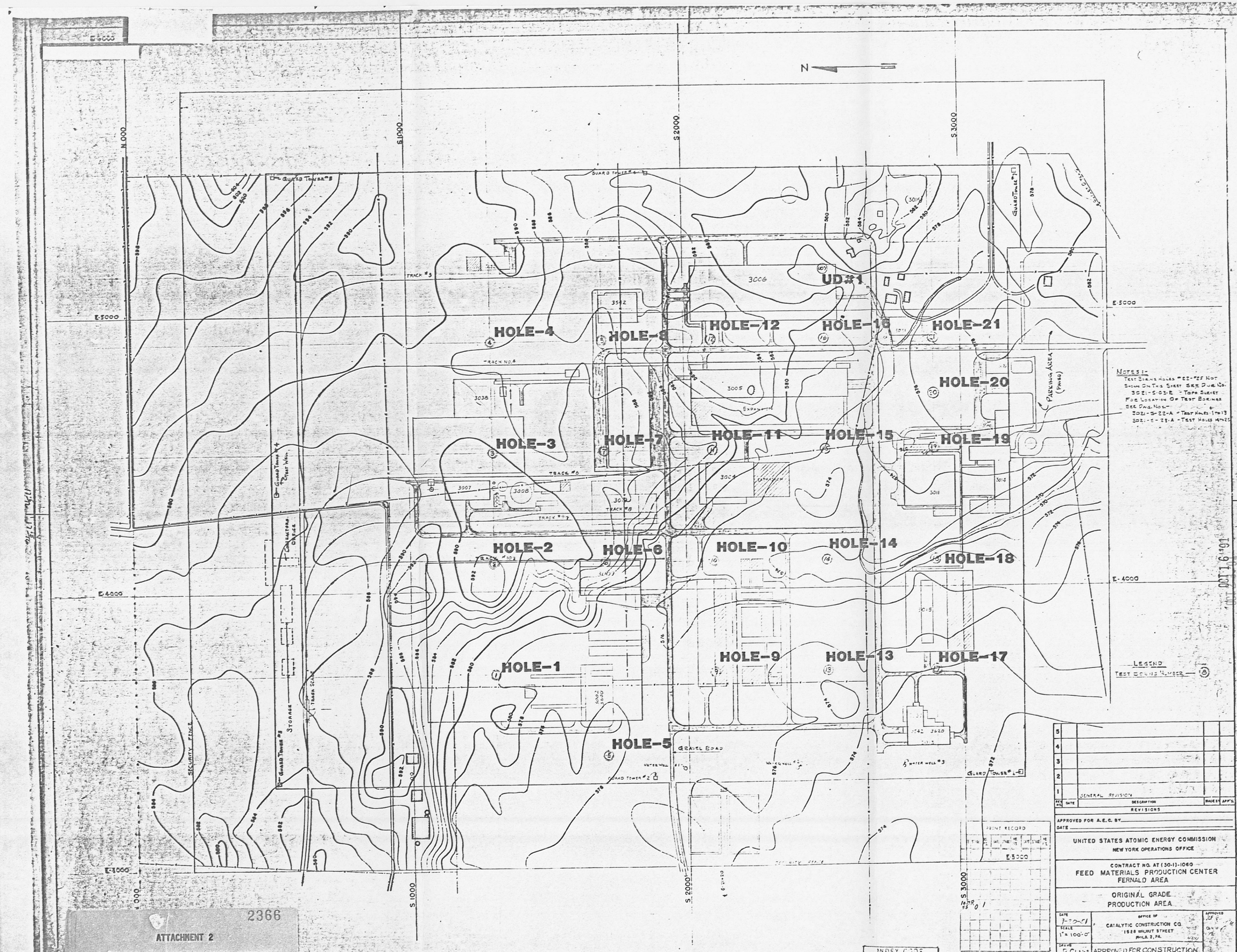
NOTES

ATTACHMENT 5: EXAMPLE OF A GEOLOGICAL DRILLING LOG

47

ATTACHMENT 6
PROPOSED BACKGROUND SAMPLING LOCATIONS
- LOCATIONS 1, 2, AND 6 = PROPOSED SAMPLING LOCATIONS 2366
- LOCATIONS 3, 4, AND 5 = ALTERNATE SAMPLING LOCATIONS 48





