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Hazardous Waste Ground-Water Task Force

Evaluation of CECOS International, Inc. Aber Road Facility Williamsburg, Ohio

EPA

OhioEPA

US Environmental Protection Agency

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UPDATE OF THE HAZARDOUS WASTE GROUND-WATER TASK FORCE EVALUATION OF CECOS INTERNATIONAL, INC.

The United States Environmental Protection Agency's Hazardous Waste Groundwater Task Force ("Task Force"), in conjunction with the Ohio Environmental Protection Agency (OEPA), conducted an evaluation at the CECOS International, Incorporated (CECOS) hazardous waste disposal facility. The Task Force effort is in response to recent concerns as to whether owners and operators of hazardous waste disposal facilities are complying with the Resource Conservation and Recovery Act (RCRA) groundwater monitoring regulations, and whether the groundwater monitoring systems in place at the facilities are capable of detecting contaminant releases from waste management units. CECOS is located near Williamsburg, Ohio, which is just east of Cincinnati, Ohio. The on-site field inspection was conducted over a two-week period from November 10 - 21, 1986.

This update of the Task Force evaluation summarizes subsequent events that are directly related to hazardous waste groundwater monitoring issues.

The groundwater monitoring system which was in place during the Task Force evaluation has been modified to accomodate new cells.

Since the Task Force site visit, technical review of CECOS's Part B permit application has been ongoing. On July 22, 1987, U.S. EPA issued a Letter of Warning and Notice of Deficiency to CECOS after having reviewed the application submitted December 19, 1986, and finding a number of deficiencies. CECOS submitted a response to the Letter of Warning/Notice of Deficiency on September 4, 1987. On October 15, 1987, CECOS submitted a Part B which was a compilation of its September 4, 1987, response and the December 19, 1986, Part B.

U.S. EPA has reviewed the October 15, 1986, Part B, submitted by CECOS and has determined that CECOS still has not submitted an adequate Part B permit application.

Specifically, CECOS has not provided adequate identification of the uppermost aquifer hydraulically interconnected beneath the facility property. Plates and descriptions of the 880 sand are inconsistent or incorrectly illustrated to demonstrate the aerial extent of the 880 sand.

CECOS has not proposed an appropriate list of indicator parameters, waste constituents or reaction products that can provide a reliable indication of the presence of hazardous constituents in the groundwater.

CECOS has not provided a sufficient number of monitor wells installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer which represent the quality of background water that has not been affected by leakage from a regulated unit or from dewatering activities. Several monitoring wells designated by CECOS as upgradient are, in fact, either currently downgradient or, in the future, will be downgradient of the landfill cells at the site.

CECOS has not provided a sufficient number of wells installed at appropriate locations and depths to yield groundwater samples from the uppermost aquifer that represent the quality of groundwater passing the point of compliance. The groundwater monitoring system does not have an adequate number of downgradient wells to monitor the channel sand deposit. The system does not provide for a "moveable point of compliance" which accounts for the lateral distance between units, and provides for immediate detection of hazardous constituents for each unit. The system fails to provide for proper well casing and screening materials.

CECOS has not proposed sampling collection, preservation, and shipment procedures to ensure monitoring results that provide a reliable indication of groundwater quality.

Finally, CECOS has not proposed statistical procedures which will provide reasonable confidence that migration of hazardous constituents from a regulated unit into and through the aquifer will be detected.

On September 25, 1987, CECOS and U.S. EPA signed an Administrative Order by Consent pursuant to Section 3008(h) of RCRA.

In entering into this Consent Order, the mutual objectives of the U.S. EPA and CECOS are: 1) to implement selected Interim Measures deemed necessary by the U.S. EPA and CECOS; 2) to review previously completed contamination studies, perform additional contamination assessment activities, submit a RCRA Facility Investigation (RFI) Report that fully describes the nature and releases of hazardous wastes and/or hazardous constituents from the facility; and 3) to review and refine previously submitted remedial evaluations, perform additional evaluations, and provide these evaluations in a Corrective Measures Study (CMS) that identifies the most appropriate methodology or methodologies for corrective measures.

In response to implementing selected Interim Measures, CECOS has submitted for U.S. EPA approval, a proposal for the construction of a landfill gas extraction system. U.S. EPA is currently reviewing that proposal.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
HAZARDOUS WASTE GROUND WATER TASK FORCE

GROUND WATER EVALUATION
CECOS INTERNATIONAL, INC.
ABER ROAD FACILITY
WILLIAMSBURG, OHIO

NOVEMBER 1987

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EXECUTIVE SUMMARY

A. Introduction

Operations at hazardous waste treatment, storage, and disposal (TSD) facilities are regulated under the Resource Conservation and Recovery Act of 1976 (RCRA), 42 U.S.C. 6901 *et. seq.* Implementing regulations issued on May 19, 1980, (40 CFR Part 260 through 265, as modified), established operating requirements for TSD facilities, including the monitoring of ground water. The Administrator of the U.S. Environmental Protection Agency (U.S. EPA) established a Hazardous Waste Ground Water Task Force (referred to hereafter as the Task Force) to evaluate the level of compliance with ground water monitoring requirements at on-site and commercial off-site TSD facilities and to address the cause(s) of noncompliance. In addition, the Task Force is to examine the suitability of the TSD facility to receive hazardous waste under the Comprehensive Environmental Response and Liability Act (CERCLA) or Superfund program.

The Task Force is comprised of personnel from U.S. EPA headquarters, U.S. EPA regional offices, and state environmental agencies. This evaluation concerns the CECOS International, Inc. (hereafter called CECOS), Aber Road facility, located north of Williamsburg, Ohio. CECOS is an operating subsidiary of Browning-Ferris Industries which is headquartered in Houston, Texas.

B. Objectives

The objectives of the Task Force evaluation at CECOS were to: (1) determine compliance with the requirements of 40 CFR Part 265, Subpart F - Ground Water Monitoring (Ohio Administrative

Code (OAC) 3745-65-90 through 3745-65-94) and 40 CFR 761; (2) evaluate the facility's proposed ground water monitoring program described in Part B of its RCRA permit application for compliance with 40 CFR Part 270.14 (OAC 3745-70); (3) evaluate the facility's potential compliance with 40 CFR Part 264, Subpart F (OAC 3745-54); (4) verify the quality of the facility's ground water monitoring data and evaluate the sampling and analysis procedures; (5) determine if any ground water contamination currently exists; and (6) determine if the facility is eligible to receive waste under the Superfund Off-site Policy.

C. Investigative Methods

To accomplish the objectives, a Facility Evaluation Team was assembled. The Facility Evaluation Team was comprised of a Management Team, a Technical Review Team, a Laboratory Evaluation Team, and a Sample Collection Team.

The on-site facility inspection began on November 10, 1986, and was conducted by three teams: the Management Team; the Technical Review Team; and the Sampling Team. Off-site inspections were conducted at contract laboratories by the Laboratory Evaluation Team. The investigation methods used by these teams are described in the technical portion of this report.

The Task Force contracted with Planning Research Corporation (PRC) of Chicago, Illinois, to prepare a document package of pertinent background information from public information sources (i.e., U.S. EPA and OEPA files). The information collected by PRC concentrated on site activities since about 1978 (e.g., inspection reports, hydrogeologic reports, the Part B application, etc.) and projected future activities. Information obtained from CECOS during the evaluation was also reviewed to supplement the information in the public files. Based upon information from these sources, the technical review team evaluated the facility with respect to the various ground water monitoring requirements.

Unless specifically stated (e.g., the review of the Revised Part B application, December 1986), the evaluation considers only information available at the time of the evaluation (November 1986).

D. Facility Background Information

CECOS operates a waste management facility in Clermont County, Ohio, located about five miles north of Williamsburg, Ohio (see Figure 1 -please note that all figures and tables are located in the back of the report). RCRA hazardous wastes, wastes containing polychlorinated biphenyls (PCB's) regulated by the Toxic Substances Control Act (TSCA), and other nonliquid wastes are landfilled in lined cells.

CECOS has nine filled cells (Cells 1-8 plus the Intermediate Cell) which are closed or are being closed. Cells 9 (nearly full) and 10 were the active cells at the time of the evaluation. CECOS has proposed building seven additional cells (11 through 17). In addition to the cells described above, other units at the facility include (or have included in the past) a closed sanitary landfill, three RCRA surface impoundments (Fireponds 1, 3, and 4/5), the Solidification Basin, and four spray irrigation areas.

Figure 2 shows the location of the units described above that existed at the time of the Task Force inspection. The Solidification Basin, spray irrigation areas, and Firepond 3 no longer exist. See Appendix E, pages 38 through 40 for the location of the Solidification Basin and spray irrigation areas. Firepond 3 was located where Cell 4/5 currently exists.

Cells 3 through 10 contain wastes which are regulated by 40 CFR Part 265 (RCRA) and 40 CFR Part 761 (TSCA). Cells 1 and 2 and the Intermediate Cell were closed before the effective date of the RCRA regulations. Cells 3, 4/5, 6, and 7 were closed in accordance with the provisions of the regulations cited above. Cell 8 is currently being closed. A closure plan has been approved for Firepond 1 by the Ohio EPA. Cells 9 and 10, the active cells, are located in the northeast corner of the site. Cell 11 was partially constructed at the time of the evaluation. The construction of Cell 11 was delayed because of the discovery of a significant water-producing deposit, the 850 Sand, at or near the bottom of the excavation. Areas designated as cells 12 through 17 on Figure 2 are planned future cells. The Intermediate Cell contains waste which would be considered hazardous waste under RCRA. However, the Intermediate Cell was closed prior to the effective dates of RCRA. The Sanitary Landfill was closed in 1982. Under the Hazardous and Solid Waste Amendments of 1984, these units are considered solid waste management units. As such they are subject to corrective action under 40 CFR 264.101 and Sections 3004 (u) and 3008 (h) of RCRA.

The facility is located in a rural setting in which adjacent land is used for agricultural purposes. Residences on Aber Road use a public water supply. Other homes around the facility obtain potable water from individual private wells.

E. Summary of Findings and Conclusions

1. Geologic Characterization

The Task Force determined that the areas beneath Cells 8, 9, 10, 11, and beneath the dewatering retention ponds (i.e., the eastern portion of the site) lack adequate geologic characterization between bedrock and an elevation of about 845 feet. With the exception of the area immediately around proposed Cell 11 and a few scattered wells, borings and wells in this portion of the site do not reach to bedrock and offer no information concerning any lower till sands which may be present between bedrock and an elevation of 845 feet (above mean sea level). The Task Force recommends that continuous borings be drilled throughout this area to determine the presence and extent of lower till sands (e.g., the sand that occurs at an elevation of 840 feet above msl).

The remainder of the site appears to be adequately characterized in terms of the geology, but due to the complex nature of the glacial stratigraphy, the Task Force recommends that all future borings should be continuously sampled and logged except those adjacent to previous borings which were continuously sampled.

2. Compliance with Interim Status Ground Water Monitoring Requirements (40 CFR Part 265, Subpart F and Ohio Administrative Code 3745-65)

a. 40 CFR 265.90 - Ground Water Monitoring System. CECOS was implementing a ground water quality assessment program (assessment monitoring) at the time of the Task Force Evaluation. The Task Force determined that neither the existing nor the proposed ground water monitoring system (see tables 4 through 7) is adequate to satisfy the requirements of assessment monitoring under 40 CFR Part 265. The major deficiencies included the inadequate placement of upgradient and downgradient wells, the need for additional wells to determine the extent of contamination, and the need to measure static ground water levels over a shorter period of time.

(1) 265.91 (a)(1) Number of Upgradient Wells. The Task Force concluded that there is not a sufficient number of upgradient wells capable of yielding representative background samples of ground water quality. Historically well M 15 (screened in the 880 Sand) has been considered upgradient. Dewatering activities have changed the gradient such that this well can no longer be considered upgradient. Ground water quality studies (Warzyn, 1986) indicate water quality is highly variable between the different stratigraphic zones. Based upon these findings, the Task Force concluded that several upgradient well nests are needed to adequately characterize background water quality in each monitoring zones above bedrock. They must be located such that future dewatering activities will not transform these wells into downgradient wells.

(2) 265.91 (a)(2) - Number of Downgradient Wells. The Task Force concluded that the number of downgradient wells in the existing ground water monitoring system is inadequate. The placement of the existing wells is not capable of effectively monitoring the contaminant flow pattern at the site. In addition, the construction of some of the wells is inadequate. CECOS has proposed a single comprehensive Ground Water Monitoring Program (November, 1986) that includes a more comprehensive monitoring system. Task Force determined that the proposed system does not have sufficient numbers of properly located wells to immediately detect and assess contamination from the existing cells into all of the potentially affected sand deposits. The Task Force also finds that the changing flow patterns at the site caused by dewatering activities will require CECOS to continually reassess both placement and numbers of wells to insure effective monitoring.

(3) 265.91 (a)(3) - Well Construction. CECOS has an older series of wells, the M series, which should be plugged and abandoned immediately unless they are suitable for water level measurement (i.e., wells with no greater than 15 foot screen lengths and which monitor only one one sand deposit). The newer MP series wells comprise most of the existing monitoring system at CECOS. These wells are generally of better design and construction. However, some of the early MP series wells experienced grout contamination and were subsequently replaced.

The Task Force recommends that future wells be constructed with inert casing materials. Because of the nature of the wastes landfilled at CECOS, stainless steel or perfluorocarbons are the most suitable materials. The Task Force does not find it necessary to replace existing wells solely because they are constructed with PVC casing.

b. 40 CFR 265.92 - Sampling and Analysis Plan. The Task Force found the sampling and analysis plan to be inadequate. The current plan is comprised of several documents, which occasionally are contradictory. The sampling protocols are not fully detailed. For example, there is no sample collection order specified (i.e., volatile organics first). The Task Force concluded that the various documents must be consolidated into a single plan and the contradictions eliminated. In addition, the plan must specify the sampling frequency and should require that water level measurements be obtained from all wells to be sampled over a set period of time (i.e., a few days) before sampling begins.

c. 40 CFR 265.93 - Preparation, Evaluation, and Response. CECOS has been following a ground water quality assessment plan since August 1985. A report completed in accordance with the plan indicated more information on the extent of contamination is needed (Warzyn, 1986).

The Task Force concluded that the existing and proposed monitoring systems (November 1986) are not capable of determining extent of contaminant migration. To achieve compliance, additional wells are needed.

Water level measurements for assessment monitoring were conducted by CECOS in October of 1986, after Warzyn completed its study. These measurements were taken over a one month period, therefore, rate and direction of ground water flow may not be adequately determined. Water level measurements should be taken each quarter over a shorter period of time (i.e., five consecutive days at all wells to be sampled) to accurately determine the rate and direction of ground water flow.

d. 40 CFR 265.94 - Recordkeeping and Reporting. There have been several changes in the dewatering configuration through time which have caused changes in ground water flow directions and rates. CECOS did not have maps or records that accurately documented these changes. As stated above, information of this type must be collected to insure the ground water monitoring system does not require modification due to effects of the dewatering program.

3. Compliance with RCRA Permit Requirements (40 CFR Part 270 and Part 264 - Part A and B application)

The Task Force reviewed the revised Part B of the hazardous waste permit application which was submitted on December 22, 1986, and found it to be inadequate. Inadequacies exist in nearly every section of the application.

The detection monitoring system proposed in Part B of the December 1986 submittal of the RCRA permit application is very similar to the Proposed Monitoring System (November 1986) for Interim Status. However, no attempt was made in the Part B to discuss either a compliance (40CFR 264.99) or a corrective action (40 CFR 264.100 - 101) monitoring program for that portion of the facility where there is evidence of ground water contamination.

The Task Force determined that the proposed systems for 40 CFR 264 (RCRA permit) was inadequate.

Other deficiencies in the application noted by the Task Force are associated with the waste analysis plan, contingency plan, and closure plans (refer to Technical Report for details).

4. Groundwater Contamination (CECOS and Task Force analytical data - prior or continuing releases)

The Task Force has concluded that there is evidence of contaminant releases near Firepond 1, the Sanitary Landfill, the Intermediate Landfill, and Cells 1, 2, 3, and 4/5. Further investigation into the source and extent of these releases is necessary to determine what corrective measures are needed. Also, the source of organic contaminants in wells MP 227 and M 26 and total selenium in the underdrains needs to be investigated further.

5. Eligibility under the CERCLA Off-site Policy

The Superfund Amendments and Reauthorization Act (SARA) imposed specific requirements on land disposal facilities. Specifi, Section 121 (d)(3)(B) requires that all releases from any unit (hazardous or nonhazardous) at a land disposal facility be addressed by an enforceable corrective action program (permit, order, or consent decree) in order for that facility to receive Superfund waste. Releases of hazardous constituents have been documented in the vicinity of the Sanitary Landfill, the Intermediate Cell, Cells 1, 2, 3, 4/5, and the surface impoundments. Thus, the Task force recommends that the Regional

Administrator of the U.S. EPA Region V take this information into consideration when determining compliance with this policy.

6. Other Compliance Issues

An additional area of noncompliance was noted by the Task Force. The Solidification Basin was operated as a hazardous waste management unit during 1981 without having been identified on Part A of the application for a RCRA permit. Additionally, a closure plan has never been submitted to the U.S. EPA or Ohio EPA for this unit.

TECHNICAL REPORT

A. Introduction

Operations at hazardous waste treatment, storage, and disposal (TSD) facilities are regulated by the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901 et seq.). Regulations issued pursuant to RCRA (40 CFR Parts 260 through 268) address waste site operations, including monitoring of ground water, to ensure that hazardous waste and hazardous waste constituents do not escape undetected into the environment.

The Administrator of the U.S. Environmental Protection Agency (U.S. EPA) established a Hazardous Waste Ground Water Task Force (referred to hereafter as the Task Force) to evaluate the levels of compliance with ground water monitoring requirements at on-site and commercial off-site TSD facilities and to address the causes of noncompliance. In addition, the Task Force examines the suitability of the facilities as a provider of treatment, storage, or disposal services for waste managed by the U.S. EPA's Superfund program. The Task Force is comprised of personnel from U.S. EPA Headquarters, U.S. EPA Regional offices, and the States. Sixty TSD facilities are scheduled for ground water evaluations. One of these is the CECOS International, Inc., Aber Road facility near Williamsburg, Ohio (CECOS).

B. Objectives

The objectives of the Task Force evaluation at CECOS were to:

* Determine compliance with the requirements of 40 CFR Part 265, Subpart F (Ohio Administrative Code 3745-65) and 40 CFR Part 761 (Toxic Substances Control Act (TSCA)).

* Evaluate the facility's proposed ground water monitoring program as described in the Part B of the RCRA permit application for compliance with 40 CFR 270.14 (c) (OAC 3745-70).

* Evaluate the facility's potential compliance with 40 CFR Part 264, Subpart F (OAC 3745-55).

* Verify the quality of the facility's ground water monitoring data and evaluate sampling and analytical procedures.

* Determine if any ground water contamination currently exists.

* Determine if the this site is eligible to dispose of CERCLA (Superfund) waste.

C. Investigative Methods

The Task Force investigation at CECOS consisted of:

* Reviewing and evaluating records and documents from U.S. EPA-Region V and Ohio EPA files, and provided by CECOS during the on-site inspection.

* Conducting an on-site inspection from November 10 through 21, 1986.

* Evaluating two off-site laboratories utilized by CECOS for the analysis of past and present ground water samples.

* Sampling and analysis of ground water from monitoring wells and underdrains at CECOS.

To accomplish the objectives, a Facility Evaluation Team was assembled, and was comprised of a Technical Review Team, a Laboratory Evaluation Team and a Sample Collection Team.

1. Technical Review Team

The Technical Review Team conducted the evaluation of the facility with respect to applicable ground water monitoring regulations. The team's objective was to determine compliance with 40 CFR Part 265, Subpart F; 40 CFR Part 761 (TSCA); potential compliance with 40 CFR Part 264, Subpart F; and compliance with 40 CFR 270.14 (c). The evaluation focused on the following six areas:

1. waste characterization and operations;
2. site history and design;
3. site geology and hydrogeology;
4. ground water monitoring system adequacy;
5. ground water sampling and analysis procedures; and
6. ground water quality data and interpretation.

The Task Force core team in Washington, D.C. contracted with Planning Research Corporation (PRC) of Chicago, Illinois, to prepare a document package of pertinent background information. The information collected by PRC concentrated primarily on past inspections and submittals (e.g., inspection reports, hydrogeologic reports, and Part B of CECOS's RCRA permit application). Information obtained from CECOS during the Task Force evaluation was also reviewed to supplement the information in the public files. By combining these information sources, the Technical Review Team performed a complete evaluation of the facility records with respect to the ground water monitoring program.

2. Laboratory Evaluation Team

The off-site laboratories that analyze or have analyzed samples for CECOS were evaluated by the U.S. EPA, Region V, Quality Assurance Office. The laboratories evaluated were Howard Laboratories, Inc., of Dayton, Ohio, and Environmental Testing and Certification Corporation (ETC) of Edison, New Jersey.

3. Sample Collection Team

Samples for the Task Force evaluation at CECOS were collected by Versar, Inc., (referred to hereafter as Versar), a U.S. EPA contractor, under the supervision of U.S. EPA personnel.

D. Waste Management Units

1. Introduction

CECOS has treated, stored and disposed of RCRA regulated hazardous waste at the Aber Road facility utilizing the following techniques:

1. land disposal of waste (hazardous and nonhazardous) by landfilling
2. storage and treatment of hazardous waste in surface impoundments
3. storage of hazardous waste in a drum storage area
4. storage of leachate in large tanks
5. land treatment of hazardous waste through spray irrigation.

In addition, CECOS has had authorization to dispose of waste containing polychlorinated biphenyls (PCBs) since September 1979.

The hazardous waste units in which the above activities occurred were active after November 19, 1980, and are regulated by the applicable provisions of RCRA. Many of these units also contain PCB's and are also regulated by applicable provisions of TSCA. Cells 3 through 10 are considered RCRA hazardous waste disposal cells and are also authorized TSCA units. Fireponds 1 (combined with Firepond 2) and 4/5, and the Old Solidification Basin (all surface impoundments) have been used to store and/or treat leachate and contaminated runoff. These fireponds are no longer used. The Solidification Basin was filled and covered in 1981. Although required to under RCRA, this unit did not go through formal RCRA closure pursuant to 40 CFR Part 265, Subpart G. RCRA closure of Fireponds 1 and 4/5 is planned. Two spray irrigation fields (Areas C and D) were used to treat contaminated water and sludge between 1980 and 1984 (Cells 8, 9, and 10 were constructed in the areas were spray fields C and D were located).

Cells 1 and 2, Firepond 3 (no longer existing), and the Intermediate Cell were closed prior to the effective date of RCRA regulations. The Sanitary Landfill reportedly did not receive hazardous waste after November 19, 1980. Therefore, these disposal units are not regulated as active portions of the facility, but are considered solid waste management units under the Hazardous and Solid Waste Amendments of 1984 (HSWA), 40 CFR Part 264.101, and Sections 3004 (u) and 3008 (h) of RCRA.

Figure 2 shows the location of the units described above that existed at the time of the Task Force inspection. The Solidification Basin, spray irrigation areas, and Firepond 3 no longer exist. See Appendix E, pages 38 through 40 for the location of the Solidification Basin and spray irrigation areas. Firepond 3 was located where Cell 4/5 currently exists.

A history of these solid and hazardous waste management units was supplied by CECOS during the Task Force Evaluation (Appendix E) and is summarized below. CECOS refers to the hazardous waste landfills (RCRA, TSCA and pre-RCRA) in Appendix E as "Secure Chemical Management Facilities" (SCMF). In past reports (e.g. Bennett and Williams, 1985 and Warzyn, 1986) and in this report the hazardous waste landfill units are called cells.

According to the facility's revised Part A application (December 1986 submittal), the design capacity for all of the hazardous waste cells is 1,928 acre-feet At the time of the Task Force evaluation, this volume was to be distributed among 17 cells. Of these 17 cells, eight were closed, two were active, and seven were planned. The total volume landfilled at the time of the Task Force evaluation was about 774.0 acre-feet. The actual land area occupied by the facility is about 211 acres.

2. Design of RCRA and TSCA Regulated Cells

Cell 3 measures 300 by 300 feet and Cell 4/5 is 300 feet wide by 500 feet long. Both of these cells are approximately 26 feet deep. All of the remaining cells, 6 through 10, are approximately 500 to 550 feet square and 50 feet deep. The locations of these cells are shown on Figure 2.

Cells 4/5 through 10 were constructed with at least one layer of recompacted fine-grained glacial sediments along the bottom and the sidewalls. Cell 3 had recompacted glacial sediments along the bottom only. CECOS refers to this as a recompacted lining. For units with no recompacted glacial sediment liner, CECOS uses the term "natural" lining. The fine grained materials used to construct the recompacted liners were obtained from the glacial sediments deposited at the site.

Cells 3 through 9 are lined with a single synthetic liner ("Hypalon" or High Density Polyethylene (HDPE)) that ranges in thickness from 30 to 80 mil (a mil equals 1/1,000 of an inch). Cell 10 has primary and secondary synthetic liners made of 80 mil HDPE. The secondary liner extends across the base of the cell and up the sidewall to a height of one foot above the primary liner.

Leak detection systems, constructed of PVC or HDPE pipe and sand, were installed under Cells 9 and 10 to detect any leakage which could pass through the primary synthetic liner. In Cell 9, the leak detection system is located between two lower recompacted liners. In Cell 10 it is located between the primary and secondary synthetic liners. Leak detection systems were not installed under Cells 3 through 8.

Underdrains were required to be installed beneath the bottom liner of Cells 3 through 10 as part of U.S. EPA's approval for PCB disposal under TSCA. They are constructed with PVC pipe, stone, in some cases geotextile, and riser pipes. Underdrains may serve to indicate leakage from the cells. The underdrain systems beneath some cells have been used for monitoring the ground water. If a liner fails, evidence of contamination is likely to be found in the underdrain system.

A leachate collection system was installed within each of the RCRA cells. Cells 3 and 4/5 have concrete standpipes (24 inches in diameter) which were installed to collect leachate after waste was placed within the cells. The newer cells (6 through 10) were built with a PVC pipe network placed within stone above the primary liner. A polyethylene drainage net was placed on the sidewalls of these cells to facilitate drainage. Three to five 36-inch standpipes were built into these five cells to collect leachate from the PVC pipe network. The standpipes were constructed of reinforced perforated concrete which was wrapped in a geotextile and surrounded by crushed stone.

There are three subcells within each cell. These are: (1) an amphoteric subcell (i.e., for substances that act as acids or bases); (2) a heavy metal subcell; and (3) a general subcell. Subcell reconfigurations were made in some of the cells while they were being filled (see Appendix E).

3. Surface Impoundments

a. Firepond 1 & Firepond 2. Firepond 1 and 2 were originally built for fire protection and water containment in 1977 (along with Cell 1). It was later used to store and treat leachate from closed disposal cells. Firepond 1 was combined with Firepond 2 by removal of a soil berm between them in 1980. Individually, these unlined ponds were both approximately 80 feet square in surface area and 8 feet deep. CECOS plans to close these ponds consistent with an Ohio EPA-approved closure plan after a new leachate tank farm has been constructed.

b. Firepond 4/5. Firepond 4/5 was constructed in 1979 at the same time as Cell 4/5. It is about 220 feet by 170 feet in surface area and 13 feet deep, and is unlined. This pond was intended to store potentially contaminated rainwater which fell in the active cell and was pumped from the cell shortly after accumulation. Analytical data indicate that some of this potentially contaminated rainwater would meet the definition of leachate. The firepond is currently available for emergency purposes and a RCRA closure plan is being prepared.

c. Solidification Basin. The solidification basin was used between July and December 1981 and therefore is a RCRA unit. It was approximately 200 feet square in surface area and 5 to 6 feet deep (2 feet below grade), with soil berms as sidewalls, and was unlined. The basin was divided into three sections by two internal soil berms.

Leachate from Firepond 1 was pumped into the solidification basin and solidified with high calcium oxide lime and sodium silicate. The solidified material was then placed in Cell 6. CECOS reports that all wastes and contaminated soil were removed and placed into Cell 6 before clean on-site soil was placed into the basin area (Appendix E). However, during the construction of an equipment shed, buried waste was encountered.

The location of the solidification basin is shown in enclosures 3 and 4 (pages 38 and 39) of Appendix E. This unit was not identified on CECOS's application for a RCRA hazardous waste permit. A closure plan has not been submitted to the U.S. EPA or the Ohio EPA.

4. Spray Irrigation Areas.

CECOS had a permit from the Ohio EPA to operate four fields for spray irrigation from September 1980 through October 1984. These fields were identified as Fields A, B, C, and D (for the location of these fields, Appendix E, page 40). Fields A and B were reportedly never used. All of Field D was used and a portion of Field C was used between fall 1980 and October 1984. Potentially contaminated water from Firepond 4/5, leachate from the Sanitary Landfill (also called "Tri Pit" water), and Clermont County sewage sludge (waste water treatment plant source unknown) were the principal materials sprayed onto the fields The top six inches of soil from Field D were stripped off and used in Cells 8 and 9 as daily cover or placed in Firepond 4/5. It is not known what was done with the topsoil from Field C.

5. Non-RCRA Units

a. Cell 1. Cell 1 was constructed and filled with "industrial waste" (predominantly paint sludges in drums) in 1977. It is about 30 feet wide, 50 feet long, 18 feet deep, and does not have a liner. There are grid charts at the facility which indicate where waste was placed within Cells 1 and 2.

b. Cell 2. Cell 2 was built between 1977 and 1978 and filled in 1978. It varies from 60 to 90 feet in width (at opposite ends) and is about 515 feet long and 25 feet deep. It does not have any lining, leak detection system, underdrains, or a subcell design. Two 24-inch reinforced concrete standpipes were installed (date unknown) to collect leachate after the cell was closed.

c. Intermediate Cell. The Intermediate Cell was filled between 1977 and 1979. This cell actually consists of many individual trenches excavated for specific waste streams. The trenches are estimated to be 12 feet wide by 30 feet long and 25 feet deep. There is no liner, leak detection system, or underdrain. CECOS maintains a map on site showing the general waste types and trench locations.

d. Firepond No. 3. This pond was constructed along with Cell 3 (1978) and measured about 250 feet by 100 feet in surface area. Firepond 3 was 8 feet deep. This firepond had no liner and was removed during the construction of Cell 4/5 in September of 1979.

e. Sanitary Landfill. The Sanitary Landfill was used between 1972 and 1982. It is approximately 19 acres in area, and no liners were installed. Three leachate standpipes were installed in 1985 and three more were being installed on the north side of the landfill at the time of the Task Force evaluation. According to CECOS (Appendix E), waste disposed in the Sanitary Landfill included:

* sanitary solid waste
* household waste
* "Bio sludge" from DuPont
* waste water treatment sludge from a General Motors Plant in Norwood, Ohio;
* "Bio sludge" from Procter and Gamble.

The Sanitary landfill included an small pond called the "Tri Pit". This area was used to solidify liquids (composition unknown). It was later covered and incorporated into the landfill.

E. Facility Operations

1. Waste Characterization

a. Introduction. CECOS receives, treats, and stores waste defined as hazardous in 40 CFR Part 261, including ignitable, reactive, corrosive, and E.P. toxic wastes. PCB wastes are also disposed at this facility under the provisions of TSCA. CECOS reports that it does not accept materials which are radioactive, pyrophoric, biologically infectious, shock sensitive, explosive, or reactive with air or water.

b. Preacceptance. CECOS requires a "Waste Product Record" (WPR) form to be completed by the waste generator prior to each waste stream being sent to CECOS (see Figure 5). Data requested on this form are intended to the provide the information necessary for CECOS to treat, store, or dispose of the waste in accordance with the requirements of RCRA and TSCA. The WPR contains the waste stream description, chemical composition (components and their concentrations), the EPA hazardous waste number, shipping requirements, a certification by a representative of the generator that the information is true and accurate, and a section for approval (with any special conditions) by the Ohio EPA. No sampling and analysis procedures are supplied on the WPR to indicate how the generator sampled or analyzed the waste stream.

c. Acceptance Procedures (Waste Analysis Plan). CECOS's handling procedure for wastes, from preacceptance to disposal, is described in the waste analysis plan (WAP). The Task Force reviewed the waste acceptance procedures in the WAP that CECOS was using at the time of the evaluation. Based upon this review the Task Force determined that the procedures in the WAP are inadequate to meet the requirements of 40 CFR 265.13. In addition, the inadequate plan is not being followed. Problems are associated with both preacceptance and acceptance procedures at the facility.

The WAP used at the time of the Task Force evaluation (primary document) was dated September 19, 1983. It is not known what document may have been used prior to this. Since the primary document was issued, the plan has been revised by adding addenda (about 33) as new techniques or procedures were initiated at the facility.

The Task Force concluded that the WAP must be rewritten. Much of the information in the plan is repetitive or irrelevant. For example, the section discussing bulk free liquid sampling and solidification (page 31 and addendum 33) is not needed because this process has not been conducted at the Aber Road facility for several years. Several other sections appear to be outdated and should be removed.

The WAP in the December 1986 submittal of Part B of the RCRA application is more concise than the plan being used at the facility during the Task Force inspection. Much of the irrelevant information has been excised. However, deficiencies continue to exist the in this revised WAP as well (See Section I. 2., page 63, "Review of Current Submittal").

The WAP describes inspection, sampling, and "fingerprinting" procedures to be conducted on each load of hazardous waste entering the facility. The Task Force observed one bulk load and one barrel load being inspected, sampled and fingerprinted during the site evaluation. Based upon these observations, the Task Force believes that, with the methods specified in the WAP, CECOS cannot identify off-specification waste that might come into the facility. The Task Force noted that in several cases the WAP was not being followed.

According to the WAP, four grab samples are to be taken from four different locations in the bulk loads using a steel rod core sampler or thief sampler and composited. Samples are to be taken "through the waste".

The Task Force observed a bulk load of contaminated soil as it was being inspected and sampled. The technician who sampled the load took three scoops from the waste surface at the center of the load. He did not sample "through the waste" as the plan specifies. This sampling was not in accordance with the WAP and cannot be considered to generate representative samples. The plan should be followed so that a representative composite sample is collected randomly (as specified in the document Test Methods for Evaluating Solid Waste (SW-846)) and should include some portions of waste taken at or near the bottom of the load. When attempting to gather a representative sample from a load of bulk waste, samples should be taken vertically through the waste.

The WAP states that when containerized waste arrives the containers are to be counted, checked for free liquids (which involves tapping the container with a steel rod), and a percentage of the barrels is to be opened. The percentage to be opened is not clearly stated. In the plan which the Task Force reviewed, "10 %" was typed into the plan, but was later deleted (i.e., scratched out) and "15 %" substituted. From one or two drums a representative sample is to be collected and composited for fingerprinting. As with bulk loads, a steel rod core sampler or thief is to be pushed through the waste for sampling purposes.

The Task Force observed the sampling of a load of drummed waste and found problems similar to those noted with bulk loads. Less than 10 % of the barrels (four out of forty-two barrels) were opened. The technician taking the sample for fingerprinting grabbed it from the top of one barrel. Only barrels with bung holes (i.e., twist-out caps located on the lid) were opened.

CECOS analyzes samples of incoming wastes at an on-site laboratory for the following characteristics:

* pH
* ignitability
* presence of free liquids
* reactivity with water
* compatibility with samples from previous loads of waste
* generation of cyanide gas
* load-bearing capacity

The pH is tested with litmus paper to determine if it is between 6 and 9. If it is found to be outside this range, it is then tested with a pH meter. If the waste is not liquid, the pH is obtained by mixing a small portion of the sample in deionized water.

Ignitability is determined by passing a match flame beneath the sample.

The presence of free liquids is tested using the paint filter test (SW-846 Method 9095). This test is conducted only if liquids are suspected (i.e., the load appears wet).

A portion of the sample is sprayed with deionized water to determine if it is water-reactive. Similarly, a portion of the sample is mixed with a composite sample ("running mixture") made from previous loads to see if it is compatible with wastes already placed into the cell. The composite sample being created at the time of the Task Force investigation was begun on November 11, 1986.

If the generator indicates that the waste may contain cyanide, CECOS will test the sample for the ability to generate free hydrogen cyanide.

Load-bearing capacity is required to be tested by the Ohio EPA. The test is conducted using a hand-held penetrometer. This test is required only when specified by the on-site Ohio EPA representatives on the approved WPR.

d. Discussion. The fingerprinting procedures used by CECOS are inadequate to characterize incoming waste. As indicated above, the Task Force has concerns regarding whether the samples collected are representative of entire shipments.

A CECOS representative indicated that the fingerprinting procedures described above were used to quickly check the waste to see that it matches the manifest, the WPR, and to insure that it is safe to handle by facility personnel. CECOS contends that the generator is responsible for identifying the waste on the WPR and the manifest that is being forwarded to CECOS and that the company is not liable for misidentified waste disposed at the facility.

The Task Force strongly disagrees with the concept that generators bear sole responsibility to insure proper identification and classification of waste being disposed at the facility. If CECOS chooses to rely upon information supplied by generators to identify and classify waste, then standard methods to analyze the waste must be used by the generator and a copy of any laboratory analyses must be attached to the WPR. Additionally, some detailed analyses must be conducted on-site by CECOS to verify information supplied by generators.

The Hazardous and Solid Waste Amendments of 1984 (HSWA) place restrictions on the land disposal of some wastes (e.g., F001 through F005 code wastes). The WPR must clearly identify how the waste was classified to insure that it is not a restricted waste, or, if it is a restricted waste, how it was treated (and by whom) to meet applicable land disposal concentration limits. CECOS representatives should verify that a generator has properly identified and classified waste streams that are being shipped and disposed at the facility. Additionally, some confirmatory analyses are necessary to verify that restricted wastes which have been treated meet the applicable treatment standard found in 40 CFR Part 268.

2. Site Operations

a. Waste Disposal. After a sample from the load has been fingerprinted and the load has been approved for acceptance, an on-site waste tracking form is completed, indicating the selected disposal subcell. This form is then given to the driver of the truck. The driver proceeds to the specified cell and presents this form to the cell operations foreman to demonstrate that the load has been approved for disposal. During disposal, the foreman specifies on the tracking sheet the location where the waste is placed within the cell A grid system and depth determination using a transit is utilized to provide this information. After unloading, the form is returned to the truck driver, who takes his truck to be washed and weighed out. The weight of the load is recorded on this sheet. The waste within the cell is covered immediately.

b. Leachate Handling. In the past, leachate was collected from cells and stored and treated in the fireponds. Currently the leachate is pumped directly into tank trucks, and shipped off-site. Some of the leachate contains high concentrations of arsenic (according to a CECOS representative at the time of the Task Force evaluation) and is shipped to the CECOS Calcasieu County, Louisiana facility for deep well injection. The remainder of the leachate is transported to the CECOS Spring Grove Facility in Cincinnati, Ohio, for treatment with activated carbon and discharged to the Cincinnati Metropolitan Sanitary Sewer District.

c. Dewatering. Dewatering systems are used to reduce the pressure of ground water on the sidewalls of empty cells, thereby preventing sidewall failure. Pumping rates around Cells 9 and 10 are currently estimated to be about 100 gallons per minute. Water removed by the dewatering system (predominantly from the Upper Sand and the 880 Sand) is pumped into one of two retention ponds on an alternating basis. The retention ponds have approximately 2 to 3 million gallons capacity each. Water from the ponds is sampled and analyzed for metals, volatile organics, pesticides, acid extractable and base/neutral organics, and phenolic compounds The analytical results are sent to the Ohio EPA for review and approval prior to the leachate being discharged. After the discharge is approved by the Ohio EPA, the public is notified through a public notice. After the public notice period, the water is discharged to the receiving stream.

The Task Force concluded that if hazardous waste or hazardous waste constituents are found in samples taken from the retention ponds, the water will be considered hazardous waste and the ponds must be considered RCRA-regulated units.

d. Potential Runoff Contamin. The Task Force observed a potential source of contamination to Pleasant Run Creek on the west side of the facility. A drain in the parking area discharges directly to the creek. The source of the water entering this drain is runoff from a parking lot and driveway which is traveled by trucks and equipment that enter the active cell. Overspray from the truck wash may also enter this drain. Runoff from the access roads also discharges to the creeks. It is suggested that this area be investigated and if necessary an alternate discharge point and treatment method selected.

F. Site Geology and Hydrogeology

1. Introduction

The Aber Road facility is located in the Till Plain Region of the Interior Lowland physiographic province. Glacial deposits overlay relatively flat-lying Ordovician bedrock. The bedrock is thinly bedded (rarely exceeding 10 inches) limestone and shale deposits of the Richmond and Maysville formations These two formations have a combined thickness of about 600 feet in some parts of southwestern Ohio. Field and laboratory permeability tests indicate the shale and the limestone are dense and have relatively low primary permeabilities

The facility is located on the eastern side of the Cincinnati Arch. The bedrock has a gentle relief overall, sloping to the north and east. The bedrock surface was eroded by a pre-Illinoian river system that formed a dendritic drainage pattern that trends predominantly north-south. A portion of the site is located over one of the buried valleys in this ancestral river system.

2. Glacial Tills

Overlying the bedrock are glacial deposits, identified on USGS Map U-316 as being deposited during the Illinoian Stage of the Pleistocene Epoch. The glacial deposits in Clermont County range from 0 to 300 feet in thickness. At the facility, two distinct till units have been identified and are commonly referred to by CECOS as the Upper and Lower Tills. The total thickness of the glacial deposits at the site ranges from about 30 feet, south of the Sanitary Landfill, to more than 100 feet in the buried bedrock valley. The Upper Till is comprised of predominantly hard, dense, sandy silty clays with scattered gravel and rock fragments. The Lower Till is a mixture of clay, silt, sand and gravel. The tills contain several lenses of sand, sand and gravel, and silty sand.

The two tills are separated by a sand and gravel deposit which generally occurs with a fine-grained silt matrix between the elevations of 870 and 890 feet (msl). This contact between the till units has been referred to by CECOS as the 880 Zone or 880 Sand.

The Upper Till is predominantly brown in color, stiff to hard in consistency, and is mottled in the upper 5 to 10 feet. Natural moisture content varies from 7 to 10 percent in the unweathered portion to 20 percent in the upper mottled portion. This till is classified as CL or CL-ML (Lean Clay or Silty Clay, respectively) in the Unified Soil Classification System. Contained within the Upper Till is a semicontinuous sand deposit referred to by CECOS as the Upper Sand. This sand deposit appears to be separated from the 880 Sand by about 5 to 15 feet of clay till.

The Lower Till is gray in color and very hard and brittle. This till has a natural moisture content of about 7 to 10 percent and ranges in classification from CL-ML to SC-SM (silty clay to sand with clay and sand with silt, S&ME, 1986a). In the western portion of the site, sand deposits are less common in the Lower Till than in the Upper Till. If present in the Lower Till, these sand deposits tend to be discontinuous. At several locations in the western portion of the facility, sand deposits occur at the Bedrock\Till Interface. These sands are unnamed and generally included with discussions regarding the Bedrock\Till Interface. In the eastern portion of the site, two relatively large sand deposits were recently discovered by CECOS while excavating Cell 11. These two sands are commonly referred to as the 840 and 850 Sands.

3. Sand Deposits

As indicated above, there are several sand deposits or permeable zones within both till units. The Task Force considers these zones to be preferential flow pathways within the uppermost aquifer. Any other sand deposits at the site are thin and discontinuous. Five deposits or zones have been discovered to be relatively thick and areally extensive enough to map and physically describe. These units are referred to by CECOS from shallowest to deepest as: the Upper Sand, the 880 Sand, the 850 Sand, the 840 Sand, and the Bedrock\Till Interface.

The Upper Sand and 880 Sand have been mapped and described in several hydrogeologic reports. The Task Force concluded that the extent and aquifer characteristics of these two deposits have been adequately defined for the purpose of RCRA and TSCA monitoring for the regulated units in existence at the time of the evaluation.

At the time of the evaluation, CECOS was studying the 840 and 850 sands. More information is needed concerning the distribution of these sands and any other lower till sands in the eastern portion of the facility (proximal to Cells 8 through 15 on Figure 2) so that they can be adequately monitored (see discussion below).