2366

ATTACHMENT 2

LOCATIONS OF 1951 SOIL CROSS SECTIONS

39

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SIX-F20-0045

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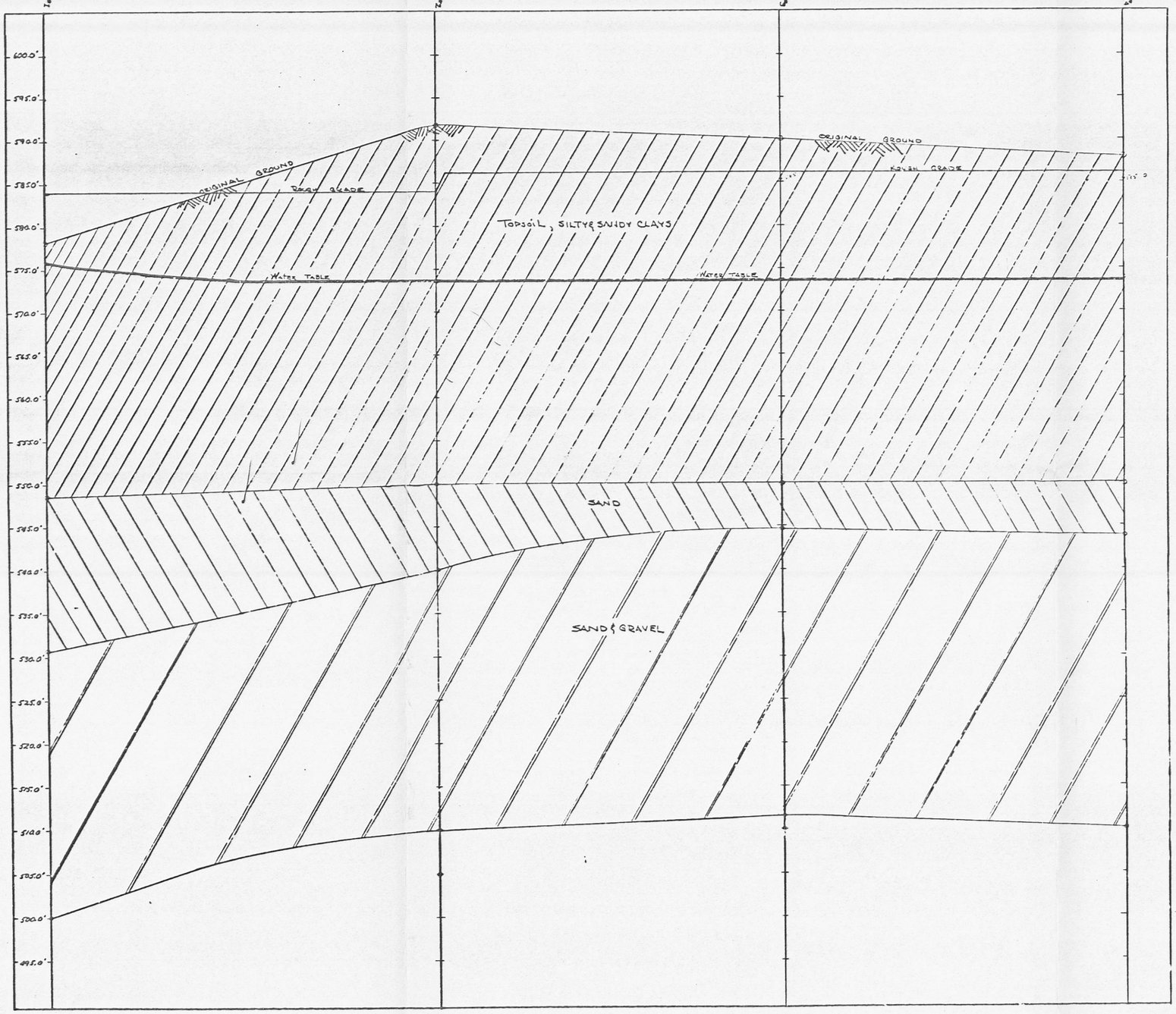
HOLES 1 2 3 4



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VERT. 1" = 5'-0"

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DO NOT SCALE REDUCED DRAWING

PRINT RECORD

DATE	BY	SAVE	SAVE	SAVE	SAVE	SAVE

OCT 15 '91

OCT 23 '91

FOR GENERAL NOTES & REFERENCE DRAWINGS SEE DWG 3021-S-22-A

NO	DATE	DESCRIPTION	MADE BY	APP'D
5				
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REVISIONS

APPROVED FOR A. E. C. BY _____
DATE _____

UNITED STATES ATOMIC ENERGY COMMISSION
NEW YORK OPERATIONS OFFICE

CONTRACT No. AT-30-1-1050
FEED MATERIALS PRODUCTION CENTER
FERNALD AREA

SOIL CROSS-SECTION AT S-1300
LOOKING NORTH

DATE	OFFICE OF	APPROVED
7-25-91	CATALYTIC CONSTRUCTION CO. 1528 WALNUT STREET PHILA. 2, PA.	
SCALE AS SHOWN		
DRAWN A.M.	APPROVED FOR CONSTRUCTION 7-25-91	
CHECKED L.B.	DRAWING NO. 3021-S-24-A	REVISION NO.