Based upon the information available at the time of the Task Force evaluation, the following sections provide a brief description of each of these five deposits, including locations, estimates of hydraulic conductivity, and the ground water flow direction and gradient within the sand deposits.

a. Upper Sand. The Upper Sand is typically found in lenses of limited lateral extent and above an elevation of 890 feet (msl). Figure 6 is an isopach map showing the thickness and distribution of the Upper Sand. The largest occurrence of the Upper Sand at the site is in the area of Cells 8 and 9, where it is as much as nine feet thick. More commonly this deposit is one foot or less in thickness. Figure 6 shows the approximate distribution of this sand.

b. 880 Sand. The 880 Sand is usually found at the base of the Upper Till which is normally between elevations 870 and 890 feet (msl). This sand is much more extensive than the Upper Sand, but is not continuous across the entire site. East of Cell 7 and south of Cells 8 and 9 it has been reported to be six feet thick (Warzyn, 1986). In the northwest portion of the site and in the eastern part of the site, thinner lenses occur. The 880

Sand is believed to extend off-site on the eastern boundary, at the southern boundary east of the Sanitary Landfill, and along the north boundary between Cells 6 and 7. Figure 7 is an isopach map which depicts the distribution of the 880 Sand.

c. 850 Sand. The 850 Sand is found in the eastern portion of the site between the elevations of 839 and 863 feet (msl) and within the Lower Till. It consists of poorly sorted sands and gravels with minor amounts of silt. A layer of fine sand (less than one foot thick) frequently occurs at the top of the 850 Sand. Based upon a report written by Soils and Materials Engineers (S&ME, 1986b), the sand is thought to be a channel sand that ranges from 14 to 23 feet in its thickest portions and follows the bedrock valley. Deposited in topographic lows in the bedrock surface, this sand deposit apparently pinches out perpendicular to the channel axis. See Figure 8 for the distribution of the 850 Sand as it was presented by CECOS at the time of the Task Force Evaluation.

After studying boring and well logs the Task Force determined that the distribution of the 850 Sand and 840 Sand may be more extensive than Figures 8 and 9 indicate. One well, PB 6, on the adjacent Thomas property to the east had nearly five feet of sand at an elevation of 847 feet. This is interpreted by the Task Force to be part of the 850 Sand. The Task Force also noted that the borings north of Cells 8, 9, and 10 are drilled predominantly to a depth of 845 feet or higher and may not have penetrated these sand deposits.

d. 840 Sand. The 840 Sand appears to be a relatively small linear sand deposit that passes beneath the 850 Sand. The 840 and 850 Sands are vertically close to one another. In some locations 840 Sand is found adjacent to the Bedrock Till Interface. Based upon pump test data, these three units appear to be hydraulically connected (S&ME, 1986b). The 840 Sand is a poorly sorted mixture of silt, sand, and gravel, commonly overlaid by a thin bed of well sorted fine to medium sand. Figure 9 shows the distribution of the sand as presented by S&ME (1986b).

e. Bedrock\Till Interface Sand deposits have been encountered on top of the bedrock at many locations. Fracturing and weathering of the bedrock may also contribute to flow in this zone. The top of the bedrock has been mapped and is shown in Figure 10. This figure gives a sitewide representation of the bedrock surface, but more recent work by S&ME (1986b) indicates the surface is different (a bedrock high is present) in the eastern portion of the site.

4. Hydraulic Conductivity

The hydraulic conductivity of the different hydrostratigraphic units has been tested by several methods including: (1) falling head tests on both undisturbed and recompacted soil samples; (2) packer pressure tests within the bedrock borehole; (3) baildown tests on completed wells; and (4) pumping tests. Table 2 presents the results of the testing by hydrostratigraphic unit and test type (Warzyn, 1986). The results for each hydrostratigraphic unit varies with test type and location.

Localized hydraulic conductivities may very greatly from the the results of the bulk hydraulic conductivity tests.

a. Upper Till Hydraulic Conductivity. The falling head laboratory tests indicate the matrix of the Upper Till has a hydraulic conductivity of between 2.4×10^{-7} and 2.5×10^{-9} cm/sec. Baildown test data indicate that the hydraulic conductivities in the weathered Upper Till ranges between 8×10^{-5} and 7×10^{-7} cm/sec. The higher values from some baildown tests reflect wells monitoring small sand seams (possibly Upper Sand). Pumping tests have indicated higher hydraulic conductivities than did the baildown tests. Pump test results for the Upper Sand range from 1.5×10^{-5} to 1.7×10^{-4} cm/sec. Warzyn concluded that the most representative estimate of the hydraulic conductivity in the upper till is from pumping tests and is approximately 1.5×10^{-5} cm/sec.

b. 880 Sand Hydraulic Conductivity. Excluding the remolded falling head test results, the range of hydraulic conductivity for the 880 Sand from all Warzyn (1986) tests was 1×10^{-1} to 3.4×10^{-4} cm/sec. Warzyn was concerned about underestimating hydraulic conductivity in the area outside the immediate well hole by the baildown test and overestimating hydraulic conductivity in the pump test because of departures from the assumptions of the pumping test (i.e., infinite extent and uniform thickness). Therefore, an average hydraulic conductivity of 1.3×10^{-2} cm/sec was computed using the geometric mean of the baildown and pump tests. This value appears reasonable and was used for the ground water flow velocity calculations discussed later in this section.

c. Lower Till Hydraulic Conductivity. The Lower Till was tested only by falling head tests. The results indicate hydraulic conductivity ranges from 1.7×10^{-8} to 4.0×10^{-9} cm/sec. These values are considered by Warzyn to be representative of the bulk hydraulic conductivity of the Lower Till. A geometric mean of 7.5×10^{-9} cm/sec was used in flow rate estimates.

d. 850 Sand Hydraulic Conductivity An aquifer test was conducted on the 850 and 840 Sands by Ground Water Associates Inc. on September 23 through 27, 1986. The results were provided in S&ME (1986b). The tests were conducted in two phases. The first phase consisted of a recovery test and the second phase a pump test. The dewatering system in and around Cell 11 was turned off for 48 hours to allow the water levels to recover. The pumps were then turned back on for phase 2 of the test. Based upon these tests, the hydraulic conductivity of the 850 Sand is considered to vary between 3.8×10^{-2} and 1.1×10^{-1} cm/sec, respectively.

e. 840 Sand Hydraulic Conductivity. The hydraulic conductivity of the 840 Sand had not been determined by CECOS at the time of the evaluation. The 840 Sand has a similar composition as the 850 Sand (silty sand and gravel) and therefore is believed to have similar hydraulic conductivities.

f. Bedrock Hydraulic Conductivity. The bedrock hydraulic conductivity was estimated by pressure testing an isolated zone in the bedrock (i.e., packer tests) and using baildown tests in wells screened across the Bedrock\Till Interface. The packer tests had uniform results of less than 1×10^{-7} cm/sec. The Bedrock\Till Interface baildown tests indicated a higher hydraulic conductivity, ranging from 7×10^{-4} to 1×10^{-5} cm/sec. The results of the baildown tests confirm that the Bedrock\Till Interface is a preferential flow pathway.

5. Ground Water Flow

Warzyn (1986) identified four hydrostratigraphic units at the CECOS facility. From top to bottom these are: the Upper Till (which contains the Upper Sand), the 880 Sand, the Lower Till, and the Bedrock. Warzyn concentrated its study of hydraulic conductivity and ground water flow within these units to the western portion of the facility. The 850 and 840 Sands were not addressed. S&ME (1986b) did study the 850 and 840 Sands. The following discussion of hydraulic conductivity, flow rate and direction is based primarily upon information provided in those two reports.

Outside the influence of dewatering, the water table generally occurs between the elevations of 890 and 900 feet (msl). All glacial deposits and the bedrock appear to be saturated beneath the water table. It is important to note that as dewatering activities change, the rate and direction of ground water flow will also change. This may require additional wells to be installed.

a. Upper Till. Generally, the ground water flow direction through the Upper Till is controlled by the hydraulic conductivity contrast between the Upper Till and the 880 Sand and the lower head in the 880 Sand (Warzyn, 1986). In places where the 880 Sand is not present, the gradient downward is lower, but still toward bedrock.

The Upper Sand within the Upper Till appears to have flow through it from the till above to the 880 Sand below (Warzyn, 1986).

b. 880 Sand. Ground water flow within the 880 Sand is complex because of natural and site-engineered factors. Factors contributing to flow within the 880 Sand include:

* The downward gradient from the upper till;
* Upward gradient from bedrock;
* Irregular distribution of sands and gravels within the 880 Zone;
* Lined secure cell boundaries that intersect this zone; and
* Dewatering activities at the eastern portion of the facility.

CECOS describes the natural direction of ground water flow (without dewatering) in the 880 Sand and the at the Bedrock\Till Interface as generally from north to south. A portion of the flow in the 880 Sand appears to be towards the southeast and southwest near the two streams on the site.

Dewatering activities designed to help stabilize the glacial deposits during cell construction (beginning in 1981) have produced cones of depression in which the flow is toward the center of pumping. The pumping center has changed through time as dewatering activities have progressed. Some flow information is available for the 880 Sand and the Bedrock\Till Interface that reflect the effects of dewatering. Figure 11 is a potentiometric map of the 880 Sand from Warzyn (1986) and indicates the general flow directions around the site during dewatering.

As Figure 11 indicates, a ground water mound exists in and around the Sanitary Landfill. The 900-foot contour of ground water potential around this mound extends beyond the northern limit of the landfill because the 880 Sand is absent and cannot relieve the built-up head. A second smaller mound is associated with Cell 2. Ground water lows include the streams on the west and southeast, the 880 Sand in the area of the Intermediate Landfill, and the dewatering area to the northeast. In general, ground water flows outward from the mounds toward the lows. Flow rates within the 880 Sand are estimated to range from 0.2 to 0.6 ft/day. Where the 880 Sand is not present the flow rates are estimated to be less than 0.01 ft/day.

c. Lower Till. The hydraulic potential in the bedrock is generally higher than that of the 880 Sand. Therefore, ground water should flow upward toward the 880 Sand through the Lower Till. In the area north of the Sanitary Landfill, a potentiometric high, attributed to the absence of 880 Sand (Warzyn, 1986), causes a downward gradient in the Lower Till. Excluding sand deposits, flow rates in the Lower Till are less than 5×10^{-5} ft/day. The 850 Sand appears to have ground water flowing toward Cell 11 from both the north and south during dewatering.

Based upon water levels measured in two wells (MP 215B and MP 231B) it appears that water flows toward the south under non-pumping conditions at a rate of 0.5 ft/day (S&ME, 1986b).

d. 840 Sand. There is no information about the flow rate or direction in the 840 Sand.

e. Bedrock\Till Interface. The hydraulic potential in the bedrock is greater than the 880 Sand. CECOS concluded this acts as a hydraulic barrier to downward movement of water or contaminants. Figure 12 is a potentiometric map of the Bedrock\Till Interface from Warzyn (1986). There is flow along the Interface based upon the potentiometric map and the pump test data that indicates this is a preferential pathway.

6. Discussion

After reviewing the available geologic and hydrogeologic information, the Task Force concluded that information is lacking in the eastern portion of the site near Cells 8 through 15, for the interval between 845 feet (msl) and bedrock. Few borings in the eastern portion of the site fully penetrate the glacial tills (see Table 8 and Figure 13). Most of these borings terminate at or above 846 feet (msl). The lack of information below this elevation in the eastern area precludes evaluation of whether the lower till sands are adequately mapped and therefore if the monitoring system is adequate in these areas. Further geologic investigation is required (e.g., continuous cores and the determination of ground water flow directions) to determine the presence, extent and importance of the lower till sands in this portion of the site.

Figure 13 shows the locations of existing wells or borings that fully penetrate the glacial tills in the eastern area. In addition, this figure indicates locations recommended by the Task Force for new, continuously cored exploration borings. These borings should fully penetrate the glacial tills and core five feet of bedrock. The new exploration borings should identify all Lower Till sand in the eastern area.

Based upon the existing geologic information, the Task Force concluded that the areas near the Intermediate Cell and Cells 1 through 7 have been adequately characterized for purposes of the detection and ground water quality assessment monitoring. Due to the complex stratigraphy at this site, it is recommended that whenever a well is installed at a new location on the site, its borehole be continuously sampled during drilling.

G. Compliance Under RCRA and TCSA

CECOS's Aber Road facility has been cited for several violations of RCRA and TSCA. These include: structural inadequacies associated with Cell 8; the failure of Cell 9 to comply with minimum technology standards under RCRA; a release of contaminated surface waters into Pleasant Run Creek; and inadequate ground water monitoring programs. Historically, the facility has exhibited occasional non-compliance with respect to recordkeeping. Below is a summary of the compliance history at the CECOS Aber Road facility since 1983.

The first formal action was in April 1983, when the Ohio EPA issued a formal warning to CECOS about the inadequacy of the ground water monitoring program under RCRA (Goldman, et. al., 1986).

In February 1984 the Ohio EPA ordered CECOS to halt construction of Cell 8, because a portion of the cell sidewall collapsed from instabilities caused by ground water saturation of the sediments. As a result of this failure, on May 31, 1984, the Ohio EPA required CECOS to obtain a $ 300,000 surety bond to "guarantee" against similar failures. The slope failure also caused the U.S. EPA to suspend the approval under TSCA for PCB disposal from February 22 through April 13, 1984.

On September 24, 1984, U S. EPA issued a Complaint, Findings of Violation and Order. This administrative action alleged that CECOS had failed to file a timely Part B of the RCRA hazardous waste permit application. The complaint also alleged that CECOS failed to respond in a timely manner to a U.S. EPA Notice of Deficiency concerning the original Part B application. A penalty of $ 11,000 was assessed.

On May 7, 1985, CECOS and EPA entered into a Consent Agreement and Final Order (CAFO) to resolve the September 24, 1984 administrative action. CECOS had supplied the necessary information to the U.S. EPA and agreed to pay the $ 11,000 penalty.

The Ohio EPA ordered CECOS to suspend operations after receiving reports on November 9, 1984, that the facility operators pumped phenol-contaminated water from a landfill cell into a tributary of the East Fork of the Little Miami River upstream from public drinking water intakes. Ohio EPA issued Director's Final Findings and Orders on November 26, 1984, ordering CECOS to comply with 25 provisions including:

* specification and monitoring of truck routes to the facility;
* construction of a truck wash;
* limitation of operating hours;
* submission of a revised surface water management plan;
* retention of an independent environmental auditor;
* sampling of off-site monitoring wells;
* submission of particulate emission control and personnel decontamination plans;
* holding monthly meetings with a citizen committee

On November 27, 1984, the Ohio EPA allowed the facility to reopen.

The Ohio EPA contracted Bennett and Williams, Inc., to perform a Geotechnical Assessment in the spring of 1985 (Bennett and Williams, 1986). Preliminary data from this geotechnical assessment triggered Ohio EPA to issue emergency Findings and Orders on May 9, 1985, which included the suspension of both RCRA and TSCA activities and required the submission of a ground water quality assessment plan. The state issued Final Findings and Orders on August 13, 1985, allowing for aitional reopening.

The Findings and Orders issued by the Ohio EPA on May 9, 1985, required the company to prepare sufficient information to confirm or deny the presence of ground water contamination. These investigations revealed widespread deficiencies in the TSCA ground water monitoring system, including grout contamination of monitoring wells. After reviewing data generated by these investigations, the U.S. EPA temporarily suspended the facility's TSCA disposal authorization on August 2, 1985. Subsequently, CECOS agreed to replace all inadequate wells by January 1, 1986. The TSCA authorization was reinstated on August 27, 1985.

On January 23, 1986 the EPA issued a Notice of Violation to CECOS for solidifying leachate in an unpermitted unit (the truck bay of the container storage area) and for placing the solidified leachate into a cell which did not meet the minimum technology requirements (Cell 9). CECOS removed the solidified waste from Cell 9.

Most recently, an Ohio EPA inspection of the facility on June 19, 1986, found no deficiencies in the areas reviewed. The facility was declared to be in "substantial compliance with the applicable hazardous waste rules." Ground water monitoring was not reviewed at the time of the inspection.

H. Ground Water Monitoring Program under RCRA Interim Status and TSCA

The following section, which describes the historical ground water monitoring systems, is taken predominantly from the CECOS Project Plan (U.S. EPA, 1986c) and CECOS's Proposed Interim Ground Water Monitoring Program (CECOS, 1985a).

1. Historical Ground Water Monitoring System

The Aber Road facility began accepting selected industrial wastes in late 1976 and began monitoring the ground water in 1977. The original ground water monitoring system consisted of several M-series wells which were installed between 1977 and 1983. This monitoring system was used through 1983 to respond to the ground water monitoring requirements for RCRA, TSCA, and an Ohio EPA Permit to Install (PTI) issued pursuant to Ohio Administrative Code 3745-27-06. Dewatering activities at the site began in June 1981, and altered the ground water flow direction within some portions of the site. Because of the gradient changes and questionable well integrity (see discussion below), the U.S. EPA determined in 1984 that the original TSCA and RCRA monitoring systems were inadequate.

As a result of these findings, installation of the MP-series wells began in the spring of 1984. These wells were intended to be part of a new comprehensive TSCA monitoring system and to replace some of the existing RCRA wells. About 170 MP-series monitoring wells have been installed.

Warzyn (1986) identified 222 existing wells and developed a well inventory (see Table 3) which documents most of the problems with these wells. Twenty-one of the wells shown in Table 1 were installed by Warzyn between February and April 1986, as part of the Assessment Program described below. (Note - the information provided under the "comments" column of Table 3 was meant to act as a guide rather than a definitive description. The information was derived from several sources, including previous engineering studies and observations made by Warzyn at the site.)

CECOS has received five U.S. EPA approval permits to dispose PCBs in accordance with TSCA. The first was issued on September 28, 1979, for secure Cell 3. Two others were issued in May 1980 and July 1981 for Cell 4/5 and 6 through 17, respectively. However, on January 17, 1984, the U.S. EPA notified CECOS that all additional cells would require individual approval under TSCA. Cells 9 and 10 were approved by U.S. EPA under TSCA on February 6, 1985, and September 12, 1986, respectively.

In accordance with the approvals, monthly monitoring of seven of the M-series wells (M 4, M 11, M 15, M 18, M 21, M 23, and M 24) began in 1979. One well (M 15) was considered upgradient and six others were considered downgradient. In 1984, these original wells were replaced by 45 well nests of the MP-series. In addition to its monitoring wells, CECOS has monitored some underdrains, leachate standpipes, and surface waters since 1983 to satisfy TSCA requirements. In 1985, as part of the TSCA well replacement program described above, four supplemental well nests were added to the TSCA ground water monitoring program.

RCRA quarterly background monitoring began on December 18, 1981, and continued until December 12, 1983, using wells M 15 (originally considered upgradient), M 18, M 24, and M 25 (originally considered downgradient). Between 1983 and 1985, leachate standpipes, underdrains, and several of the MP-series wells were monitored to satisfy the RCRA requirements.

In the spring of 1985, CECOS initiated a site-wide monitoring well development program to respond to Director's Findings and Orders issued by the Ohio EPA. During the summer of 1985, CECOS sampled 33 leachate standpipes and analyzed them for compounds listed in Appendix VIII of 40 CFR Part 261. Based on the results of this analysis, CECOS proposed a list of compounds to the Ohio EPA for future monitoring. After the leachate sampling, CECOS began sampling 59 monitoring wells for volatile organics analysis (VOA) until a final ground water monitoring program could be established. (Also see Preparation, Evaluation and Response, Subpart 4).

Based upon historical data and the initial results of the ground water quality assessment program, CECOS concluded that the pre-RCRA cells (Cells 1 and 2 and the Intermediate Cell) in the northwest quadrant of the site, and the old Sanitary Landfill in the southern portion of the site were the primary areas that required further study. Warzyn was contracted in the spring of 1985 to perform this study, and completed it in May of 1986.

Quarterly monitoring of wells M 15, M 21, M 22, M 26, M 27, and M 28 began on November 12, 1980 as required by the Permit to Install (PTI) for Cells 3 and 17. A stipulation of the permit required that 19 additional wells had to be maintained as "standby" wells.

2. Proposed Ground Water Monitoring System

In response to a request by the U.S. EPA and Ohio EPA at a meeting held in Columbus, Ohio, in August 1986, and as recommended by Warzyn (1986), CECOS prepared a report describing a Proposed Ground Water Monitoring Program (CECOS, 1986) that was intended to satisfy all of the monitoring requirements of RCRA, TSCA, and the Ohio PTI. This program was evaluated by the Task Force and found to be inadequate. The proposed system is shown on Figure 15 and is listed in Tables 4 through 7. The inadequacies under RCRA noted by the Task Force in the Proposed

Ground Water Monitoring system are discussed later in this section.

a. Uppermost Aquifer. CECOS has defined the uppermost aquifer to be the 880 Sand zone. The Task Force determined that the uppermost aquifer includes all unconsolidated sand or more highly permeable deposits at or above the Bedrock\Till Interface. The hazardous waste cells cut through or are in contact with many of the sand deposits (e.g., Upper Sand , 880 Sand, and 850 Sand). Therefore, even if the sand deposits are not directly connected, a release could occur to the the uppermost aquifer without being detected in the 880 Sand.

b. Upgradient Wells. The Task Force concluded that there are not enough upgradient wells capable of yielding representative samples of the uppermost aquifer. Historically, well M 15 (screened in 880 Sand) was considered upgradient. Dewatering activities have changed the gradient (i.e., flow direction) such that this well can no longer be considered upgradient. Furthermore, not enough is known about the construction of most M-series wells (e.g., M 19 through M 28, Table 3) to ascertain if these wells are screened in discrete intervals or if their construction might be affecting the ground water samples.

Ground water quality studies by Warzyn (1986) indicate the concentrations of different cations and anions (SO_4, HCO_3, Cl, Na, K, Mg and Ca) are highly variable between the Bedrock\Till Interface wells and shallower glacial sand deposits (880 Sand and Upper Sand). Therefore, the Task Force determined that several upgradient well nests are required to adequately characterize the background inorganic water quality of all sand zones above bedrock. These nests should be located outside the influence of dewatering activities. The wells designated as upgradient in the current monitoring system and proposed monitoring systems appear either to be too close to be unaffected by the hazardous waste cells, or are not upgradient of the facility. It is recommended several upgradient well nests be installed outside the influence of dewatering.

c. Downgradient Wells. The number of downgradient wells in the existing system (See Table 4 through 7) is sufficient. In response to a meeting with the U.S. EPA and Ohio EPA in Columbus on August 13, 1986 and recommendations by Warzyn (1986), CECOS has proposed a single Comprehensive Ground Water Monitoring Program (CECOS, 1986) that includes downgradient wells in many of the sand units (see Tables 4 through 7). Although this program would be a significant improvement over the current system, the Task Force determined the proposed system does not have sufficient wells to immediately detect or assess contamination from the existing cells into all of the sand deposits in contact with the cells. Further, some of the existing wells in the proposed system are inadequately constructed. The Task Force recommends that the downgradient wells in the proposed system with inadequate construction (see below) be replaced if CECOS intends to use them.

d. Well Construction. CECOS has an older series of wells known as the M series. Many of the M series wells are "fully penetrating" (i.e., screened throughout their length), have no "as-built" construction diagrams, and failed to produce non-turbid water during development. Therefore, a program to plug and abandon the M series wells should be developed. Some of the M series wells may be suitable for water level measurement. These would be wells with screens 15 feet or less in length, and screened in one sand deposit.

The newer MP series wells are better designed in that they generally have limited screen lengths, as-built construction diagrams are available, and for the most part they were developed properly. Some of the original MP wells were constructed improperly, and were found to be contaminated with grout. MP wells with improper well construction have been replaced or are not included in the Comprehensive Ground Water Monitoring Program (CECOS, 1986). These improperly constructed wells should also be plugged and abandoned.

Future monitoring wells used for collection of samples should be constructed with inert casing materials. Because of the nature of the wastes landfilled at the CECOS Aber Road facili stainless steel (304, 316, or 2205) or polytetrafluoroethylene (PTFE) are the best-suited materials. The Task Force has determined that it is not necessary to replace properly designed and built existing wells solely because they are constructed with PVC casing.

3. Sampling and Analysis Plan

a. Sampling Plan. The Sampling and Analysis Plan is inadequate. The plan is composed of several documents which contradict one another (see list in next section). These contradictions exist in the equipment decontamination procedures and also in the specification for cable to be used for sampling. Another deficiency was noted in that the plans contain references describing sampling and analysis procedures rather than the procedures themselves. Also, the order of sample collection was not specified. However, as discussed later, CECOS does collect samples in a correct order. The Task Force recommends that the plan be consolidated into one document and the deficiencies and contradictions eliminated. The plan must specify sampling frequency and length of time allowed to take water level measurements. CECOS indicated that it was rewriting the plan at the time the field sampling and analysis activities were observed.

b. Sample Collection and Handling Procedures On February 19, 1987, routine field sampling and analysis activities performed by CECOS personnel were observed by the Task Force. Activities for the sampling of one monitoring well and one underdrain were observed. The Sampling and Analysis Plans in effect were the same as the ones reviewed by the Technical Review Team. As indicated above, many other documents describing general and/ or specific field sampling and analysis procedures are available for this facility. Some of these documents are:

* the Part B application (September, 1984 submittal)
* Proposed Ground-Water Quality Monitoring Plan for CECOS International Aber Road Secure Landfill, Jackson Township, Clermont County, Ohio (Ecological Analysts, Inc, 1983)
* Guide for Sampling Groundwater Monitoring for CECOS Aber Road facility (CECOS, 1985b)

* Howard Laboratories Quality Assurance/Quality Control Program

* ETC Summary of Quality Assurance/Quality Control Procedures

None of the above referenced documents are complete, accurate descriptions of field sampling activities as they are currently being performed at CECOS. Problems noted during this review of field activities were:

1) shortage of backup sampling equipment;

2) inadequate decontamination of field equipment;

3) No effort is made to check for hazardous gases or immiscible liquids in the wells;

4) Precise purge volumes are not measured;

5) inadequate control of bailer; lowered too fast, possibly aerating the sample;

6) field equipment blanks are not prepared for the underdrain pumps; and

7) inadequate number of dedicated field personnel.

Supplies and equipment generally appeared to be adequate. There is a shortage in backup equipment, specifically pumps used for purging and sampling underdrains. Sample bottles utilized are appropriate, but it appears there is an occasional shortfall in available inventory. When bottles specified in the plan are not available, substitute bottles are used. The inventory of sample bottles may require more frequent review. New sample bottles are shipped to the contract laboratory (Howard Laboratories or ETC), where they are prepared. The bottle cleanup is consistent with U.S. EPA procedures. After being labeled, the washed bottles are sent to CECOS from the contract laboratories.

Paper towels are used in sampling equipment decontamination activities. This could lead to false positives due to possible contaminants in the towels. The towels also have the potential to disintegrate and leave residue on equipment. It is suggested that the facility use towels made of a more sturdy and inert materials.

Presampling procedures include the measurement of water levels and total depth for wells and the purging of stagnant water from both wells and underdrains. There is no effort made to check for hazardous gases or immiscible liquids Water levels are measured using a Slope Indicator Company water level indicator, Model #51453. In this type of water level indicator, a sensor is lowered into the well and a signal on the cable reel sounds when the sensor reaches the air/water contact. The cable is coated with black vinyl or rubber, and the sensor is not weighted. Repeated measurements are made to assure an accurate measurement. The cable is measured from a designated point on the well casing. The cable is marked in one foot increments. A foot ruler is used to determine depths to an accuracy of 0.25 inch.

Total depth is also determined with the water level indicator. In the measurement of total depth observed by the Task Force, some difficulty was encountered in determining the actual bottom. During bailing, it was discovered there were some ridges in the well casing of monitoring well M 15 that could potentially give false bottom readings. It is suggested that a weighted device be used for water level and total depth measurements.

The cable was decontaminated using deionized distilled water and a paper towel. The problems with the paper towel were discussed above. Based upon water level and total depth measurements, the well and purge volumes were properly calculated.

The purging and sampling of monitoring well M 15 was accomplished using a dedicated PVC 3-1/2" I.D. bailer. Most routinely sampled monitoring wells appeared to have similar equipment. The bailer is stored inside the locked well casing when not in use. The bailer appeared to be relatively clean and in good condition. The bailer is suspended on a 130 pound test monofilament nylon line using a brass clevis hook. The bailer is raised and lowered using a "Penn" downrigger reel mounted on a surveyor's tripod. The reel was manually powered. The facility also has a battery-powered downrigger reel. The battery powered reel is used with smaller bailers.

Sampling efforts at monitoring well M 15 were observed. The bailer used for M 15 has been determined by CECOS to contain a volume of one gallon when full. The actual volume purged was determined by counting the number of full bailers removed from the well. Fractional volumes were estimated. The total volume of water purged from M 15 was far in excess of the three well-volume criterion. A more precise measurement of purge volume may result in less time spent in bailing and provide a better documentation of actual purge volumes. Well M 15 was not considered contaminated and therefore the purge water was dumped directly onto the ground. The monofilament line was wiped with a dry paper towel each time the bailer was pulled from the well.

Between wells the bailer line was wiped with paper towels soaked with deionized water. The purging operation began with the expectation of sampling immediately after purging. The lowering of the bailer was not adequately controlled, and the bailer splashed heavily, resulting in the aeration of water remaining in the well (problem 5 above). The bailing operation caused a significant drawdown within the well, and the well needed some time to recover before sampling. Therefore, the bailing procedure was not a problem in term of aerating the sample. However, it would have been a problem if sampling had started immediately after purging as originally planned.

The well was sampled one hour after completing the purging operation. A water level measurement just prior to sampling indicated the well had recovered approximately 70% of its original volume. The lowering of the bailer for sampling purposes was done more carefully to avoid sample aeration. The initial bailer full of sample water was discarded. The sample order began with volatile organics followed by TOX, TOC, phenols, metals, SO_4/Cl, and field parameters. The sample bottles were filled by pouring from the top of the bailer. All sample containers except for volitile organic analysis (VOA) vials were rinsed with sample water before filling. A quadruple sample was collected for TOX and TOC. Field parameters (pH, temperature, and specific conductance) were determined immediately after collection. The meters were appropriately calibrated prior to beginning field activities for that day. A one-point check at pH 7.0 was performed prior to the actual pH measurement.

Temperature values were taken from the pH meter (Orion SA250). The conductivity meter was a YSI Model 33. This instrument is not temperature-compensated. Conductivity values are noted "NTC" (not temperature compensated) and adjusted for temperature later.

Samples are returned to the facility's laboratory for preservation and filtration, when required. The TOC and phenol samples are preserved with reagent grade H_2SO_4 dispensed from a VOA vial using a disposable plastic pipette. The sample is then checked to assure that the pH is less than 2. The entire metals sample is filtered through a 0.45-micron filter using a glass "Millipore" apparatus, which is appropriately cleaned between samples. Filter blank samples are not collected. The empty original sample bottle is rinsed with deionized water, rinsed with filtered sample water, and then refilled with the remaining filtered sample. The filtered sample is then preserved with HNO_3 dispensed and checked in the same manner as with the H_2SO_4 preservative. All samples are stored in a locked refrigerator located in the laboratory. Volatile organic samples are shipped to ETC and all other routine samples are picked up by Howard Laboratories.

Sample tracking and custody procedures are well documented through the use of a "Field Log", "Chain of Custody", and "Sample Analysis Request" forms. Observations found these forms to be properly used. Previous data pertaining to the sample sites were available for reference at the time of sampling.

Sample collection at underdrain U 20 was performed immediately after completing the well sampling. The initial purge water appeared muddy and rusty. At the end of the purge cycle, estimated at the time of pumping to be 200 gallons, the water appeared clear. Purge water was run onto the ground. Samples were collected from a 12-foot long rubber discharge hose. The sampling order began with volatile organics, then TOX, and PCBs. Field parameter aliquots were collected last. The determination of field parameters was performed at the sample location, immediately after their collection.

The material in the pump system used for underdrain sampling include metals and rubber hose. The use of this unit at the different underdrain sites requires a thorough cleaning between sites. Each cleaning event performed should be documented in writing. The adequacy of the cleaning procedures should be supported by at least one equipment blank for each round of underdrain sampling. The Task Force recommends this protocol for the pump system be developed and added to the proposed facility sampling and analysis plan.

Field blanks and trip blanks are prepared by CECOS. Their preparation was not observed. A verbal review of blank preparation protocols indicated that the procedures followed were appropriate for the purposes of these two types of blank samples. Equipment blanks are not prepared which the Task Force considers to be a deficiency. Equipment blanks for the underdrain pump system and filter (for dissolved parameters) must be considered for addition to the facility's QA/QC program.

Field sampling activities appear to be hampered by an insufficient number of personnel. The entire field sampling and analysis program is supported by less than two full-time positions. There is little or no time for self-evaluation of the program by those actually performing the field tasks. Equipment maintenance and supply inventories cannot be adequately maintained with the present number of field staff. This lack of personnel may also be contributing to the slow development of a single adequate (i.e., up-to-date) "Sampling and Analysis Plan" for this facility. In summary, the Task Force recommends that the number of personnel used for sampling and monitoring activities be increased.

4. Preparation Evaluation and Response

CECOS has been implementing a ground water quality assessment plan since August 1985 after observing a significant increase in pH and specific conductance in some of the wells on the western portion of the site. The Task Force noted inadequacies in the ground water quality assessment plan in the area of determination of the rate and extent of contamination and in taking water level measurements. Also, CECOS was one month late in taking samples for second quarter 1986 reassessment monitoring.

The Task Force reviewed the initial report submitted under the ground water quality assessment plan (Warzyn, 1986). The Task Force concurs with many of the conclusions and recommendations in that report. However, the Task Force concluded that monitoring wells in addition to those proposed in that report are necessary to determine the extent of contamination.

Following the completion of the Warzyn report, CECOS discussed the conclusions and recommendations in that report with representatives of the Ohio EPA and U.S. EPA. Following that discussion, CECOS began implementing the recommendations in that report. In addition to the new wells recommended by by Warzyn, CECOS agreed to install three additional wells at the request of the regulatory agencies. At the time of the Task Force evaluation, CECOS was installing these wells.

In addition to implementing the recommendations in the Warzyn report to further delineate the extent of contamination, CECOS continued the "Interim Ground Water Monitoring Program" (CECOS, 1985a). This program called for the analysis of sample from 56 monitoring wells for volatile organic compounds. At the request of the U.S. EPA and Ohio EPA, three additional wells, MP 248, MP 200R, and MP 262, were added to this program CECOS was to monitor these 59 wells quarterly and based upon the potentiometric and analytical data, make the determinations required under 40 CFR 265.93 (d)(4). The ground water monitoring program was to be continued until the Comprehensive Ground Water Monitoring Program suggested by Warzyn could be developed and approved by the appropriate regulatory agencies.

The Task Force reviewed potentiometric information being gathered by CECOS and noted these data are collected over an excessively long period of time. The potentiometric data are collected prior to sampling an individual well. Because of the large number of wells being monitored, the collection of this information extends over a period of several months. The Task Force concluded that this procedure was unacceptable. In order to obtain an accurate "snapshot" of the potentiometric surface within the various sand deposits, water level measurements must be collected over a period of several days. Without accurate potentiometric data, CECOS cannot accurately determine the ground water flow velocity (i.e., rate) and flow direction. Therefore, the Task Force believes water level measurements should be taken over a shorter period of time (i.e. five days in a row) to accurately determine the flow velocity and direction.

I. Ground Water Monitoring Program Proposed for Final Permit

1. Introduction

The original Part B application for the CECOS Aber Road facility was submitted to the U.S. EPA Region V, Waste Management Division, RCRA Permits Section on September 23, 1983. The original Part B application was not adequate and two Notices of Deficiency (NOD) were issued on December 2, 1982, and March 13, 1984. In general, this Part B submission was incomplete in all areas including ground water monitoring. It did not consider the changes in ground water flow caused by the dewatering activities at the site. CECOS revised the Part B application and submitted a second application on September 15, 1984. On September 24, 1984, the U.S. EPA issued a Finding of Violation and Compliance Order because the original Part B submission and the resubmissions were submitted late.

The U.S. EPA, Region V sent CECOS a letter on September 3, 1986, which indicated the major deficiencies of the revised Part B application (September 1984 submittal). The letter indicated the areas to be updated included, but were not limited to:

* Closure Plan for Firepond 4/5
* Spray Irrigation Field(s)
* Amended construction details
* Waste Analysis Plan
* Facility Closure Plan
* Inspection schedule
* Contingency Plan
* Closure Cost Estimates

CECOS was allowed 90 days to submit another revision. The second revision of the Part B application was received by the U S EPA on December 22, 1986.

2. Review of Current Submittal

The Task Force reviewed the revised Part B application and found the revised application to be extremely incomplete and technically inadequate. It contained generalities where specific, detailed information and procedures were required, and also contained information that is obsolete or outdated. It also failed to include areas that needed to be addressed.

The following section contains some of the deficiencies in the December 1986 RCRA permit application found by the Task Force with respect to the requirements of 40 CFR 270.14 and the 40 CFR Part 264. The U.S. EPA, Region V has completed a Notice of Deficiency which specifies in detail the deficiencies and technical inadequacies in the application.

a. 40 CFR 270.14 (c)(1). Future Part B applications for the RCRA permit submittals must contain all quarterly monitoring data obtained during Interim Status.

b. 40 CFR 270.14 (c)(2). The Task Force determined that the uppermost aquifer has not been adequately characterized (See Section H.2.a., page 49). This section details the need for further characterization below the elevation of 845 msl in the eastern portion of the site. It is recommended that continuous borings be installed to bedrock and that five feet of bedrock be cored when installing the new borings.

c. 40 CFR 270 14 (c)(3) A deficient Point of Compliance was proposed in that wells were not adequately spaced along the perimeter of the hazardous waste management areas and did not take into account pumping conditions at the site.

d. 40 CFR 270.14 (c)(4). Ground water contamination around Cell 4/5, Firepond 4/5, and the Sanitary Landfill exists (See Section L.2.b., page 78). If Firepond 4/5 is leaking, a description of the plume of contamination that entered the ground water, including a delineation of the plume on a topographic map, is required under 40 CFR 270.14 (c)(4). Additional wells are recommended in the area of Firepond 4/5 to determine if the firepond is contaminating the ground water.

e. 40 CFR 270.14 (c)(5). The proposed monitoring system in the Part B of the RCRA permit application is inadequate in the following areas: a) an inadequate geologic characterization of the eastern portion of the site (see Section F.6., page 41); b) inadequate plume delineation (described above); and c) inadequacy of some of the existing well locations and construction (see Section H. 2. b. through d., pages 50 through 51).

f. 40 CFR 270.14 (c)(6). CECOS has proposed detection monitoring in the eastern portion of the site. The Task Force determined that more supporting data, analyses, and additional well installation are necessary to implement an adequate detection monitoring program.

g. 40 CFR 270.14 (c)(7) and (8). Because ground water contamination exists at the site, CECOS should initiate a compliance ground water monitoring program for that portion of the facility affected by the contamination. CECOS should be monitoring under this program until some type of corrective action plan is implemented.

h. 40 CFR 264 (Part A Deficiencies). The Part A application does not contain a required description of all the processes CECOS intends to use to handle wastes. For example, there is no discussion of the processes CECOS plans to use with the proposed solidification impoundments and drum storage associated with the solidification impoundments. In addition, the Part A application includes outdated waste codes and codes for wastes that cannot be landfilled at this facility (e.g., all hazardous waste whose hazardous waste number begins with P are banned by Ohio EPA requirements).

1. 40 CFR 264 (Part B Deficiencies). The detection monitoring system proposed in Part B of the CECOS application for the RCRA permit is very similar to the Proposed Monitoring System (November 1986) for Interim Status (40 CFR 265). However, no attempt was made in the Part B application to discuss either a compliance (40 CFR 264.99) or corrective action (40 CFR 264.100-101) monitoring program for that portion of the facility were there is evidence of contamination. The Task Force determined that both proposed systems for 40 CFR 264 (RCRA permit) and 40 CFR 265 (Interim Status) are inadequate to satisfy the respective regulations.

The waste analysis plan in the Part B application lacked sufficient detail in many areas, failed to include required information, relied too heavily on generator information, and contained inadequate procedures to meet the requirements. Required information not addressed in the plan included:

* A brief description of all of the treatment, storage, and disposal methods utilized at the facility.

* A general description of the types of wastes to be received by the facility, broken down by facility process. This must include wastes generated on-site.

* Procedures for identifying restricted wastes (waste defined under 40 CFR Part 268) in the screening of incoming loads.

The waste analysis plan fails to demonstrate that the proposed screening methods for incoming waste are adequate to establish that wastes received are the same as identified on the manifests. CECOS must also implement a procedure to routinely verify the information supplied by the generator on the WPR.

J. Off-site Laboratory Evaluation

The Task Force evaluated both off-site laboratories used by CECOS. Howard Laboratories, Inc., in Dayton, Ohio, analyzes samples from CECOS for inorganic drinking water quality parameters (arsenic, barium, cadmium, chromium, fluoride, lead, mercury, nitrate, selenium, and silver), ground water quality parameters (chloride, iron, manganese, total phenol, sodium, and sulfate), ground water indicator parameters (pH, specific conductance, total organic carbon, and total organic halogen), organochlorine pesticides (endrin, lindane, methoxychlor, and toxaphene), PCBs, plus volatile and semivolatile extractable organics.

The principal deficiencies found in evaluation of Howard Laboratories (U.S. EPA, 1987) pertain to quality control practices affecting data validation The laboratory is not using a U.S. EPA-approved method for semi-volatile organics. The laboratory has participated successfully in performance evaluation studies for drinking water metals, pesticides and herbicides. Performance data for PCBs are not available. In general, the laboratory shows competence for analytical work for the parameters of interest, but must improve its quality assurance practices.

Environmental Testing and Certification (ETC) Corporation analyzes most of the constituents listed in Appendix VIII of 40 CFR Part 261 for CECOS. The laboratory staff, equipment, methodology, quality assurance, and quality control program were found to be acceptable by the Task Force (U.S. EPA, 1986).

K. Task Force Sampling

1. Methodology

Samples for the Task Force evaluation at CECOS were collected by Versar, Inc., (Versar), a U.S. EPA contractor, under the supervision of U.S. EPA personnel. A CECOS representative accompanied the sampling team at all times. Video tapes were made by CECOS of most sampling activities. Polytetrafluoroethylene (PTFE) bailers provided by Versar were used to sample all monitoring wells. Pumps supplied by CECOS were used to sample the underdrains. All samples and blanks were split into two portions with the facility receiving one portion and the EPA retaining the second. All Task Force sample bottles and preservatives were provided by a U.S. EPA contract laboratory. Bottles for CECOS's sample splits were supplied by ETC. Versar provided all of the equipment and materials necessary to manage, handle, field filter, document, and ship the Task Force samples.

Prior to obtaining water levels, purging, or sampling, Versar monitored the open well head for organic chemical vapors using a photoionization detector. After this safety screening, static water levels were measured in 160 wells for evaluation by the Technical Review Team. Water level indicators were supplied by the U.S. EPA, Region V and Versar. All water level indicator units were calibrated to ensure comparable measurements.

Monitoring well sampling activities were preceded by the removal of the static water column. This "purging" was completed using bailers. The same bailer was then used to collect samples from the well. A volume of water equal to three times the static water volume present in the well was evacuated. When three volumes of water could not be removed, the wells were purged to dryness. These slow recharging wells were sampled when there was a sufficient volume of water to fill at least one parameter bottle set (including split samples). For many wells this required purging on one day and sampling on the next day. To obtain a sufficient volume of water for all parameters it was necessary to return to some wells on a number of successive days.

Underdrains which were sampled were purged prior to sampling using equipment supplied by CECOS. This was the same equipment that CECOS normally utilizes to sample the underdrains. All of the underdrains except one, identified as U 24, were purged using a portable gasoline-driven pump. At each underdrain at least 200 gallons of water was purged. If CECOS suspected the underdrain water to be contaminated, the purge water was placed in drums and sent to be treated with leachate. Water within underdrains not believed to be contaminated was allowed to run onto the ground. Field parameters (pH, specific conductance, and temperature) were analyzed periodically to determine if sample water constituents were stabilizing. After stable field parameter readings were obtained, sampling began. A blank sample was obtained from the portable pump prior to its use.

At underdrain U 24, purging and sampling was accomplished using a submersible electric pump. The volume of water purged from this location was not measured. Underdrain U 24 was purged to dryness, and sampling then occurred on the following day. Dewatering activities at Cell 9 appeared to be responsible for the small amount of water present in this underdrain.

For monitoring wells, the method of sample collection was dependent upon the recharge of the individual well. All wells were sampled using dedicated PTFE bailers supplied by Versar. In some wells there was a CECOS-owned, dedicated PVC bailer. These bailers were removed, identified, placed in a heavy plastic bag and given to CECOS personnel for custody. In a few cases, well recharge rates were sufficient to allow sampling immediately after purging. However, at most wells it was necessary to wait at least 24 hours for the well to recharge sufficiently to obtain the necessary sample volume. The bailer and cable used at these slow recharging wells were left on site, but were custody sealed by the Task Force Sampling Team. Some wells required two visits to obtain the required sample volume and one well required three visits.