CC-178-72

2366

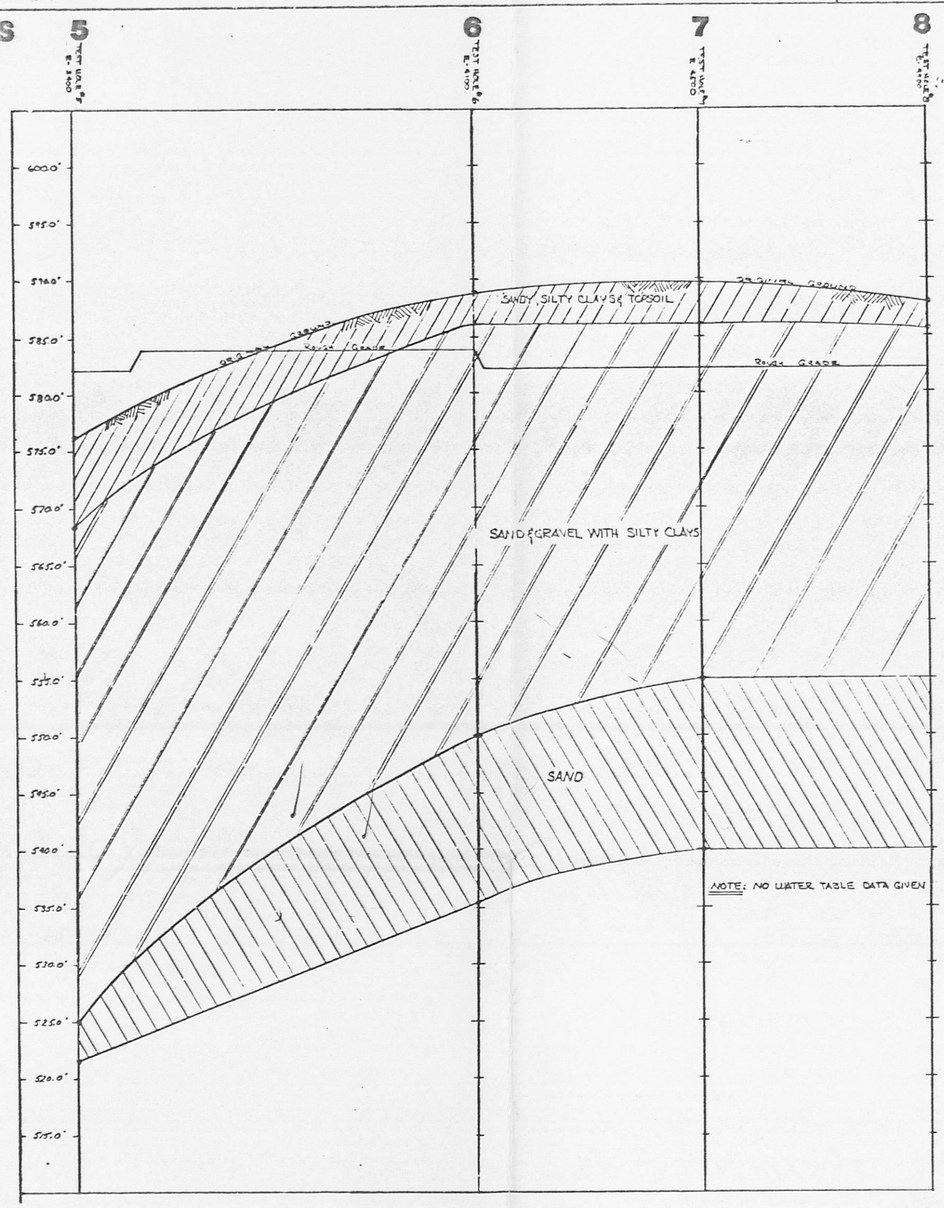
ATTACHMENT 3a

SOIL CROSS SECTION S-1300

40

107892-2

3021-S-25-A



SCALE: HORZ.-1"=100'-0"
VERT.-1"=5'-0"

FOR GENERAL NOTES & REFERENCE DRAWINGS SEE DWG 3021-S-22-A

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REVISIONS

APPROVED FOR A. E. C. BY _____
DATE _____

UNITED STATES ATOMIC ENERGY COMMISSION
NEW YORK OPERATIONS OFFICE

CONTRACT No. AT(30-1)-1060
FEED MATERIALS PRODUCTION CENTER
FERNALD AREA

SOIL CROSS-SECTION AT S-1700
LOOKING NORTH

DATE 7-25-51	OFFICE OF CATALYTIC CONSTRUCTION CO. 1528 WALNUT STREET PHILA. 2, PA.	APPROVED
SCALE AS SHOWN		
DRAWN A.N.	APPROVED FOR CONSTRUCTION	
CHECKED L.B.	DRAWING NO. 3021-S-25-A	REVISION NO.

PRINT RECORD

DATE	BY	NO. PTS.	DATE	BY	NO. PTS.	DATE	BY	NO. PTS.

2366
ATTACHMENT 3b
SOIL CROSS SECTION S-1700
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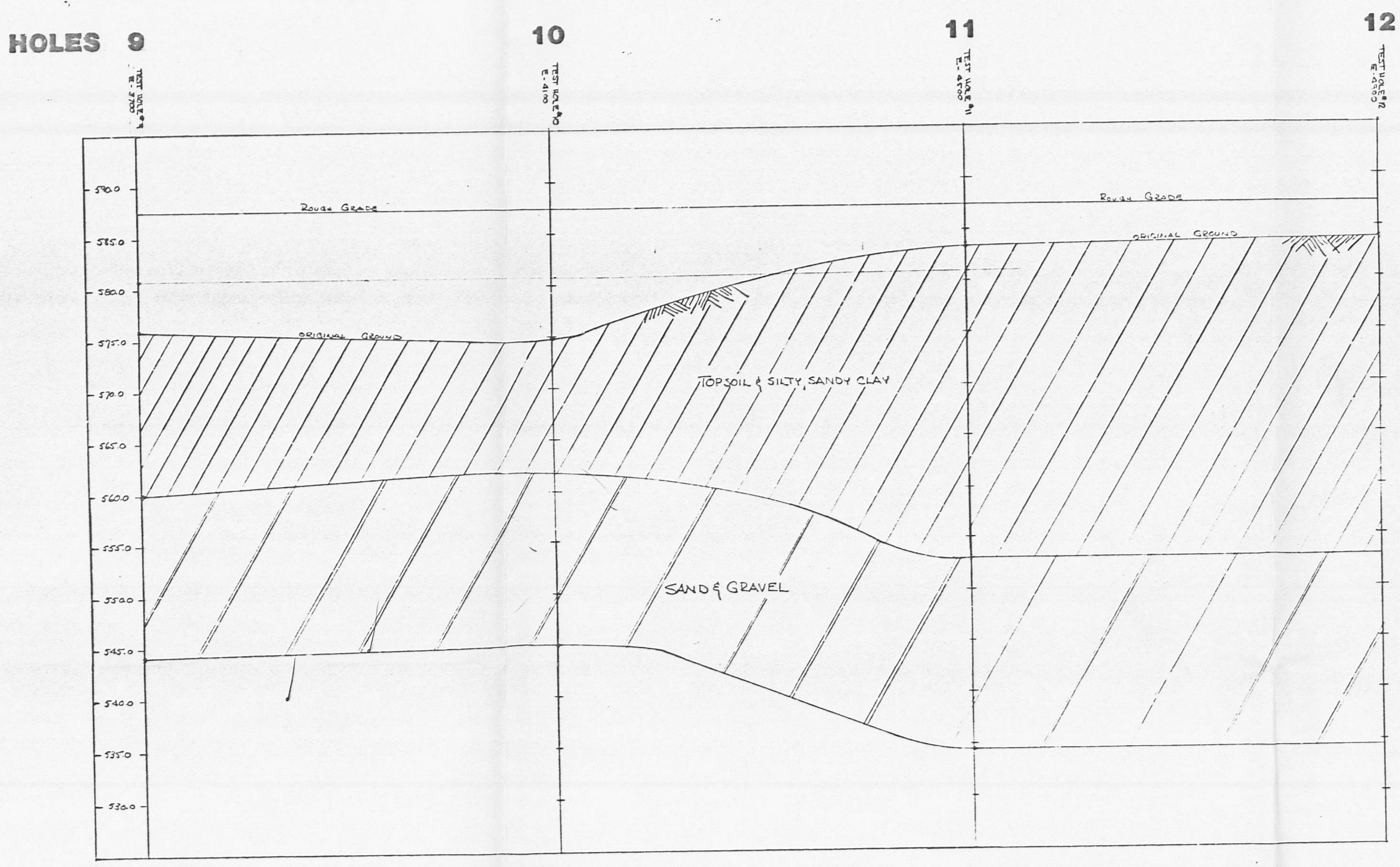
OCT 15 '91
OCT 23 '91

3021-S-26-A



SCALE: HORZ- 1"=30'0" VERT- 1"=5'0"

NOTE: NO WATER TABLE DATA GIVEN

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OCT 23 '91

FOR REFERENCE DRAWINGS & GENERAL NOTES SEE DWG 3021-S-22A

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REVISIONS

APPROVED FOR A. E. C. BY ____

DATE ____

UNITED STATES ATOMIC ENERGY COMMISSION
NEW YORK OPERATIONS OFFICE

CONTRACT No. AT(30-1)-1060
FEED MATERIALS PRODUCTION CENTER
FERNALD AREA

SOIL CROSS-SECTION AT S-2100
LOOKING NORTH

DATE: 7-25-51
SCALE: AS SHOWN
DRAWN: A.N.
CHECKED: L.B.

OFFICE OF
CATALYTIC CONSTRUCTION CO.
1528 WALNUT STREET
PHILA. 2, PA.

APPROVED FOR CONSTRUCTION

DRAWING NO. 3021-S-26-A

PRINT RECORD

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ATTACHMENT 3c
SOIL CROSS SECTION S-2100
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HOLES 13 14 15 16