All sample bottles were filled directly from the bailer using a bottom-emptying device. Volatile organic analyses (VOA) vials were filled as replicate samples while other sample bottles were split proportionally between U.S. EPA and CECOS containers. Sample bottle types, sizes, and preservatives are listed in Table 1. Samples for the seepage site in Cell 11 were collected as replicate aliquots. A PTFE bailer tube was used to drain the seepage stream into the sample bottles. The discharge from the bailer tube was allowed to flow for 20 minutes prior to sampling.

Underdrain samples collected using the portable pump were collected in replicate. The samples were collected directly from the pump's discharge hose. At underdrain U 24 the sample was first collected into a clean glass 2.5 gallon jug. This jug was cleaned by Versar in accordance with contract requirements.

Sample bottles were filled from the jug with the aid of a clean glass funnel. It was necessary to fill the jug three times to fill all U.S. EPA and CECOS sample containers.

2. Sampling Locations

Sampling points for this evaluation included six underdrains, twenty-three monitoring wells, and one seepage area. Quality assurance samples are discussed in the following section (K. 3.). Specific sample locations and the cells or hydrostratigraphic units they represent are listed below.

SITE	REPRESENTING
Underdrains:	
U 4	Cell 3
U 12	Cell 4/5
U 13	Cell 6
U 17	Cell 7
U 22	Cell 8
U 24	Cell 9
Monitoring Wells:	
M 41, MP 220AR, MP 244AR	**Upper Sand**
M 3, M 26, MP 200R, MP 206, MP 208, MP 217A, MP 219A, MP 222B, MP 229B, MP 232A, MP 246, MP 248B, MP 249B, MP 253A, MP 256A, MP 261A, MP 215BR	**880 Sand**
MP 222R, MP 261, MP 227	Bedrock\Till Interface and Lower Till
Cell 11 Seep:	880 Sand

3. Quality Assurance and Control

Quality assurance and control (QA/QC) for U.S. EPA contractor sample collection, handling and analysis were conducted in accordance with the Hazardous Waste Ground Water Task Force - Protocol for Ground-Water Evaluation (EPA, 1986a). The Sampling Team oversaw Versar's procedures during the sampling effort to ensure consistency with the QA/QC and evidence handling requirements contained in that document.

A total of ten Q.A.-related samples were collected. These samples included field blanks (2), a trip blank (1), equipment blanks (3), a bottle blank (1), and duplicates (3). Field blanks were prepared at representative sampling locations for all samples collected during the inspection. The trip blank was prepared by Versar at its Virginia laboratory prior to departure. The trip blanks were held by Versar in their truck, during the entire period of sampling at CECOS. The trip blanks were submitted for analysis along with the last day's samples. Equipment blanks were prepared to cover the two batches of bailers (different dates of preparation) used at this facility. The third equipment blank was taken from the CECOS portable pump which was used to sample the underdrains. A bottle blank was prepared to assure no contamination was introduced through storage on-site and for comparison with the CECOS bottle blanks. Matrix spikes involved collecting an extra sample volume for the laboratory and were taken from underdrain U 4, and monitoring wells MP 200R and MP 249B. Duplicate samples were collected at 10% of the sample locations. Duplicate samples were obtained from underdrain U 4, and monitoring wells MP 222B and MP 249B.

Field measurements included temperature, pH, specific conductance, and turbidity. All thermometers were traceable to NBS-standardized instruments. Daily calibrations were performed on each of the pH and specific conductance meters to be used on that day. Calibration checks were performed prior to each measurement of pH and conductivity. The turbidity meter was standardized daily immediately prior to commencing sampling activities.

All sampling equipment was thoroughly cleaned and wrapped for transport to CECOS at Versar's laboratory. Bailers to be reused at the same monitoring well were stored in the well casing under custody seal. No sampling equipment was used at more than one monitoring well. Used or contaminated bailer cable or water level indicator tapes were cleaned by wiping with a hexane-soaked tissue followed by wiping with a tissue soaked with distilled water.

4. Custody and Sample Handling

All samples collected for the U. S. EPA were shipped to the contract laboratories: Compu-Chem in Research Triangle Park, North Carolina, completed the organic analyses, and Centec in Salem, Virginia, completed the inorganic analyses. All samples were shipped in accordance with applicable Department of Transportation regulations (49 CFR Parts 171-177). Samples in which contamination was expected were designated as "medium-level hazardous" for laboratory personnel. All samples from wells, underdrains, and the seepage area were considered "environmental" for shipping purposes. Each sample shipment was accompanied by a

Chain-of-Custody Record which was completed by Versar. This form (Figure 3) identified the contents of the shipment in terms of sample type, date and time, etc. The original chain-of-custody form accompanied the shipment and a copy was provided to the Field Team Leader. Samples taken from the facility by U.S. EPA were documented with a Receipt for Samples form (Figure 4), which was completed by Versar personnel. A copy of this receipt was provided to facility personnel. The originals were retained by the U.S. EPA Field Team Leader.

5. Scheduling

Many logistical problems, such as weather, equipment, and well performance affected the time required to obtain the samples and influenced the sequence of sampling. The Sampling Team Leader, in conjunction with the Field Team Leader, established the priority for sampling and developed daily schedules to minimize delays. The expected recharge rate for some wells was not well known prior to sampling. In most cases recharge rate data provided by CECOS indicated faster recharge rates than were actually experienced by the Task Force. Most wells required at least two sampling setup and teardown sequences. One well required four sets of these operations. On November 10-12, 1986, static water levels were measured in 160 wells for use by the Technical Review Team. Actual sampling activities began on November 13, and were concluded on November 21, 1986.

L. Ground Water Quality Interpretation

1. Task Force Analyses

Samples were analyzed by the U.S. EPA contract laboratories for the parameter groups shown in Appendix D. The slow rate of recharge in some wells prevented the Task Force from obtaining analyses for all parameters in several wells. These wells are indicated in Appendix A. Laboratory analytical results were obtained from two U.S. EPA contractor laboratories participating in the Contract Laboratory Program (CLP). Standard quality control measures were observed including:

* The analysis of field and laboratory blanks to allow detection of possible contamination due to sample handling;
* Analysis of laboratory spiked samples and performance evaluation samples;
* Analysis of laboratory and sample duplicates to estimate precision; and
* The review and interpretation of the results of these control measures. These procedures can be found in the Quality Assurance Project Plan (QAPP) for this site (U.S. EPA, 1986c).

The Quality Assurance/Quality Control summary can be found in Appendix B. Appendix C is a table of the analytical results for all constituents found above the limits of detection. Appendix D provides a summary, by parameter, of the analytical techniques used and the reference methods for the sample analyses.

2. Data Interpretation

Historically, there have been a number of areas that have shown ground water contamination. The following text will discuss these areas individually.

a. Northwest Area. This area consists of the Intermediate Cell, Firepond 1, and Cells 1, and 2.

Well MP 222B indicates that the shallow sand seam (Upper Sand) between the Intermediate Cell and Cell 3 is highly contaminated with organic and inorganic constituents. Warzyn (1986) indicated the source of this contamination to be the Intermediate Cell. A report written by U.S. EPA (U.S. EPA, 1985) stated that the source of contamination in this area may be either Firepond 1 or Cell 3. CECOS contends that Cell 3 is not leaking. Monitoring data provided to members of the Task Force indicates that contamination of the Cell 3 underdrains is less than the contamination of the monitoring wells between Cell 3 and the Intermediate Cell. This information suggests that the source of contamination in this part of the northwest area is originating from firepond 1 and/or the Intermediate Cell, not Cell 3.

Contamination has also been found in the 880 Sand beneath this shallow sand. CECOS concluded that this contamination is due either to vertical migration through the Upper Till or migration through the annulus of poorly sealed wells. The Task Force determined there also may be direct hydraulic communication between the Upper Sand and the 880 Sand in this area.

Well MP 246 has historically shown chlorinated organic contamination. This was also confirmed by the Task Force analytical results. This well is located near the northwest corner of Cell 2 and is screened in till just below a sand seam at 885 feet msl. This sand is probably directly connected to Cell 2. It has not been determined if this sand is the Upper Sand or the 880 Sand. The Task Force agrees with the Warzyn (1986) recommendation that the extent of this contaminated sand zone must be determined.

Well M 11 and MP 248B are located along the northeast border of Cell 2. Well M 11 has shown elevated concentrations of TOX in the past. However, this well has a 30 foot screen, and it is uncertain which sand zone is the source of the contamination. Task Force results which indicate contamination in MP 248B were as follows:

TOX	247	ppb
POC	8,300	ppb
Ammonia Nitrogen	13,000	ppb
Total Chromium	42	ppb

These results have been found to be acceptable during the Task Force QA\QC review. Table 9 is a comparison of Task Force analytical results for TOX, POC, ammonia nitrogen, and total chromium from wells across the site screened in the 880 Sand. Assuming these values represent background concentrations for the site, it is apparent that the concentrations in MP 248B are 5 to 10 times higher than the other 880 Sand wells sampled. Historically, MP 248B has not shown elevated concentrations of these analyses. Therefore, the Task Force concluded that these results indicate a contaminant plume has advanced into this area, originating from Cell 2.

The Task Force recommends that the extent of the contamination found in this area of the site be further investigated and that the identity of the compounds that compose the elevated TOX values be determined. Corrective action must be initiated in this area to halt the advance of this plume.

b. Firepond 4/5 - Sanitary Landfill. The area between Firepond 4/5, Cell 4/5, and the Sanitary Landfill contains a number of monitoring wells that have been sampled and show contamination. In the past well MP 200 has shown vinyl chloride contamination. The Task Force sampled well MP 200R and found vinyl chloride along with purgeable organic carbon (POC) and purgeable organic halogenated carbon (POX). The Task Force detected the following constituents in the wells shown:

Well MP200R

Vinyl Chloride	17	ppb
POC	4,800	ppb
POX	11	ppb

Well MP261

Acetone	13	ppb

Well MP261A

Unknown Semi-volatile Organic	14	ppb
" " " "	25	ppb

Well MP244AR

Unknown Semi-volatile Organic	14	ppb

Well MP219A

POC	870	ppb

Well MP220AR

Dichlorofluoromethane	6	ppb
POC	540	ppb
TOX	62	ppb

These results confirm CECOS's suspicion that there is contamination in the ground water in this area. Facility representatives have reported an increase in conductivity and TOX values in wells MP 200, MP 219A, MP 220A, and MP 244A. Facility representatives have stated (Warzyn, 1986) that the source of this contamination is landfill gas from the Sanitary Landfill. The Task Force has concluded that the source of this contamination has not been adequately determined by CECOS. It could be Cell 4/5, Firepond 4/5, the Sanitary Landfill, or any combination of them. Further investigation into the source of this contamination is needed.

c. Cell 6. Well MP 227, located just north of Cell 6, was sampled by the Task Force, with the following results:

Benzene	1.1	ppb
Toluene	2.4	ppb
Phenol	3.3	ppb

CECOS's analytical results have indicated that low levels of volatile organic compounds are present in this well. CECOS. has alleged that this contamination of the well occurred during construction or sampling of the well. The Task Force recommends that the extent of this contamination be investigated further to determine if CECOS's allegation is correct or if this is an indication of contamination migrating from Cell 6.

d. Well M 26. Well M 26 is located at the southern end of the Sanitary Landfill. The Task Force sampling results indicate that the ground water in this well had 13 ppb of acetone and 53 ppb of an unknown semi-volatile organic compound. An October 1985 sampling of this well by CECOS found TOX at 475 ppb and COD at 228 ppm, both very high values that may indicate at least periodic releases of contamination in this area. The Task Force recommends that this area be included in the assessment studies being conducted at the site.

e. Underdrains. CECOS has found that underdrains U 4, U 5, U 6, and U 7 under Cell 3 and U 9, U 10, and U 12 under Cell 12 4/5 are contaminated. The Task Force has confirmed these findings with its analyses of U 4 and U 12. The Task force also analyzed U13 (Cell 6), U17 (Cell 7), U 22 (Cell 8), and U 24 (Cell 9). The Task Force analyses found the following total selenium levels in the underdrains:

U 4	5.1 ppb
U 24	12.2 ppb
U 22	7.6 ppb
U 13	10.5 ppb
U 17	22.9 ppb

Some of these values exceeded the Primary Drinking Water Standard of 10 ppb for selenium. Few wells were found to contain selenium and it is not known whether or not this element is naturally occurring in the soil at the site or may be caused by the synthetic liners used by the facility. In view of these findings, the Task Force recommends further investigation into the source of selenium in these underdrains is necessary.

M. Summary of Findings and Recommendations

Hazardous Waste Units

1. The Solidification Basin was used between July and December 1981 and therefore is subject to the requirements of 40 CFR 265. A closure plan for the Solidification Basin has never been submitted as required under 40 CFR 265.112.

2. The topsoil from the Spray Irrigation Field C was excavated to build Cell 7. It is not known whether this topsoil was treated as hazardous waste or used as construction material.

3. Retentions ponds are used to hold ground water from dewatering activities. The Task Force concluded that if hazardous waste constituents appear in the pond, then these ponds should be considered hazardous waste units.

Waste Handling

4. The waste analysis plan (WAP) fails to meet the requirement of 40 CFR 265.13 and must be rewritten. The following topics need to be addressed:

   a. Sampling and analysis procedures should be specified on the Waste Product Record by the the generator to indicate how the waste stream was analyzed.

   b. The Task Force disagrees with CECOS's contention that the generator bears sole responsibility to identify and classify the waste on the Waste Product Record.

   c. The Task Force observed that the sampling protocols in the WAP were not followed. The Task Force believes that CECOS can not identify all off specification waste using the current sampling protocols. Sampling protocols should be specified and followed to obtain representative samples of entire incoming shipments of waste.

   d. Drums of waste without "bung holes" are not opened or sampled routinely. This is an example of where off-specification waste can go undetected. Generators should use lids with bung holes on all barrels or CECOS should routinely check the barrels without the holes.

5. The Task Force observed a potential surface water contamination problem near the truck wash. The overspray from the truck wash and water that comes in contact with yard vehicles is drained through a catch basin to Pleasant Run Creek. Run-off from the access roads in the facility also drain into the creek.

Hydrogeology

6. The Task force finds that hydrogeological information in the eastern portion of the site below the elevation of 845 feet (msl) is inadequate. The 840 and 850 Sands may be more extensive than CECOS has interpreted and other Lower Till sands may be present. The Task Force recommends that:

   a. Exploration borings be installed at the locations shown on Figure 13.

   b. The borings must be continuously sampled to bedrock below the elevation of 850 feet and include a five-foot core of bedrock in order to obtain the missing information.

7. There is no information on the flow direction in the 840 Sand.

8. The Task Force finds that all unconsolidated sands above bedrock should be considered the uppermost aquifer.

9. The Task Force recommends that all future borings be continuously sampled and logged except those borings adjacent to previous borings that were continuously sampled.

Ground Water Monitoring

10. The Task Force found that the existing and proposed ground water monitoring systems failed to meet the requirements of 40 CFR 265.90 and 265.91. These systems are inadequate in the following areas:

    a. an inadequate definition of uppermost aquifer;

    b. inadequate number of upgradient and downgradient wells capable of yielding representative samples; and

    c. wells included in these systems with inadequate construction, logs or construction diagrams.

11. The Task Force recommends that the ground water monitoring system include several upgradient well nests. Wells proposed that are not adequately constructed (e.g., M series wells) should be replaced if used.

12. Improperly constructed wells not intended to be replaced should be plugged and abandoned.

13. Due to the complexity of the hydrogeology at the site and the effect of dewatering and cell walls, the Task Force recommends that CECOS generate flow maps quarterly to reevaluate whether the ground water monitoring system is

adequate. Major events that effect ground water flow (e.g. start-up or shutdown of dewatering wells) should be recorded.

Sampling and Analysis

14. The Task Force found the sampling and analysis plan (SAP) to be inadequate. Some of the inadequacies are:

a. The plan consists of several documents. It must be consolidated into one document.

b. The protocol for decontamination of the pump used to sample the underdrains is inadequate.

c. Equipment blanks should be incorporated into the QA\QC procedures.

15. The Task Force observed a number of deficiencies in CECOS's sampling procedures (see section H 3 b)

16. Water level measurements are taken over too long of a time span. Water level measurements should be taken over a shorter period, no more than five consecutive days.

Preparation, Evaluation, and Response

17. The Task Force found the ground water quality assessment to be inadequate due to inadequate determination of rate and extent of contamination. Additional monitoring wells are needed.

RCRA Permit Application

18. The Task Force found the revised RCRA permit application (December 1986 submittal) to be inadequate.

a. All ground water monitoring data must be submitted with tart B RCRA permit application.

b. The uppermost aquifer has not been adequately defined. The Task Force determined that the uppermost aquifer should include all unconsolidated deposits above bedrock. Further investigation is needed in the eastern portion of the site to define the deposits below an elevation of 850 feet (msl).

c. A deficient Point of Compliance was proposed in that the wells were not adequately spaced along the perimeter of the hazardous waste management areas and did not take into account pumping conditions at the site.

d. Contamination exists at the site. If a regulated unit is leaking (e.g., Firepond 4/5), then a description and delineation of the plume(s) on a topographic map must be submitted in the RCRA permit application.

e. The ground water monitoring system proposed in the Part B or the RCRA permit application is inadequate based upon: 1) an inadequate definition of the uppermost aquifer, 2) inadequate plume delineation, and 3) inadequacy of the location and construction of some of the existing wells.

f. CECOS has proposed a detection monitoring system in the eastern portion of the site and the Task Force determined more supporting data and analyses are required to justify detection monitoring in this portion of the site.

g. Because ground water contamination exists at the site, CECOS should implement a compliance monitoring program for that portion of the facility affected by the contamination. CECOS should continue monitoring under this program until some type of corrective action plan is implemented.

h. The Part A of the RCRA permit application does not have a description of all processes used at the facility.

i. The waste analysis plan (WAP) and closure plan are inadequate.

Offsite Laboratory

19. The Task Force found deficiencies with the quality control practices of the Howard Laboratories. No problems were found with ETC laboratories for Appendix VIII samples analyzed for CECOS.

Ground Water Quality Interpretation

20. The extent of contamination in the sand deposit to the north of Cell 2 must be determined.

21. The advance of the contamination plume to well MP 248B, north of Cell 2, needs to be halted with corrective action. Corrective action around the Intermediate Landfill, Cell 1 and Firepond 1 is also needed.

22. Further investigation into the source of contamination and the need for corrective actions is needed in the areas of:

a. Cell 4/5 and the Sanitary Landfill,

b. Cell 6,

c. the underdrains, for selenium.

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TABLES

TABLE 1

Parameter Sampling Order, Bottle Type, and Preservative List

Sampling Order	Parameter	Bottle Type	Preservatives*
1.	Field measurements	200 mL plastic	None
2.	Volatile organics	2 - 40 mL VOA vials	Cool 4°C
3.	Purgeable organic carbon (POC)	1 - 40 mL VOA vials	Cool 4°C
4.	Purgeable organic halogens (POX)	1 - 40 mL VOA vials	Cool 4°C
5.	Extractable organics	4 - 1 L. amber glass	Cool 4°C
6.	Pesticides/herbicides	2 - 1 L. amber glass	Cool 4°C
7.	Total metals	1 L. plastic	HNO_3 2 mL (to pH <2)
8.	Dissolved metals	1 L. plastic	HNO_3 2 mL (to pH <2)
9.	Total organic carbon (TOC)	1 - 120 mL glass	H_2SO_4 2 mL (to pH <2) Cool 4°C
10.	Total organic halogens (TOX)	1 L. amber glass	Cool 4°C no headspace
11.	Phenols	1 L. amber glass	H_2SO_4 2 mL (to pH <2) Cool 4°C
12.	Cyanide	1 L. plastic	NaOH 2 mL (to pH >12) Cool 4°C
13.	Nitrate and ammonia	1 L. plastic	H_2SO_4 2 mL (to pH <2) Cool 4°C
14.	Sulfate and chlorine	1 L. plastic	Cool 4°C
15.	Field measurements	200 mL plastic	None

* Preservative Concentrations:

HNO_3 - 1:1 dilution of 35% solution
H_2SO_4 - concentrated (98%)
NaOH - 400 g/L (10 normal)

TABLE 2

(Taken from Warzyn, 1986)

HYDRAULIC CONDUCTIVITY TEST RESULTS

Well	Comment	Elevation of Tested Zone	Type of Test[1]	Hydraulic Conductivity (cm/sec)
UPPER TILL				
MP-253	Weathered, 1 ft. sand & gravel	888-890	FH-R	7.5×10^{-9}
MP-254	Weathered	882-884	FH-R	1.2×10^{-7}
MP-254	Weathered	876-879	FH-R	8.0×10^{-9}
MP-255A	Weathered	888-890	FH-R	2.5×10^{-9}
MP-257A	Weathered	890-893	FH-R	5.3×10^{-9}
MP-259	Weathered	886-889	FH-R	4.0×10^{-9}
MP-260A	Weathered	901-905	FH-R	1.1×10^{-8}
MP-256A	Weathered	898-900	FH-U	2.4×10^{-7}
MP-252A	Weathered with 2 sand seams	882-887	Baildown test	8.0×10^{-5}
MP-254A	Weathered	877-882	Baildown test	2.0×10^{-6}
MP-258A	Weathered	882-891	Baildown test	2.0×10^{-6}
MP-255A	Upper Sand	885-894	Baildown test	2.0×10^{-6}
MP-224B	Upper Sand	897-900	Baildown test	1.0×10^{-4}
MP-261A	Weathered	882-891	Baildown test	7.0×10^{-7}
MP-201	* SEE TEXT *		Pumping test	1.4×10^{-5}
MP-262	* SEE TEXT *		Pumping test	1.7×10^{-4}

[1] FH-R = Laboratory Falling Head, remolded sample.
FH-U = Laboratory Falling Head, undisturbed sample.