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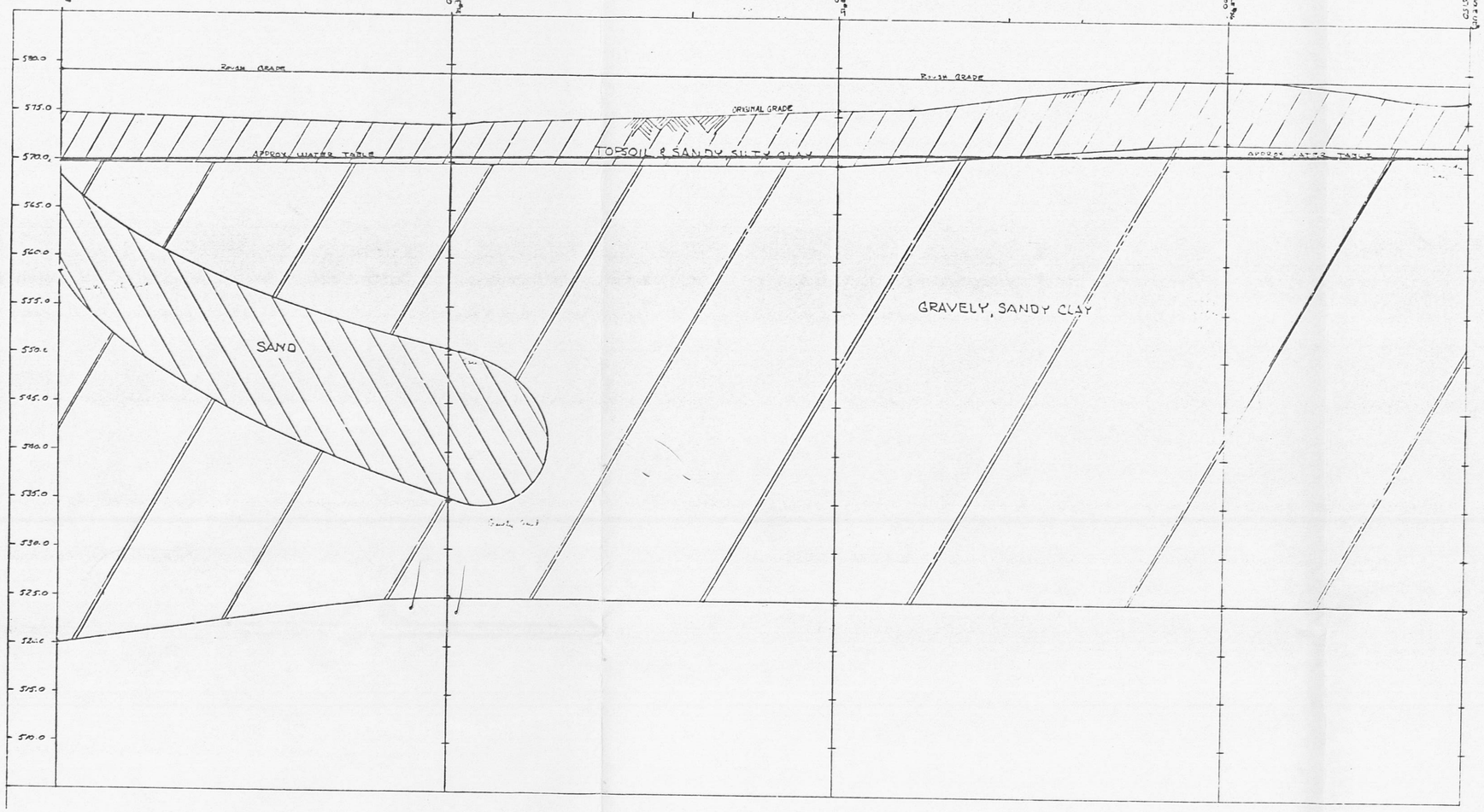

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FOR GENERAL NOTES & REFERENCE DRAWINGS SEE DWG 3021 S 22-A

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REVISIONS

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DATE _____

PRINT RECORD

UNITED STATES ATOMIC ENERGY COMMISSION
NEW YORK OPERATIONS OFFICE

CONTRACT No. AT (30-1) 1060
FEED MATERIALS PRODUCTION CENTER
FERNALD AREA

SOIL CROSS-SECTION AT S-2500
LOOKING NORTH

DATE 7-25-51	OFFICE OF CATALYTIC CONSTRUCTION CO. 1528 WALNUT STREET PHILA. 2, PA.	APPROVED
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ATTACHMENT 3d