TABLE 2 (CONTINUED)

Well	Comment	Elevation of Tested Zone	Type of Test[1]	Hydraulic Conductivity (cm/sec)
880 SAND				
MP-256A	2' Sand	871-874	FH-R	6.4×10^{-9}
MP-201	3' Sand	870-873	Baildown Test	2.0×10^{-3}
MP-223AR	0' Sand	867-879	Baildown Test	3.0×10^{-4}
MP-201	3' Sand	870-873	Pumping Test	6.0×10^{-2}
MP-202	2' Sand	879-881	Pumping Test	1.0×10^{-1}
MP-223A	2.5' Sand	866-870	Pumping Test	1.0×10^{-1}
LOWER TILL				
MP-252		869-873	FH-R	4.0×10^{-9}
MP-252		857-859	FH-R	6.0×10^{-9}
MP-252		844-849	FH-R	2.9×10^{-8}
MP-253		868-865	FH-R	3.8×10^{-9}
MP-256		865-868	FH-R	5.3×10^{-9}
MP-257		872-876	FH-R	4.5×10^{-9}
MP-258		865-868	FH-R	4.7×10^{-9}
MP-258A		856-863	FH-R	7.4×10^{-9}
MP-259		867-869	FH-R	4.0×10^{-9}
MP-259		846-848	FH-R	2.9×10^{-8}
MP-260		853-860	FH-R	1.7×10^{-8}
MP-261		864-867	FH-R	1.1×10^{-8}
MP-255		862-864	FH-U	8.0×10^{-9}
MP-258		862-864	FH-U	6.0×10^{-9}

[1] FH-R = Laboratory Falling Head, remolded sample.
FH-U = Laboratory Falling Head, undisturbed sample.

TABLE 2 (CONTINUED)

Well	Comment	Elevation of Tested Zone	Type of Test	Hydraulic Conductivity (cm/sec)
BEDROCK				
MP-252	Limestone-Shale	824-842	Packer	3.0×10^{-10}
MP-253	Limestone-Shale	829-848	Packer	1.0×10^{-7}
MP-254	Limestone-Shale	829-846	Packer	5.0×10^{-10}
MP-255	Limestone-Shale	838-852	Packer	1.0×10^{-10}
MP-256	Limestone-Shale	831-849	Packer	1.0×10^{-9}
MP-257	Limestone-Shale	834-853	Packer	1.0×10^{-8}
MP-258	Limestone-Shale	833-850	Packer	4.0×10^{-8}
MP-259	Limestone-Shale	824-842	Packer	4.0×10^{-8}
MP-260	Limestone-Shale	825-843	Packer	1.0×10^{-9}
MP-261	Limestone-Shale	835-853	Packer	8.0×10^{-9}
MP-252	Till-Bedrock	842-848	Baildown	6.0×10^{-5}
MP-253	Till-Bedrock	850-858	Baildown	7.0×10^{-4}
MP-254	Till-Bedrock	849-857	Baildown	1.0×10^{-5}
MP-259	Till-Bedrock	841-850	Baildown	5.0×10^{-4}

[cac-68]

TABLE 3

(taken from Warzyn, 1986)

INVENTORY OF MONITORING WELLS AND PIEZOMETERS AT THE CECOS ABER ROAD FACILITY

Well Number	Date Completed	East	North	Top of Well	Top of Casing	Bottom of Well	Top of Screen	Bottom of Seal	Formation Screened	History of Development	Comments
MP-200	03/05/84	5642	4893	913.35	913.68	874	875	876	2 feet fine to medium sand	6/6/85 Surged and Bailed	Grout Contaminated
MP-200R	12/02/85	5647	4890	911.33	911.36	873	878	880	4 feet coarse sand		
MP-201	03/06/84	5445	5430	909.47	909.78	872	873	875	3 feet fine to coarse sand	6/5/85 Surged and Bailed	Acceptable
MP-202	03/02/84	5525	5246	911.56	911.82	880	881	882	2 feet fine to coarse sand	6/17/85 Surged and Bailed	Acceptable
MP-203	01/28/84	8123	6065	930.36	929.74	877	880	881		No Development	
MP-203R	12/21/85	8113	6049	927.88	928.22	877	882	887	Till		
MP-203A	02/10/84	8120	6061	930.62	929.85	895	897	898		No Development	
MP-203B	02/10/84	8118	6057	930.20	929.37	899	--	--		No Development	No Screen
MP-203C	02/15/84	8115	6052	928.89	928.89	890	891	892	Till	No Development	
MP-204	01/30/84	7799	5957	918.16	917.52	875	879	880	3 feet silt and sand	No Development	
MP-204R	12/22/85	7785	5969	918.12	918.39	876	881	885	3.5 feet sand		
MP-204A	02/16/84	7794	5960	918.98	918.25	882	884	885	2 4 feet silty fine sand	No Development	
MP-204B	02/17/84	7802	5955	918.56	917.76	885	886	887	Sand seam	No Development	
MP-204C	02/19/84	7790	5963	917.96	917.58	892	895	896	Till	No Development	
MP-205	01/28/84	7701	6366	914.85	916.51	865	867	868	3.5 feet fine sand		
MP-205A	02/09/84	7708	6362	915.03	916.78	861	866	867	Till	6/14/85 Surged and Bailed	Open Bottom
MP-205AR	11/19/85	7689	6339	916.69	916.71	862	867	871	3 feet sand and gravel		
MP-205B	02/12/84	7696	6346	918.18	918.36	880	--	--	1.5 feet fine sand	6/14/85 Surged	Grout Contaminated No Screen
MP-205BR	11/18/85	7694	6340	914.55	915.00	879	884	889	4 feet sand and gravel		
MP-205C	02/12/84	7710	6367	916.72	916.72	891	892	893		No Development	
MP-205D	02/12/84	7703	6361	916.68	916.78	848	-	--	Weathered till	No Development	No Screen
MP-206	02/11/84	8015	6384	916.90	917.01	875	877	878	Sand and silt seams	6/14/85 Surged and Bailed	Acceptable
MP-206A	02/11/84	8011	6392	916.73	916.73	888	891	892	7 feet sand and gravel	6/14/85 Surged and Bailed	Open Bottom

Table 3 (continued)

Well Number	Date Completed	East	North	Top of Well	Top of Casing	Bottom of Well	Top of Screen	Bottom of Seal	Formation Screened	History of Development	Comments
MP-206AR	11/20/85	7997	6393	916.82	916.82	888	893	895	6.3 feet sand and gravel		
MP-206B	02/11/84	8011	6387	917.02	917.10	898	903	904	Weathered till	No Development	
MP-206C	02/12/84	8018	6387	916.81	917.07	877	880	881	Till	6/14/85 Surged and Bailed	Grout Contaminated
MP-206CR	11/20/85	8001	6392	915.41	915.42	874	879	879	7.0 feet sand and gravel		
MP-207	03/17/84	5167	5766	906.65	906.65	862	892	893	Weathered till	6/15/85 Bailed with 1.5 feet sand seam	Not Fully Developed
MP-208	02/25/84	5217	6029	907.40	907.60	880	881	882	Silty sand	6/17/85 Surged and Bailed	Acceptable
MP-209	04/27/84	8069	5995	922.18	922.20	885	890	895	Till	No Development	
MP-209A	04/27/84	8075	5997	923.49	923.49	780	805	807	Till and Bedrock		Log is Numbered MP-209R
MP-210	04/01/84	8527	6261	911.04	911.12	849	852	853	Sandy silty clay	6/17/85 Surged and Bailed	Grout Contaminated
MP-210R	12/02/85	8538	6188	911.82	911.99	848	853	855	Till		Anomolous Water levels
MP-210A	04/12/84	8523	6262	911.39	911.56	871	873	874	Silty sand and gravel	No Development	Not Developed
MP-211	03/29/84	8671	5960	911.77	911.77	850	853	854	Till	6/24/85 Bailed	Grout Contaminated
MP-211R	12/04/85	8679	5948	912.02	912.09	853	858	863	Till		Slow Recovery, Anomolous Water Levels
MP-211B	04/11/84	8673	5954	911.83	911.83	879	881	882	1.5 feet Silty CMF sand	No Development	Not Developed
MP-212	03/29/84	8314	5810	913.09	913.12	851	854	855	Till and bedrock	6/24/85 Bailed	Grout Contaminated
MP-212A	04/01/84	8319	5808	913.53	913.56	888	889	890	0.5 feet Silty fine sand	No Development	Not Developed
MP-212C	04/07/84	8324	5802	913.41	913.45	871	873	874	CMF sand and gravel	No Development	Not Developed
MP-212D	04/07/84	8314	5806	912.54	912.58	876	877	878	1.5 feet CMF sand and gravel	No Development	Not Developed
MP-213	05/24/84	8396	5573	909.05	909.05	847	850	851	Till	6/13/85 Surged and Bailed	Grout Contaminated
MP-213R	12/05/85	8427	5551	910.92	910.92	850	855	867	Till		
MP-213A	05/24/84	8401	5581	910.27	910.28	879	884	886	CMF sand and gravel	No Development	Not Developed
MP-214	05/26/84	8002	5040	907.72	909.04	847	852	853	Till	6/13/85 Surged	Grout Contaminated
MP-214R	11/07/85	8007	5058	910.90	910.90	815	820	824	Bedrock		
MP-214A	11/09/85	8009	5066	910.82	910.82	830	835	838	Till		
MP-214BR	12/20/85	8013	5056	910.65	910.90	[illegible]	[illegible]	[illegible]	2 feet sand		

Table 3 (continued)

Well Number	Date Completed	East	North	Top of Well	Top of Casing	Bottom of Well	Top of Screen	Bottom of Seal	Formation Screened	History of Development	Comments
MP-214B	05/30/84	8006	5049	905.67	907.99	877	882	883	1.2 feet CMF sand and gravel	No Development	Slow Recovery
MP-215	05/19/84	7679	4662	909.13	909.19	829	831	833	Till	6/11/85 Surged and Bailed	Grout contaminated
MP-215A	05/20/84	7679	4657	909.04	909.09	808	892	893	2.8 feet CMF sand	No Development	Not Developed
MP-215B	05/22/84	7680	4667	909.03	909.03	840	845	863	Sand and gravel	6/12/85 Surged and Bailed	Grout contaminated
MP-215BR	11/25/85	7680	4673	909.93	910.18	852	857	865	9.8 feet sand and gravel		
MP-216	05/17/84	7417	4332	909.99	910.03	848	851	852	Till	5/10/85 Surged	Grout Contaminated
MP-216B	05/17/84	7411	4831	910.17	910.28	879	882	883	3.0 feet CMF sand and gravel	6/11/85 Surged	Grout Contaminated
MP-216BR	11/22/85	7403	4330	911.35	911.59	878	883	885	7.5 feet sand and gravel		
MP-217	05/15/84	6792	4522	897.22	897.19	835	838	839	Till	5/31/85 Surged	Grout Contaminated
MP-217R	11/05/85	6784	4530	897.57	897.57	819	833	836	Bedrock		
MP-217A	05/20/84	6794	4532	898.19	898.21	882	884	885	Silty CMF sand	6/11/85 Surged and Bailed	Acceptable
MP-217B	05/21/84	6794	4536	898.44	898.45	873	875	876	Silty CMF sand	6/11/85 Surged and Bailed	Acceptable
MP-218	05/13/84	6262	4680	907.14	907.16	853	856	857	Till	5/29/85	Grout Contaminated
MP-219	04/23/84	5487	4927	910.30	910.32	855	858	859	Till	6/3/85 Surged and Bailed	Grout Contaminated
MP-219A	05/01/84	5483	4927	910.00	910.01	883	884	885	1.0 foot Silty CMF sand	6/6/85 Surged and Bailed	Acceptable
MP-220	04/20/84	5350	4970	909.48	909.60	856	859	860	Till and bedrock	6/3/85 Surged and Bailed	Grout Contaminated
MP-220R	11/03/85	5349	4965	910.30	910.60	845	850	853	Bedrock		
MP-220A	05/01/84	5351	4974	909.71	909.76	891	992	893	Weathered till	6/6/85 Surged and Bailed	Not fully Developed
MP-220AR	11/04/85	5344	4982	910.00	911.40	888	893	896	Till		
MP-221	04/24/84	5400	5201	910.67	910.86	844	854	856	Bedrock	6/3/85 Surged and Bailed	Probable Grout Contamination
MP-221R	11/21/85	5398	5193	910.48	910.57	848	853	857	Bedrock		
MP-222	04/12/84	5495	5573	910.18	910.30	842	852	854	Bedrock	6/4/85 Surged and Bailed	Grout Contaminated
MP-222R	12/08/85	5521	5564	911.76	912.00	852	857	863	Till and Bedrock		
MP-222B	04/25/84	5496	5579	910.33	910.38	889	891	892	2.0 feet silty CMF sand	6/17/85 Surged and Bailed	Acceptable
MP-223	04/12/84	5364	5794	909.45	909.46	840	850	852	Bedrock	6/4/85 Surged and Bailed	Grout Contaminated
MP-223R	11/08/85	5372	5781	910.10	910.10	847	[illegible]	855	Till and bedrock		

Table 3 (continued)

Well Number	Date Completed	East	North	Top of Well	Top of Casing	Bottom of Well	Top of Screen	Bottom of Seal	Formation Screened	History of Development	Comments
MP-223A	04/26/84	5362	5789	909.91	909.91	872	875	876	CMF Sand	6/5/85 Surged and Bailed	Grout Contaminated
MP-223AR	11/10/85	5377	5776	910.53	910.59	869	874	878	Sand and gravel		
MP-224	/ /	5590	5803	913.07	913.07	851	854	855	Till	6/4/85 Surged and Bailed	Grout Contaminated
MP-224B	04/30/84	5590	5798	913.54	913.59	897	899	900	1.0 foot silty fine sand	6/5/85 Surged and Bailed	Acceptable
MP-225	04/14/84	5755	5771	911.95	912.01	850	853	855	Till	6/4/85 Surged and Bailed	Leaky Seal
MP-226	04/14/84	6011	5820	913.80	913.80	837	847	849	Bedrock	5/31/85 Surged and Pumped	Acceptable
MP-227	04/19/84	6278	5774	911.63	911.65	850	853	854	Till	5/31/85 Surged and Bailed	Grout Contaminated
MP-227A	04/28/84	6271	5776	911.96	911.99	872	877	878	5 feet sand	6/9/85 Surged and Bailed	Grout Contaminated
MP-227AR	11/06/85	6285	5771	912.16	912.33	871	876	879	5 feet sand and gravel		
MP-228	04/08/84	6525	5695	912.33	912.33	850	853	854	Till	5/30/85 Surged and Bailed	Not Fully Developed Slow Recovery
MP-228R	11/15/85	6534	5702	911.82	911.97	840	845	848	Till and Bedrock		
MP-228A	04/14/84	6530	5695	912.35	912.38	873	878	881	5 feet sand and gravel	6/9/85 Surged	Grout Contaminated
MP-228AR	11/17/85	6524	5707	912.05	912.05	875	880	883	5 feet sand and gravel		
MP-228B	/ /	6534	5702	911.82	911.97	--	--	--	No log		
MP-229	04/07/84	6780	5641	910.83	910.87	849	852	853	Till	5/30/85 Surged and Bailed	Grout Contaminated Anomalous Water Levels
MP-229B	04/24/84	6784	5640	910.71	910.82	873	878	879	2.5 feet sand and gravel	6/6/85 Surged and Pumped	Acceptable
MP-230	04/02/84	7045	5585	908.92	908.99	846	849	850	Till and Bedrock	5/30/85 No Development	Screen Plugged by Grout, Anomalous Water Levels
MP-230X	10/29/85	7029	5592	908.93	909.05	823	828	830	Bedrock		
MP-230A	04/24/84	7641	5508	909.76	909.81	879	880	881	Sand and gravel seam	6/6/85 Surged and Bailed	Acceptable
MP-231	05/14/84	7490	6057	915.31	915.37	843	846	847	Till	5/29/85 Surged and Bailed	Grout Contaminated
MP-231R	11/16/85	7492	6049	916.20	916.21	796	801	805	Till and Bedrock		
MP-231A	05/15/84	7493	6061	915.29	915.30	887	892	893	4.5 feet silty sand	6/11/85 Bailed	Grout Contaminated
MP-231AR	11/17/85	7503	6069	915.84	915.84	885	890	894	4 feet sandy silt		
MP-231B	05/16/84	7496	6065	915.85	915.88	855	860	861	5 feet sand and gravel	6/12/85 Surged	Grout Contaminated
MP-231BR	11/17/85	7497	6054	918.01	918.01	851		[illegible]	Till		

Table 3 (continued)

Well Number	Date Completed	East	North	Top of Well	Top of Casing	Bottom of Well	Top of Screen	Bottom of Seal	Formation Screened	History of Development	Comments
MP-232	04/11/84	6986	5332	907.81	907.88	846	849	850	Till	5/29/85 Surged	Screen Plugged by Grout
MP-232A	05/02/84	6984	5328	907.96	907.96	872	877	880	4.5 feet silty sand	6/5/85 Surged	Acceptable
MP-233	04/10/84	6905	5134	908.04	908.14	846	849	850	Till	5/31/85 Surged	Screen Plugged by Grout
MP-233A	05/02/84	6902	5132	908.10	908.10	881	883	884	1.5 feet sand and gravel	6/5/85 Surged and Bailed	Grout Contaminated
MP-233AR	11/18/85	6913	5139	907.62	907.78	880	885	888	Till		
MP-234	04/28/84	6617	5155	910.39	910.45	849	852	853	Till	5/29/85 Surged	Grout Contaminated
MP-234R	11/01/85	6624	5150	912.32	912.32	836	841	844			
MP-234A	05/04/84	6612	5157	910.74	910.82	887	889	890	2.5 feet silty sand and gravel	6/9/85 Surged and Bailed	Acceptable
MP-234AR	11/18/85	6631	5148	911.14	911.44	886	891	893	Till		
MP-235	05/06/84	6383	5239	915.27	915.26	853	856	857	Till	5/29/85 No Development	Screen Plugged with Grout
MP-235A	05/11/84	6377	5240	915.33	915.36	898	900	901	1.4 feet silty sand	No Development	
MP-235B	05/12/84	6373	5241	915.15	915.23	877	880	881	4 feet silty sand	6/9/85 Surged	Open Bottom
MP-235BR	11/19/85	6363	5242	912.01	912.32	876	881	883	Fine sand and sandy clay		
MP-235C	05/13/84	6379	5233	914.37	914.43	888	890	891	Silty sand	6/6/85 Surged and Bailed	Grout Contaminated
MP-235CR	11/19/85	6359	5242	914.80	915.20	887	892	894	Till		
MP-236	05/31/84	6462	5467	928.11	928.28	851	854	855	Till	6/15/85 Surged and Bailed	Grout Contaminated
MP-237	05/09/84	6119	5306	913.82	913.83	843	853	854	Bedrock	5/30/85 Surged and Pumped	Acceptable
MP-238	05/05/84	5870	5373	915.15	915.23	853	856	857	Till	6/10/85 Surged and Bailed	Grout Contaminated
MP-238R	11/20/85	5876	5372	915.41	915.72	853	858	860	Till		
MP-238A	05/06/84	5867	5377	915.54	915.54	883	884	885	1 foot clayey sand and gravel	6/10/85 Surged and Bailed	Grout Contaminated
MP-239	05/11/84	5929	5615	913.30	913.34	852	855	856	Till		Open Bottom
MP-240	05/24/84	5640	5445	923.98	924.06	843	853	855	Bedrock	6/10/85 Surged	Grout Contaminated
MP-240R	12/04/85	5642	5439	924.20	924.20	852	857	862	Till and bedrock		
MP-241	05/10/84	5777	5110	911.93	912.00	855	859	859	Till	No Development	Screen plugged by Grout
MP-241R	11/26/85	5777	5117	913.58	913.59	855	860	865	Till and bedrock		
MP-241A	05/10/84	5475	5107	911.88	911.91	[illegible]	[illegible]	[illegible]	3.5 feet silty sand and gravel	6/10/85 Surged and Bailed	Acceptable

Table 3 (continued)

Well Number	Date Completed	East	North	Top of Well	Top of Casing	Bottom of Well	Top of Screen	Bottom of Seal	Formation Screened	History of Development	Comments
MP-241AR	12/02/85	5779	5123	913.41	913.41	882	887	891	Sand and gravel and silty clay		
MP-242	05/29/84	4481	6881	907.99	908.11	783	780	793	6 feet sand and gravel	6/18/85 Pumped	Acceptable, Artesian Conditions
MP-242A	05/30/84	4480	6886	908.38	908.39	852	857	859	7.5 feet sand and gravel	6/17/85 Surged	Grout Contaminated
MP-242AR	12/05/85	4477	6878	909.24	909.24	855	860	867	6 feet sand and gravel		
MP-243	06/01/84	4793	3590	883.40	883.42	844	854	856	Bedrock	6/26/85 Surged and Air Purged	Acceptable
MP-244	04/24/84	5833	4852	909.80	909.79	856	859	860	Till	6/3/85 Surged and Bailed	Slow Recovery
MP-244R	11/05/85	5823	4850	909.67	909.73	843	848	852	Bedrock		
MP-244A	05/02/84	5836	4850	909.44	909.54	888	889	890	.5 foot sand	No Development	
MP-244AR	12/23/85	5819	4853	910.21	910.28	887	892	895	5 feet sand		
MP-245	06/02/85	4817	6267	893.28	893.44	875	880	880	Coarse to medium sand and gravel		Ground Surface Elevation Estimated
MP-246	06/01/85	5387	6051	908.57	908.59	884	889	--	Till		Ground Surface Elevation Estimated
MP-247	06/01/85	6372	4649	907.71	907.72	848	858	860	Clayey silt		Ground Surface Elevation Estimated
MP-247A	06/01/85	6376	4648	910.07	910.07	881	891	892	Sandy Silt		
MP-248	10/31/85	5680	5977	909.82	909.98	831	836	840	Bedrock		
MP-248A	11/03/85	5672	5979	909.64	909.81	861	866	870	Unweathered Till		Anomalous Water Levels
MP-248B	11/04/85	5664	5982	909.71	909.88	878	883	888	Sandy clay		Ground Surface Elevation Estimated
MP-249	10/30/85	5121	5601	904.16	904.31	836	841	845	Bedrock		
MP-249A	11/15/85	5130	5596	904.40	904.40	852	857	860	No log		Ground Surface Elevation Estimated
MP-249B	11/22/85	5122	5609	903.66	903.69	881	886	889	No log		Ground Surface Elevation Estimated
MP-250	11/24/85	6036	4864	910.02	910.09	854	859	864	Till		
MP-250A	11/26/85	6041	4863	910.35	910.38	871	876	879	3.2 feet coarse sand		
MP-251	10/25/85	8848	6185	911.48	911.89	810	815	926	Bedrock		
MP-251A	12/05/85	8843	6188	911.02	911.35	871	876	881	Silt, sand and gravel		
MP-252	04/04/86	6267	4353	894.58	894.94	842	847	848	Till, 8 foot sand seam and bedrock	4/4/86 Surged and Bailed	
MP-252A	04/01/86	6260	4357	894.96	895.31	877	882	885	Till, 8 and 2.0 2.0 foot sand seams	4/4/86 Surged and Bailed	