SOIL CROSS SECTION S-2500

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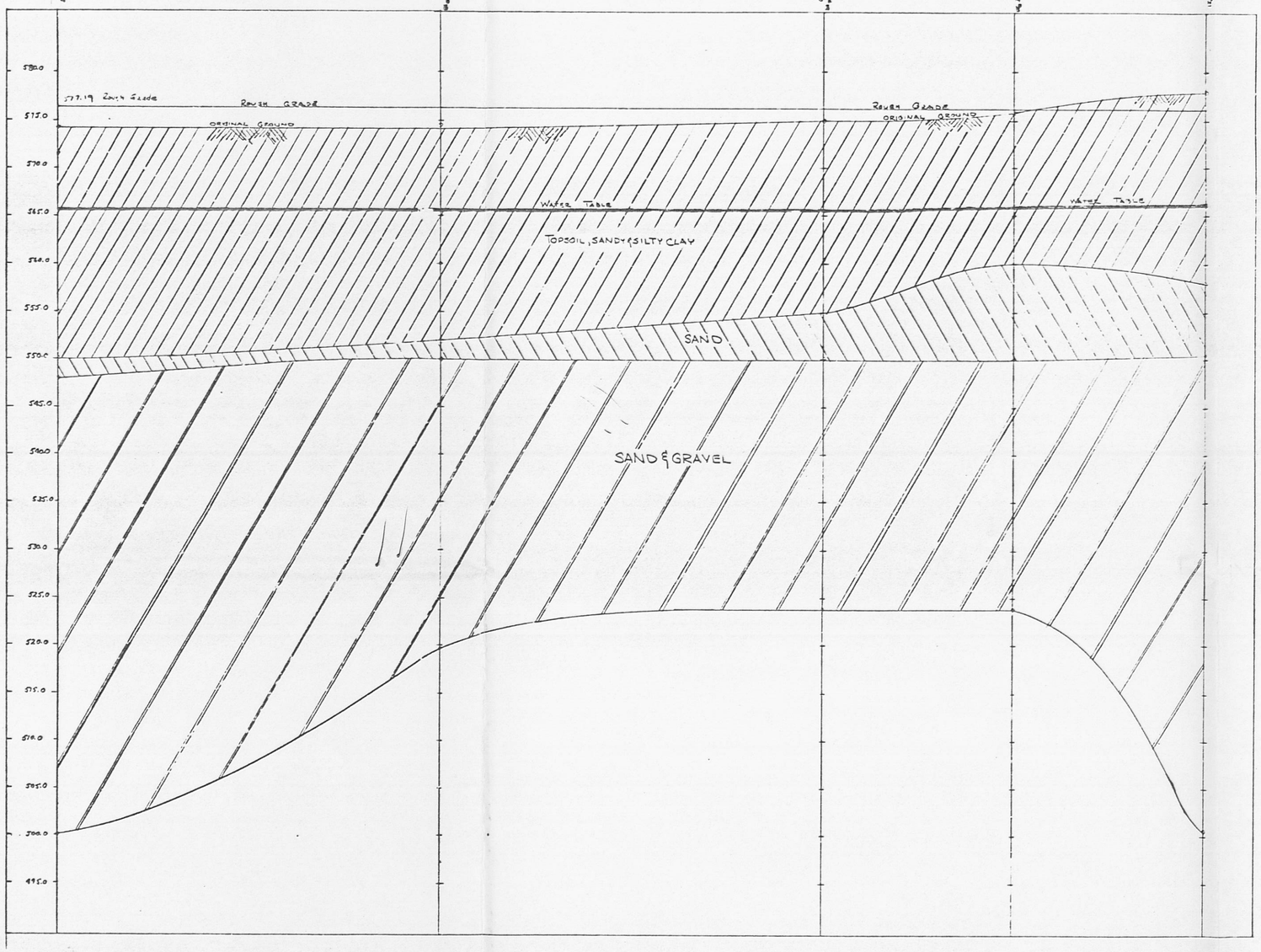
HOLES 17 18 19 20 21



SCALE: HORZ 1"=30'-0"
VERT 1"=30'-0"

2366

ATTACHMENT 3e

SOIL CROSS SECTION S-2900

44

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FOR GENERAL NOTES & REFERENCE DRAWINGS SEE DWG 3021-S-22-A

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REVISIONS

APPROVED FOR A. E. C. BY _____

DATE _____

UNITED STATES ATOMIC ENERGY COMMISSION
NEW YORK OPERATIONS OFFICE

CONTRACT No. AT-30-1)-1060
FEED MATERIALS PRODUCTION CENTER
FERNALD AREA

SOIL CROSS-SECTION AT S-2900
LOOKING NORTH

DATE 7-25-51	OFFICE OF CATALYTIC CONSTRUCTION CO. 1528 WALNUT STREET PHILA. 2, PA.	APPROVED
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3021-S-22-A

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SOUTH COORD.	1300	1300	1300	1300	1700	1700	1700	1700	2100	2100	2100	2100	2500
ELEV OF MEAN	578.3	592.0	590.1	588.4	672.0	683.0	669.0	658.0	568.0	568	584.0	584.0	674.7

GROUND WATER @ 5-0

SOIL TRIANGLE

REFERENCE DRAWINGS

TITLE	DRAWING NUMBERS
TEST BORING CHART HOLES 14-25	3021-S-23-A
SOIL CROSS-SECTION AT S 1300 LOOKING NORTH	3021-S-24-A
" " " S 1700 " "	3021-S-25-A
" " " S 2100 " "	3021-S-26-A
" " " S 2500 " "	3021-S-27-A
	3021-S-28-A

PRINT RECORD

DATE	ITEM	NO. PCS.	DATE	ITEM	NO. PCS.	DATE	ITEM	NO. PCS.
1/17/61	1	1						

NO.	DATE	DESCRIPTION	MADE BY	APP'D
		REVISIONS		

APPROVED FOR A.E.C. BY _____

DATE _____

UNITED STATES ATOMIC ENERGY COMMISSION
NEW YORK OPERATIONS OFFICE

CONTRACT No. AT(30-1)-1060
FEED MATERIALS PRODUCTION CENTER
FERNALD AREA

TEST BORING CHART-HOLES 1 TO 13

DATE 1/17/61	OFFICE OF CATALYTIC CONSTRUCTION CO. 1520 WALNUT STREET PHILA. 2, PA.	APPROVED
SCALE 1"= 5'-0		
DRAWN CHERMOL		
CHECKED L.O.	DRAWING NO. 3021-S-22-A	REVISION NO.