Table 3 (continued)

Well Number	Date Completed	East	North	Top of Well	Top of Casing	Bottom of Well	Top of Screen	Bottom of Seal	Formation Screened	History of Development	Comments
MP-253	03/19/86	5610	4185	901.37	901.59	850	855	858	Till, 1.5 feet fine gravel, and bedrock	3/86 Surged and Bailed	
MP-253A	03/22/86	5604	4188	900.34	900.68	884	889	892	Weathered till with 1 foot sand and gravel seam	3/86 Surged and Bailed	
MP-254	03/27/86	5168	3760	886.45	886.84	849	854	857	Weathered till and bedrock	4/1/86 Surged and Bailed	
MP-254A	04/02/86	5163	3758	887.39	887.74	872	877	880	Weathered (mottled) till	Not Developed	
MP-255	03/22/86	5468	5479	909.86	910.26	851	856	858	Till and Bedrock	3/86 Surged and Bailed	
MP-255A	03/22/86	5468	5475	910.71	911.11	885	890	894	Till and 1 foot sand seam	3/86 Surged and Bailed	
MP-256	03/09/86	5348	5441	909.51	909.91	849	854	858	Till and Bedrock	3/86 Surged and Bailed	
MP-256A	03/11/86	5348	5435	909.81	910.21	870	875	878	Till and 2 feet sand and gravel seam	3/86 Surged and Bailed	
MP-257	02/25/86	5202	5422	906.11	906.51	851	856	858	Till and Bedrock	3/86 Surged and Bailed	
MP-257A	03/03/86	5205	5417	907.86	908.26	888	893	896	Weathered till	3/86 Surged and Bailed	
MP-258	03/10/86	5089	5439	904.03	904.25	850	855	858	Till and Bedrock	3/86 Surged and Bailed	
MP-258A	03/06/86	5088	5445	902.59	903.01	882	887	891	Weathered till	3/86 Surged and Bailed	
MP-259	03/13/86	5178	5873	904.21	904.31	841	846	850	Weathered till and bedrock	3/86 Surged and Bailed	
MP-259A	03/14/86	5172	5868	904.56	904.71	872	877	880	Weathered till	3/86 Surged and Bailed	Anomalous Water Levels
MP-260	03/23/86	5433	5870	911.33	911.65	844	849	853	Till and Bedrock	3/86 Surged and Bailed	
MP-260A	03/18/86	5439	5867	911.50	911.92	881	886	890	Weathered till	3/86 Surged and Bailed	
MP-261	02/21/86	5718	4877	911.95	912.36	852	857	860	Till and Bedrock	3/86 Surged and Bailed	
MP-261A	02/23/86	5724	4877	912.03	912.43	882	887	891	Till	3/86 Surged and Bailed	
MP-262	03/22/86	5503	5740	913.06	913.06	877	880	881	3 feet sand and gravel	3/86 Bailed and Pumped	
M-1	11/11/78	7844	6434	918.37	918.37	900	910	911	No Log	No Development	Grout Contaminated
M-2	11/30/78	4566	5130	897.51	897.51	879	889	890	No Log		Could Not be Developed
M-3	11/30/78	4581	4507	887.65	887.65	869	879	880	No Log	6/27/85 Air Developed	Could Not be Fully Developed
M-4	10/10/77	4762	3579	885.54	885.54	852	853	853	No Log	6/26/85 Bailed	Acceptable
M-6	09/21/78	5555	5668	912.12	912.12	880	882	907	No Log	6/ 7/85 Surged and Bailed	Acceptable
M-7	11/02/78	5222	5546	909.00	909.00	875	897	[illegible]	Till		22 Foot Screen

Table 3 (continued)

Well Number	Date Completed	East	North	Top of Well	Top of Casing	Bottom of Well	Top of Screen	Bottom of Seal	Formation Screened	History of Development	Comments
M-9	11/03/78	5301	6007	908.20	908.20	872	897	897	Till and sand seam		25-Foot Screen
M-10	11/22/78	--	--	--	--	--	--	--	--		Well Removed 12/7/81
M-11	11/06/78	5737	5920	912.62	912.62	871	901	901	Till and sand seam	6/22/85 Surged and Bailed	30-Foot Screen
M-12	11/06/78	5964	5796	917.10	917.10	883	906	906	Till	6/23/85 Surged and Bailed	Not Fully Developed
M-14	11/14/78	--	--	--	--	--	--	--	Till and sand seam	Bent Riser Pipe	No Development
M-15	11/11/78	7825	6441	916.21	916.21	882	904	905	Till and sand seam	6/20/85 Bailed	Acceptable
M-16	11/13/78	--	--	--	--	875	899	899	Till and sand seam		
M-17	11/09/78	--	--	--	--	865	895	895	Till	Riser Pipe Damaged	Abandoned
M-18	11/27/78	6373	4649	907.64	907.64	865	895	896	Till	6/25/85 Surged and Bailed	Turbid
M-19	09/24/78	--	--	--	--	879	--	--	No Log		
M-20	10/77	7834	6437	917.27	917.27	854	855	--	No Log		Plugged screen
M-21	10/77	4553	5131	897.67	897.67	844	845	--		6/24/85 Surged	Acceptable Still Turbid
M-22	05/03/78	4578	4519	886.08	886.08	859	860	--	No Log	6/27/85 Surged and Air Purged	Acceptable
M-23	07/77	4853	5012	903.81	903.81	810	--	--	No Log	7/17/85 Pumped	Acceptable
M-24	12/18/79	5635	4894	912.11	912.11	869	871	--	No Log	6/21/85 Surged	Inadequate Seal
M-25	12/20/79	5452	5328	914.23	914.23	869	873	--	No Log	6/21/85 Surged	Screen Broken
M-26	05/14/80	4762	3589	885.28	885.28	867	877	--	No Log	6/26/85 Air Developed	Not Fully Developed
M-27	05/15/80	5090	5668	904.80	904.80	872	892	--	No Log	6/27/85 Surged and Air Purged	Turbid
M-28	05/15/80	5197	5973	904.80	904.80	875	895	--	No Log	6/27/85 Surged and Air Purged	Turbid, 24-Foot Screen
M-32	08/05/80	7427	4303	911.98	911.98	814	899	--	Till	Riser Pipe Bent	
M-33	11/80	6514	5705	912.41	912.41	871	878	--	4 feet sand and gravel	Former Dewatering Well	Acceptable
M-34	11/80	6466	5717	915.40	915.40	871	872	--	0.7 feet sand	Well Plugged	
M-35	11/80	6418	5731	914.88	914.88	873	874	--	Sand and Gravel	7/16/85 Pumped	Acceptable, Former Dewatering Well
M-36	11/80	6609	5679	913.47	913.47	872	883	--	3.5 feet sand and gravel	7/12/85 Pumped	Former Dewatering Well
M-37	08/17/81	4872	3774	892.53	892.53	869	879	--	No Log	No Development	Not Fully Developed
[illegible]	[illegible]	[illegible]	[illegible]	900.39	900.39	[illegible]	[illegible]	-	No Log	[illegible]	[illegible]

Table 3 (continued)

Well Number	Date Completed	East	North	Top of Well	Top of Casing	Bottom of Well	Top of Screen	Bottom of Seal	Formation Screened	History of Development	Comments
M-39	08/28/81	5369	3926	892.42	892.42	870	880	--	No Log	7/16/85 Air Purged	Not Fully Developed 10-Foot Screen
M-40	08/31/81	5333	4016	898.58	898.58	876	886	--	No Log	6/25/85 Surged and Air Purged	Turbid, Slow Recovery
M-41	08/27/81	5573	6006	909.24	909.24	884	897	--	No Log	6/23/85 Surged, Air Purged and Bailed	Adequate
M-42	09/10/81	5546	5981	910.66	910.66	885	898	--	No Log	6/23/85 Surged and Air Purged	Turbid
M-43	10/81	7022	5472	913.42	913.42	869	--	--	No Log	7/17/85 Pumped	Adequate, Former Dewatering Well
M-44	04/05/82	7014	5574	912.56	912.56	872	--	--	No Log	Former Dewatering Well	Acceptable
M-45	11/10/81	6797	5631	912.80	912.80	870	885	--	Till		
M-46	11/17/81	6538	5200	913.00	913.00	861	901	--	No Log	6/29/85 Surged and Air Purged	Acceptable
M-47	02/01/82	6788	5633	912.40	912.40	875	878	--	Sand and Gravel Seam	Previously Developed	Former Dewatering Well
M-48	04/26/83	7725	4957	908.60	908.60	822	826	828	Bedrock	Well is Damaged	Can't Be Developed
M-49	05/02/83	7727	4947	909.30	909.30	872	878	880	Sand and Gravel	6/25/85 Surged	Grout Contaminated
M-50	05/04/83	7731	4955	908.77	908.77	888	893	895	Till	Riser Pipe Bent	
L-1	/ /	5386	5978	911.30	--	--	--	--			
L-2	/ /	5675	5906	913.15	--	--	--	--			
L-28	/ /	5202	5452	907.51	907.51	--	--	--			
L-29	/ /	5221	5617	909.71	909.71	--	--	--			
L-30	/ /	5461	5594	912.44	912.44	--	--	--			
U-5	/ /	5586	5464	919.86	919.86	--	--	--			

NOTES:
1) Elevations of Bottom of Well, Top of Screen, and Bottom of Seal have been rounded off to the nearest foot for all wells.
2) Elevations have been approximated from boring logs and well installation details for wells with incomplete information.

[cac-68]

TABLE 4: GROUNDWATER MONITORING SYSTEMS

UPPER SAND WELLS

EXISTING WELL	EXISTING RCRA MONITORING SYSTEM *	EXISTING TSCA MONITORING SYSTEM	EXISTING PTI MONITORING SYSTEM	PROPOSED COMPREHENSIVE MONITORING SYSTEM **
M 18	X			X
M 41	X			X
MP 203A		X		
MP 203B		X		
MP 203C		X		
MP 204C		X		
MP 205C		X		
MP 205D		X		
MP 206AR		X		
MP 206B		X		
MP 207		X		X
MP 209R		X		
MP 215A	X	X		X
MP 220AR		X		X
MP 222B		X		X
MP 224B		X		X
MP 231A	X			
MP 231AR		X		X
MP 235A		X		
MP 235CR		X		
MP 244AR		X		
MP 246		X		X
MP 248B		X		
MP 255A				X
MP 257A				X
UNDERDRAINS				
U 4	X			
U 9	X			
U 10	X			

* TAKEN FROM: PRELIMINARY REPORT INTERIM GROUND WATER MONITORING PROGRAM ABER ROAD FACILITY (CECOS. 1985A).

** TAKEN FROM: PROPOSED GROUND WATER MONITORING PROGRAM (NOVEMBER, 1986).

TABLE 5: GROUND WATER MONITORING SYSTEMS

880 SAND WELLS

EXISTING WELL	EXISTING RCRA MONITORING SYSTEM *	EXISTING TSCA MONITORING SYSTEM	EXISTING PTI MONITORING SYSTEM	PROPOSED COMPREHENSIVE MONITORING SYSTEM **
M 2	X			
M 6	X			X
M 7	X			X
M 9	X			X
M 11				X
M 15			X	X
M 18	X		X	
M 26			X	
M 27			X	
M 28			X	
M 33	X			
M 36	X			
M 41	X			
M 43	X			
M 45	X			
M 47	X			X
MP 2				
MP 200	X			
MP 200R		X		X
MP 201	X	X		
MP 202	X	X		X
MP 203R		X		
MP 204R		X		
MP 204A		X		
MP 204B		X		
MP 205A	X			
MP 205AR		X		X
MP 205BR		X		
MP 206	X	X		
MP 206CR		X		
MP 208	X	X		
MP 210A		X		X
MP 211B		X		X
MP 212A		X		
MP 212C		X		
MP 212D		X		
MP 213A		X		X
MP 214B		X		
MP 214BR				X
MP 216B	X			
MP 216BR		X		X
MP 217A		X		X
MP 217B		X		
MP 219A	X	X		

TABLE 5 (CONTINUED): GROUND WATER MONITORING SYSTEMS

880 SAND WELLS

EXISTING WELL	EXISTING RCRA MONITORING SYSTEM *	EXISTING TSCA MONITORING SYSTEM	EXISTING PTI MONITORING SYSTEM	PROPOSED COMPREHENSIVE MONITORING SYSTEM **
MP 219AR				
MP 220A	X			
MP 223AR		X		X
MP 227A	X			
MP 227AR		X		X
MP 228A	X			
MP 228AR		X		X
MP 229B		X		
MP 229B	X	X		
MP 230A	X	X		X
MP 232A		X		
MP 233A	X			
MP 233AR		X		
MP 234AR		X		
MP 234B		X		
MP 235B	X			
MP 235BR		X		
MP 238A	X			
MP 241A	X			
MP 241AR		X		
MP 242AR		X		X
MP 244A	X			
MP 245	X	X		X
MP 247	X	X		
MP 247A	X	X		
MP 248A		X		
MP 249B		X		X
MP 250A		X		
MP 251A		X		X
MP 252A				X
MP 253A				X
MP 254A				X
MP 259A				X
MP 261A				X
MP 262				X

* TAKEN FROM: PRELIMINARY REPORT INTERIM GROUND WATER MONITORING PROGRAM ABER ROAD FACILITY (CECOS, 1985A).

** TAKEN FROM: PROPOSED GROUND WATER MONITORING PROGRAM (NOVEMBER, 1986).

TABLE 6: GROUND WATER MONITORING SYSTEMS

LOWER TILL (INCLUDING 840 AND 850 WELLS)

EXISTING WELL	EXISTING RCRA MONITORING SYSTEM *	EXISTING TSCA MONITORING SYSTEM	EXISTING PTI MONITORING SYSTEM	PROPOSED COMPREHENSIVE MONITORING SYSTEM **
M 4				X
M 21			X	X
M 22			X	X
MP 205		X		
MP 210	X			
MP 210R		X		
MP 211	X			
MP 211R		X		
MP 212	X	X		
MP 213	X			
MP 213R		X		
MP 214AR		X		
MP 215		X		
MP 215B				X
MP 215BR		X		
MP 216	X	X		
MP 217	X			
MP 219		X		
MP 220	X			
MP 223A	X			
MP 224	X	X		
MP 225	X	X		
MP 226	X	X		
MP 227	X	X		
MP 228	X			
MP 229		X		
MP 231R		X		X
MP 231BR		X		
MP 232		X		
MP 235		X		
MP 236		X		
MP 238	X			
MP 239		X		
MP 240R		X		
MP 242AR				
MP 249A		X		
MP 250		X		

* TAKEN FROM: PRELIMINARY REPORT INTERIM GROUND WATER MONITORING PROGRAM ABER ROAD FACILITY (CECOS, 1985A).

** TAKEN FROM: PROPOSED GROUND WATER MONITORING PROGRAM (NOVEMBER, 1986).

TABLE 7: GROUND WATER MONITORING SYSTEMS

BEDROCK TILL INTERFACE WELLS

EXISTING WELL	EXISTING RCRA MONITORING SYSTEM *	EXISTING TSCA MONITORING SYSTEM	EXISTING PTI MONITORING SYSTEM	PROPOSED COMPREHENSIVE MONITORING SYSTEM **
M 4				
MP 200				
MP 209A		X		
MP 214R		X		X
MP 217R		X		X
MP 218	X	X		
MP 220R		X		X
MP 221	X			
MP 221R		X		X
MP 222	X			
MP 222R		X		X
MP 223	X			
MP 223R		X		X
MP 227R				
MP 228				
MP 228R		X		X
MP 230R		X		X
MP 231R				
MP 233		X		
MP 234R		X		
MP 237	X	X		
MP 238R		X		
MP 241R		X		
MP 242		X		X
MP 243		X		X
MP 244R		X		
MP 248		X		X
MP 249		X		X
MP 251		X		X
MP 252				X
MP 253				X
MP 254				X
MP 256				X
MP 257				X
MP 258				X
MP 261				X

* TAKEN FROM: PRELIMINARY REPORT INTERIM GROUND WATER MONITORING PROGRAM ABER ROAD FACILITY (CECOS, 1985A).

** TAKEN FROM: PROPOSED GROUND WATER MONITORING PROGRAM (NOVEMBER, 1986).

TABLE 8 - WELL AND BORING TOTAL DEPTHS THE EASTERN PORTION OF THE SITE

Wells	Depth (feet)	Bottom of Well (feet elev.)
M 1	18	900
M 4	34	852
M 15	34	882
M 20	63	854
M 31	?	?
M 32	98	814
M 43	44	869
M 48	87	822
M 49	37	872
M 50	21	888
MP 1	?	?
MP 2	?	?
MP 203	53	877
MP 204	43	875
MP 205A	54	861
MP 206CR	41	874
MP 209A	143	780
MP 210R	64	848
MP 211	62	850
MP 212	62	851
MP 213R	61	850
MP 214R	96	815
MP 215	80	829
MP 216	62	848
MP 217R	79	819
MP 230R	86	823
MP 231R	120	796
MP 232	62	846
MP 233	62	846
MP 251	102	810

Boring	Depth (feet)	Bottom of Well (feet elev.)
11-1	70.5	?
11-1A	26	?
11-2	71	843
11-2A	36	882
11-3	71	840
11-3A	36	875
11-4	85	823
11-4A	36	873
11-5	78	830
11-6	86	823
11-7	99	810
11-8	105	812
11-9	79	835
11-10	22	841
11-11	87	833
11-12	71	840
11-13	27	841
11-14	26	841
11-15	20	847
11-16	16	845
12-1	103	818
11-37	?	?
OB-10-7A	?	?

Table 9

ANALYTICAL RESULTS FOR THE TASK FORCE
SAMPLES OF THE 880 SAND

WELL	TOTAL CHRONIUM	AMMONIA NITROGEN	POC	TOX
M-3	ND	ND	ND	9.9
M-26	ND	ND	ND	20
MP-206	ND	1400	650	7.2
MP-208	13	400	ND	ND
MP-217A	11	900	ND	11
MP-219A	ND	400	870	ND
MP-229B	ND	400	ND	ND
MP-232A	10	ND	ND	ND
MP-246	ND	200	160	53
MP-249B	13	300	ND	ND
MP-249B	20	400	ND	ND
MP-253A	ND	ND	ND	24
MP-256A	7	700	ND	6.5
MP-261A	NA	NA	ND	NA
MP-215BR	ND	1400	ND	ND
MP-227	8	1500	ND	28