SCALE FOR THIS DRAWING

2366

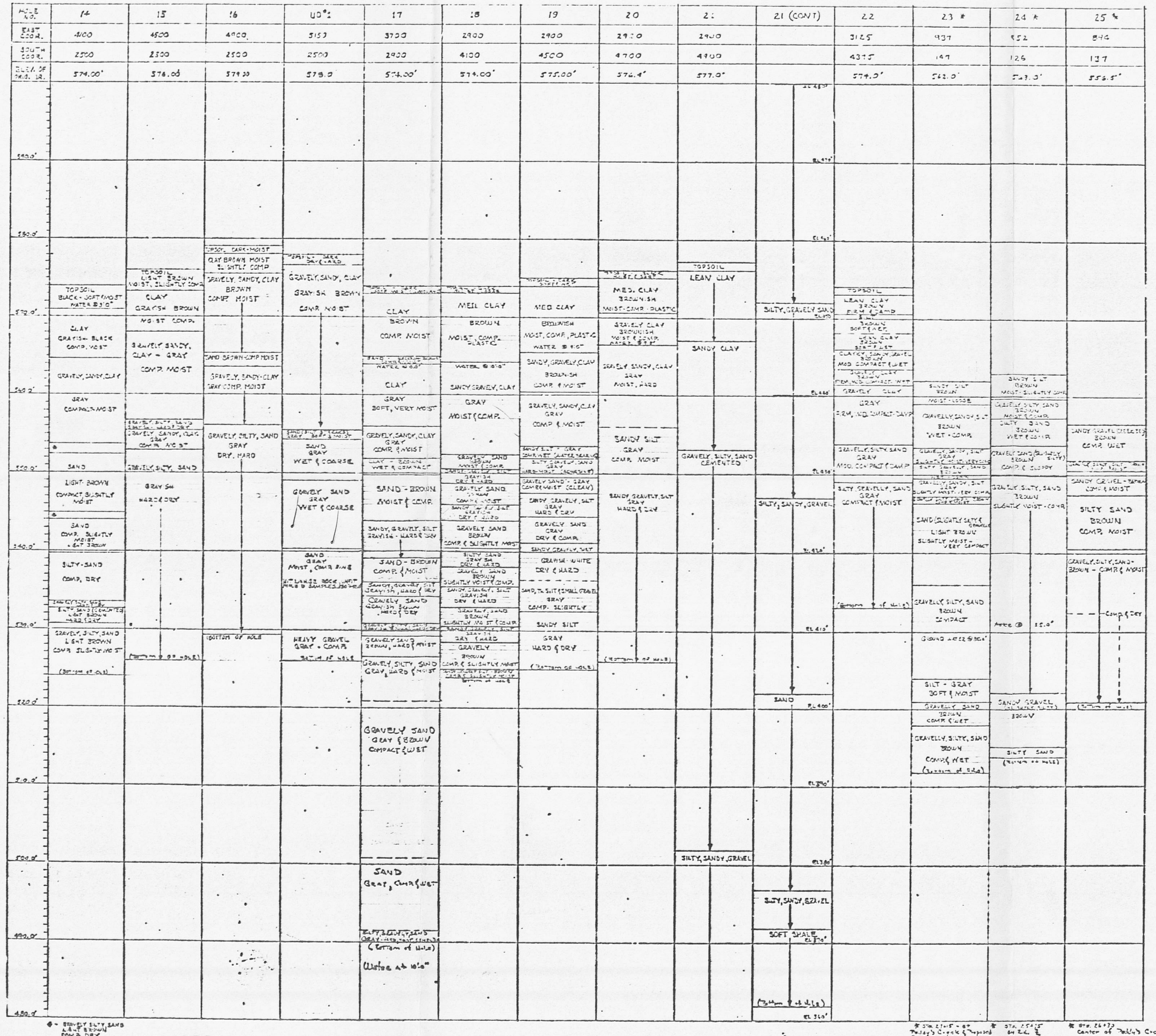
ATTACHMENT 4a

SOIL CROSS SECTION DRILLING LOG
BORINGS 1-13
[(S-1300 = 1-4); (S-1700 = 5-8),
(S-2100 = 9-12); (S-2500 = 13)]

45

107892_7

3021-S-23-A



FOR GENERAL NOTES & REFERENCE DRAWINGS SEE DWG 3021-S-23-A

REVISIONS

APPROVED FOR A. E. C. BY

DATE

UNITED STATES ATOMIC ENERGY COMMISSION
NEW YORK OPERATIONS OFFICE

CONTRACT No. AT(30-1) 1060

FEED MATERIALS PRODUCTION CENTER
FERNALD AREA

TEST BORING CHART
HOLES 14-25

DATE 7-25-51

SCALE 1" = 10'

OFFICE OF CATALYTIC CONSTRUCTION CO.
1528 WALNUT STREET
PHILA 2 PA.

DRAWING NO. 3021-S-23-A

21X 1450 -X 00028

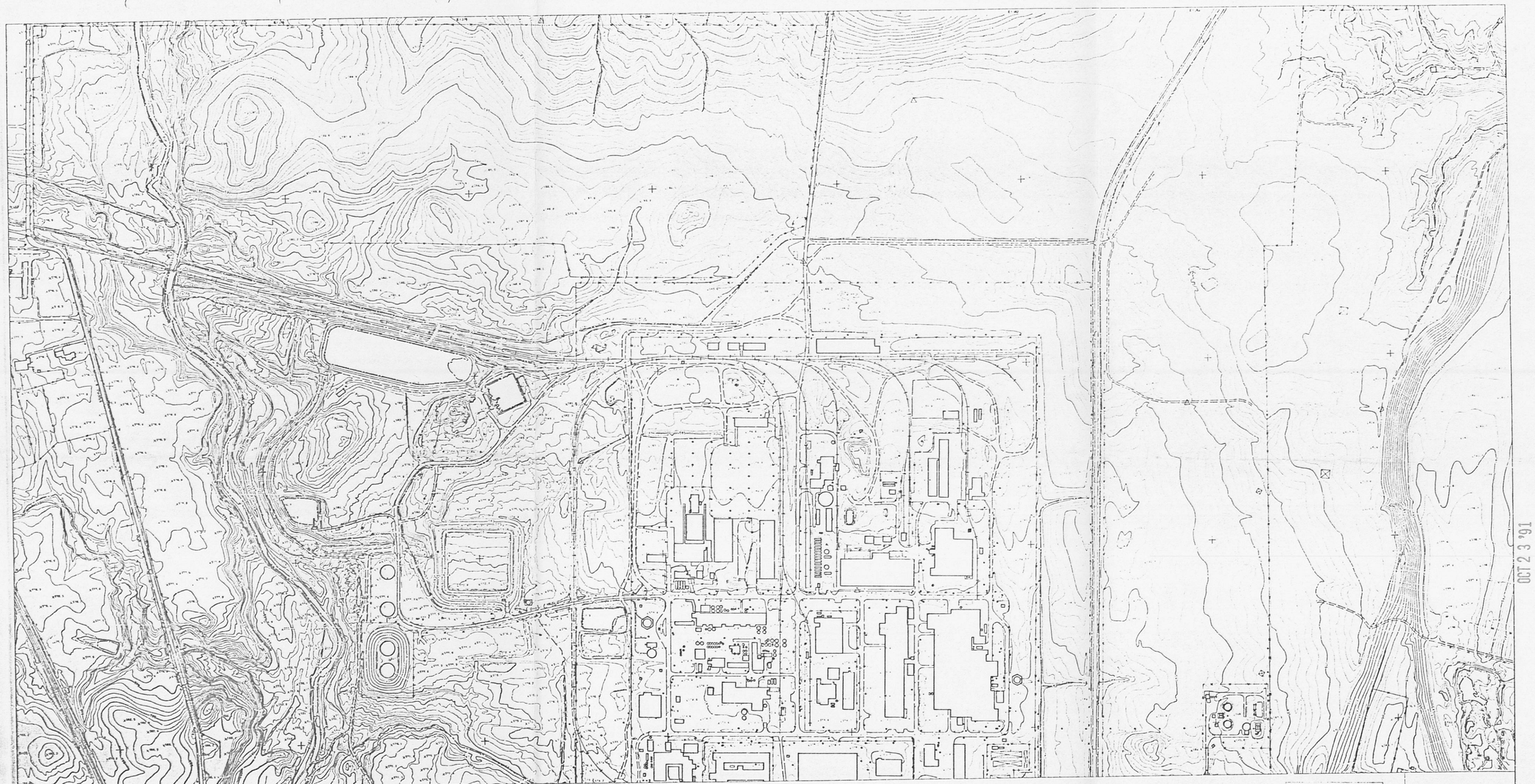
2366

ATTACHMENT 4b

SOIL CROSS SECTION DRILLING LOG
BORINGS 14-25
[(S-2500 = 14-16 & UD#1)
(S-2900 = 17-21)]

10782_8

46



OCT 2 3 '91

107892-9

2366

Topography by photogrammetric methods from aerial photographs taken May 2, 1991.

1983 local grid based upon Ohio coordinate system, south zone, City of Cincinnati datum.

Coordinate values in feet x1000.

ATTACHMENT 7b

FEMP TOPOGRAPHY MAP - SOUTH SECTION

107892_1D

North

South

Westinghouse Materials Company of Ohio

Feed Material Production Center

REDUCED DRAWING
DO NOT SCALE

0" ½" 1" 2" 3"

TITLE CODE
75X 5500 G 00065

WESTON

OCT 2 3 '91

2366

50