Note: All results are in parts per billion
NA - not analyzed
ND - not detected

FIGURES

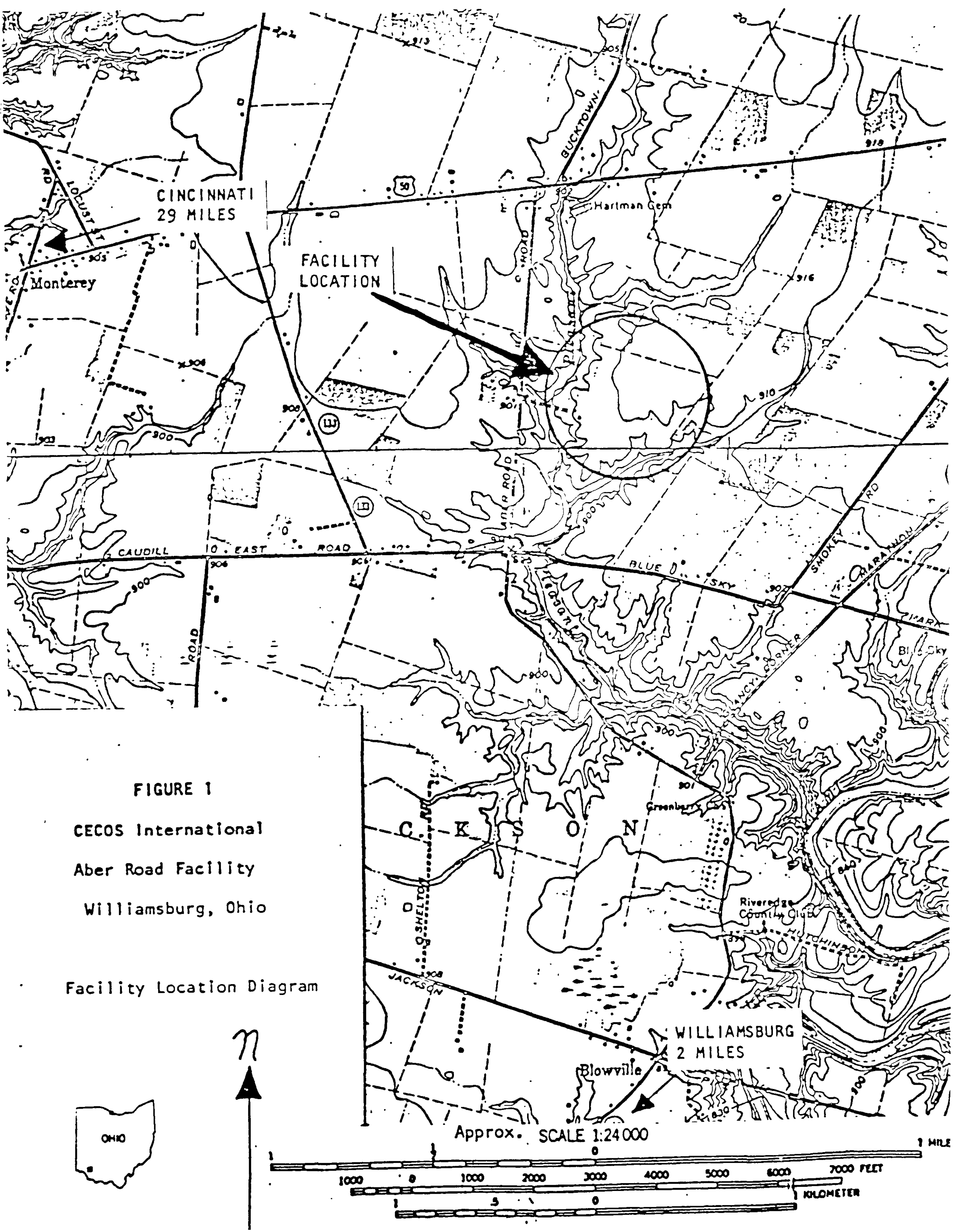


FIGURE 1

CECOS International

Aber Road Facility

Williamsburg, Ohio

Facility Location Diagram

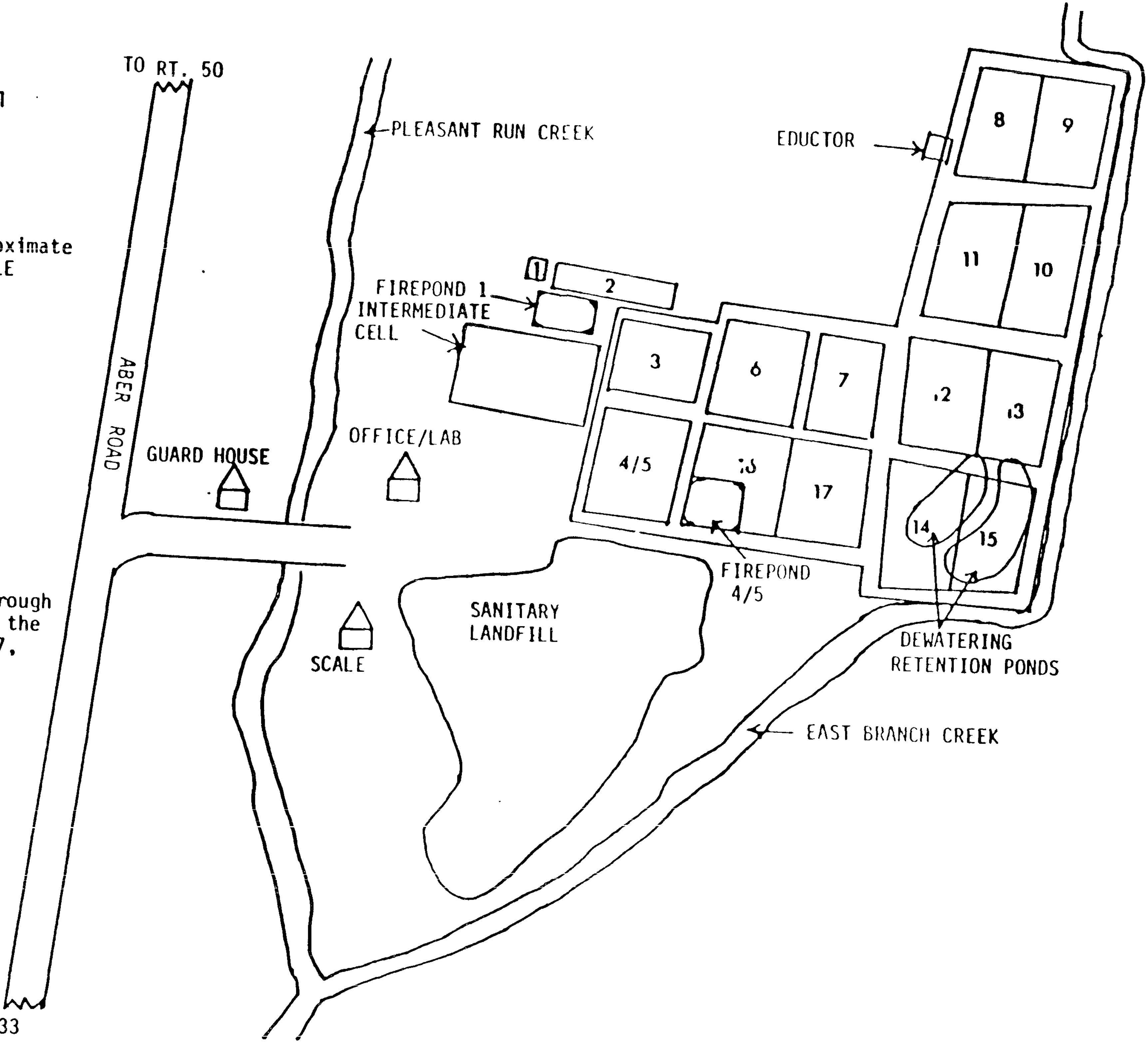
FIGURE 2

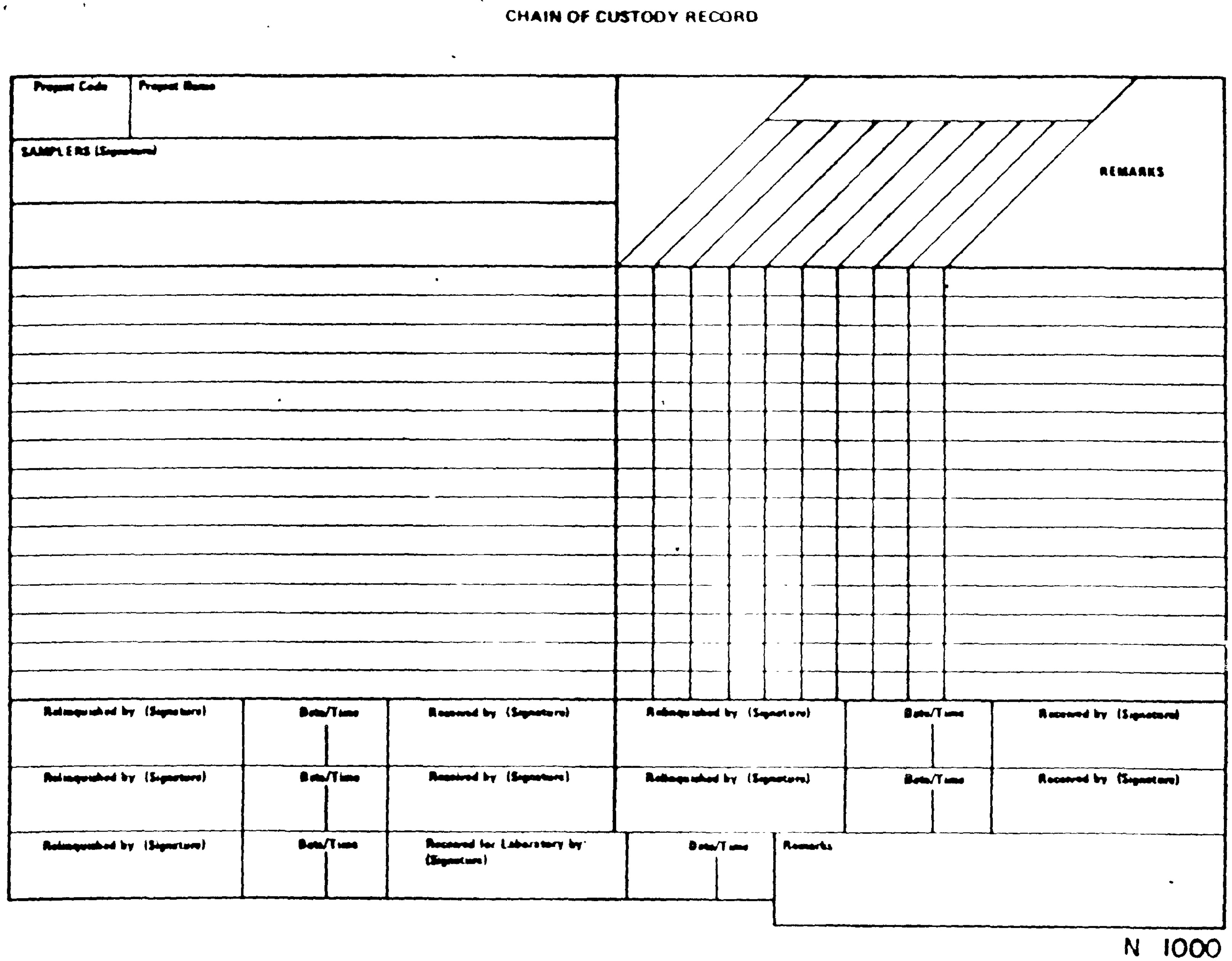
CECOS International
Aber Road Facility
Williamsburg, Ohio

SITE MAP

Locations are Approximate
Diagram NOT TO SCALE

Cell locations 1 through 17 are indicated by the numbers 1 through 17, respectively




CHAIN OF CUSTODY RECORD

Project Code	Project Name			REMARKS
SAMPLERS (Signature)				

Relinquished by (Signature)	Date/Time	Received by (Signature)	Relinquished by (Signature)	Date/Time	Received by (Signature)
Relinquished by (Signature)	Date/Time	Received by (Signature)	Relinquished by (Signature)	Date/Time	Received by (Signature)
Relinquished by (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

N 1000

Figure 3 Chain-of-Custody Form.

RECEIPT FOR SAMPLES

PRC. NO	PROJECT NAME	Name of Facility
SAMPLERS (Signature)		Facility Location
Split Samples Offered ( ) Accepted ( ) Declined		

STA NO	DATE	TIME	Comp	Grab	SPLIT SAMPLES	TAG NUMBERS	STATION DESCRIPTION	NO OF CONTAINERS	REMARKS

Transferred by (Signature)		Received by (Signature)		Telephone
Date	Time	Title	Date	Time

Distribution: Original to Coordinator Field Files; Copy to Facility

N 349

Figure 4 Receipt for Sample form.

FIGURE 5

CECOS INTERNATIONAL

WASTE PRODUCT RECORD

THIS SECTION TO BE COMPLETED BY THE WASTE GENERATOR
IMPORTANT: PLEASE READ INSTRUCTIONS BEFORE COMPLETING THIS RECORD

PRODUCT CODE: 767 BKO
WPR NUMBER: 200632
REVIEWED BY:

GENERATOR NAME:
SHIP FROM ADDRESS (if different):
MANIFEST ADDRESS (if different): Same
BILLING ADDRESS:

WASTE NAME: Plant Scraps

PROCESS GENERATING THIS WASTE: Manuf. of pressure sensitive labels

BUSINESS CONTACT NAME: PHONE NO.
TECHNICAL CONTACT NAME: Same PHONE NO.

WASTE DESCRIPTION (AT 70°F)

IMPORTANT: PLEASE READ INSTRUCTIONS BEFORE COMPLETING THIS RECORD

PHYSICAL STATE: [X] SOLID [ ] SEMI-SOLID [ ] LIQUID
VISCOSITY: N/A [ ] LOW [ ] MEDIUM [ ] HIGH
SPECIFIC GRAVITY/DENSITY: ≥ 1.0
FLASH POINT (°F): ≥ 140 [ ] CLOSED CUP [ ] OPEN CUP
pH (INDICATE RANGE): 5-9

PHASE/LAYERING: N/A
TOP ___ % [ ] SOLID [ ] LIQUID
MIDDLE ___ % [ ] SOLID [ ] LIQUID
BOTTOM ___ % [ ] SOLID [ ] LIQUID
SOLIDS: [ ] BY WEIGHT [ ] BY VOLUME DISSOLVED ___ % SUSPENDED ___ %

BTU/LB: N/A
ASH CONTENT @ 650°C
CHLORINE BY WEIGHT (%) ___ & TRACE OR ___ %
SULFUR BY WEIGHT (%) ___ & TRACE OR ___ %

CHEMICAL COMPOSITION (Use Chemical or IUPAC Nomenclature)

COMPONENT	CONCENTRATION	RANGE
PERCENT MOISTURE (WATER)		
Cotton Rags	60%	50-60
Metal Strapping	≤10%	5-10
Poly bags	10%	5-10
Paper Scraps	10%	5-10
Silicon Resin	<5%	1-5
Acetone Xylene Residue	<5%	1-5

IS THIS WASTE RADIOACTIVE, EXPLOSIVE, PYROPHORIC OR SHOCK SENSITIVE? [ ] YES [X] NO
IS THIS WASTE WATER OR AIR REACTIVE? [ ] YES [X] NO
DOES THIS WASTE MATERIAL CONTAIN:
OSHA CARCINOGENS [ ] YES [X] NO
PESTICIDES [ ] YES [X] NO
PCB's [ ] YES [X] NO
IF YES, PER SCT IN CHEMICAL COMPOSITION FOR AQUEOUS WASTES, DOES THIS WASTE SHIPMENT CONTAIN ANY ORGANIC PRIORITY POLLUTANT > 10 PPM [ ] YES [ ] NO

SPECIAL OR UNIQUE WASTE HANDLING PRECAUTIONS:

Is this waste "A Hazardous Waste" as defined by Part 261 of the U.S. Environmental Protection Agency Resource Conservation & Recovery Act (RCRA) [X] YES [ ] NO

IF YES PROVIDE THE EPA HAZARDOUS WASTE NUMBER(S): D001

FACILITY EPA I.D. NUMBER:

SHIPPING REQUIREMENTS

a. Indicate how the waste material is to be shipped
[X] Drum [ ] Bulk [ ] Other
Size of Drum: 55 gallon DOT Spec: 17H or Spec. Spec Permit Type Steel
b. Shipping Frequency
Quantity: 30 dr. Per: 4 x per yr.
c. Type of Vehicle (i.e. Box Van, Lugger, Vactruck, Flatbed, etc.): Box Van
d. Scheduling contact ___ Telephone ___

DOT INFORMATION

To be completed by Waste Generator
A. PROPER U.S.D.O.T. SHIPPING NAME: Waste Flammable Solid N.O.S.
B. UN/NA NUMBER: 1325 DOT HAZARD CLASS: Flammable Solid

CERTIFICATION

I hereby certify that I have personally examined and am familiar with the information submitted in this and all attached documents. Based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed.

DATE: 3/6/86 SIGNATURE: TITLE: Tech Sales

FOR CECOS USE ONLY

SPECIAL CONDITIONS
___ A. MUST HAVE ≥ 1,500 lb/ft² LOAD BEARING CAPACITY
___ B. FLASH POINT MUST BE GREATER THAN ___ °F
___ C. MUST NOT POSSESS A POUR POINT AT 75°F
___ D. LIMIT ___ DRUMS PER ___
___ E. OPERATIONS MUST BE NOTIFIED ___ WORKING DAYS PRIOR TO SHIPMENT
___ F. MAXIMUM ___ % SETTLEABLE SOLIDS BY VOLUME
___ G. NOT TO POSSESS ANY STRONG ODORS
___ H. MUST NOT BE DUSTY
___ I. ___ TRIAL LOADS ONLY ___ (NO. OF DRUMS)
___ J. OTHER

CECOS DOCUMENTATION

A. DISPOSAL SITE: Aber Road
B. DISPOSAL METHOD: General Cell 3rd corner
1. 1119 BB 2.
3. 4.
C. REGULATORY CORRESPONDENCE
TYPE [ ] NOTIFICATION [ ] SUPPLEMENTAL REQUEST
NUMBER

DATE: 3/19/86 SIGNATURE: TITLE: Asst Mg-EH&S

THIS SECTION IS FOR REGULATORY AGENCY DOCUMENTATION

A. APPROVAL STATUS [X] ~~APPROVAL~~ Commercially Acceptable [ ] APPROVAL WITHHELD [ ] DISAPPROVED
B. REASONS OR SPECIAL CONDITIONS FOR APPROVAL STATUS
No free liquids, no void space

DATE: 3/19/86 SIGNATURE: TITLE/AGENCY:

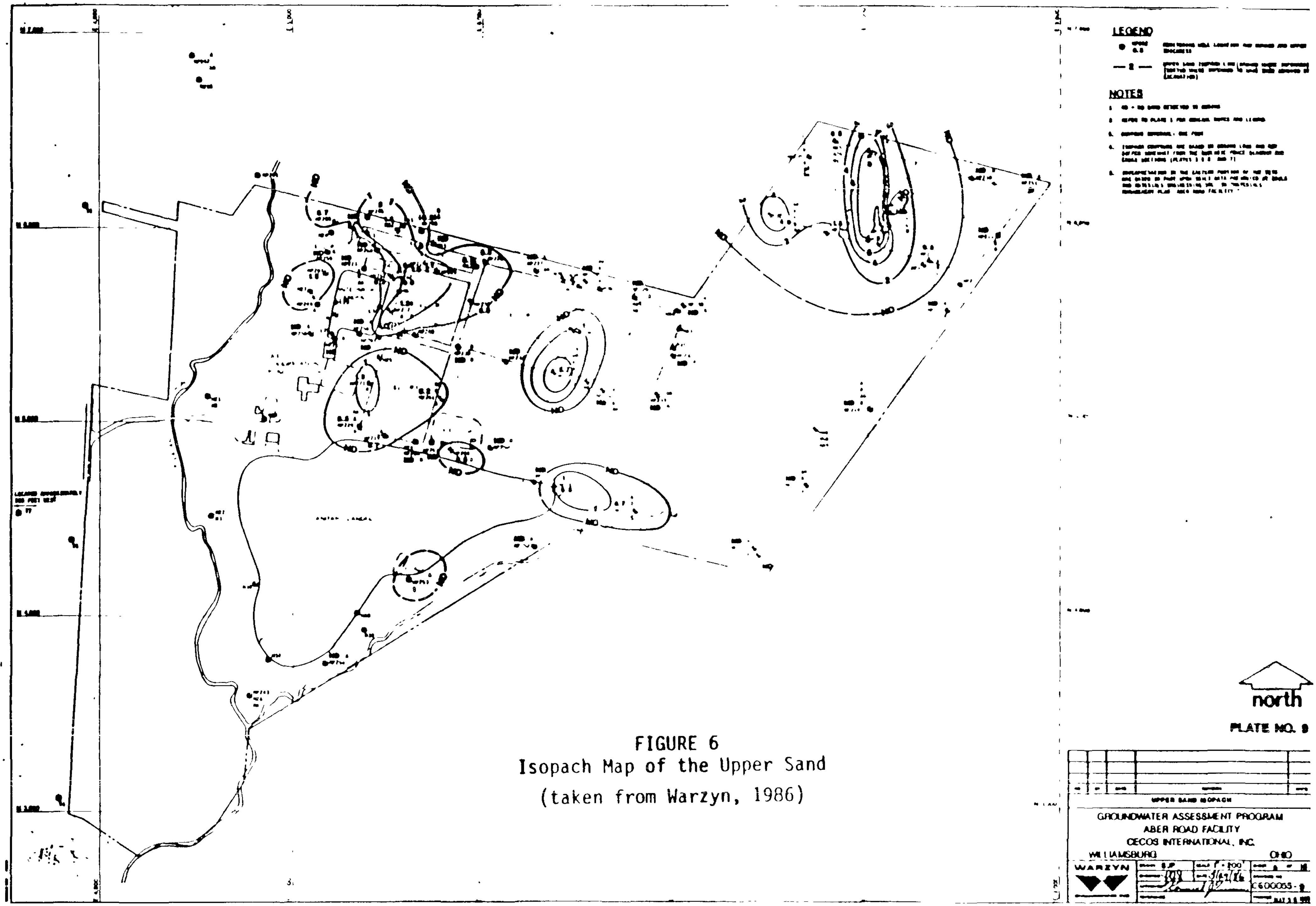


FIGURE 6
Isopach Map of the Upper Sand
(taken from Warzyn, 1986)

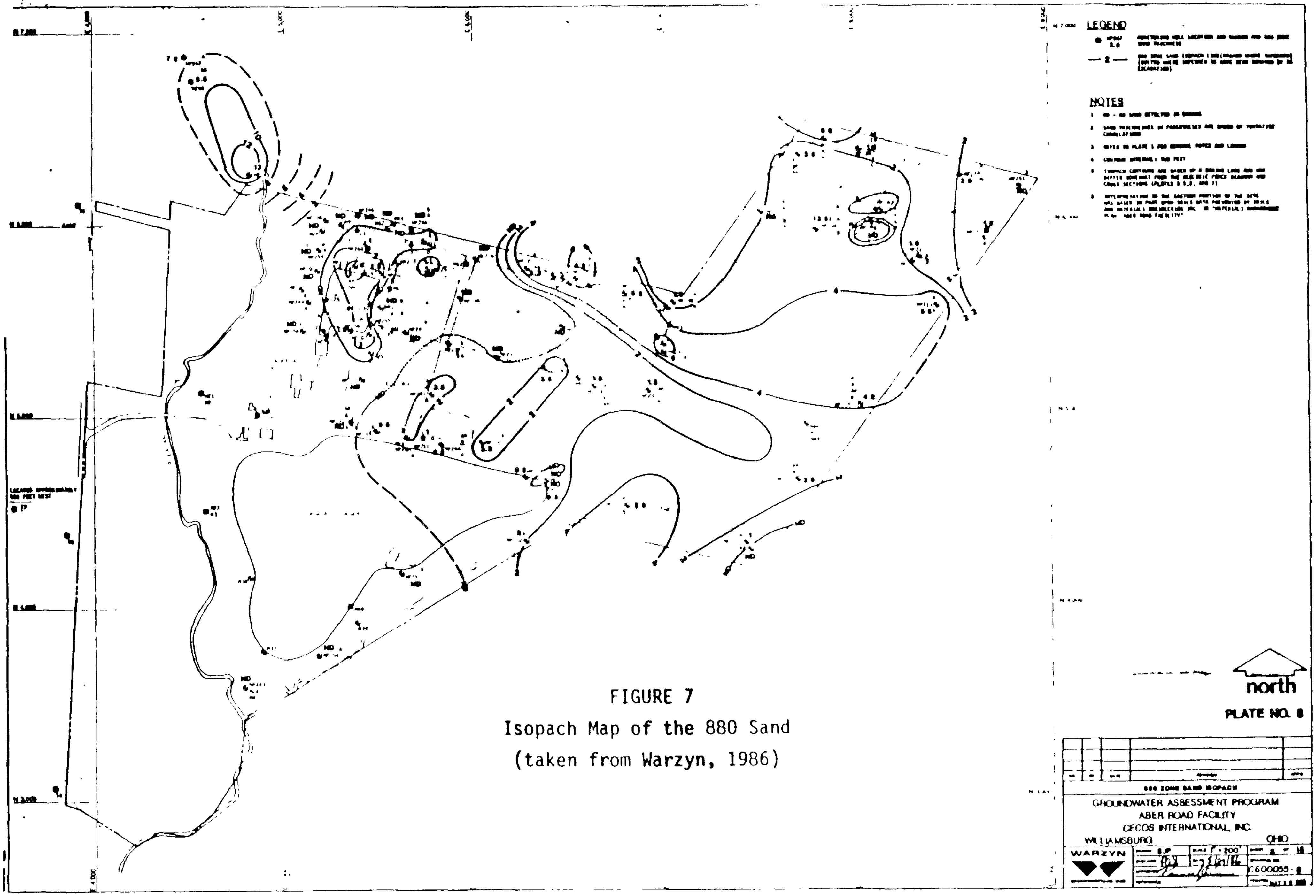


FIGURE 7
Isopach Map of the 880 Sand
(taken from Warzyn, 1986)

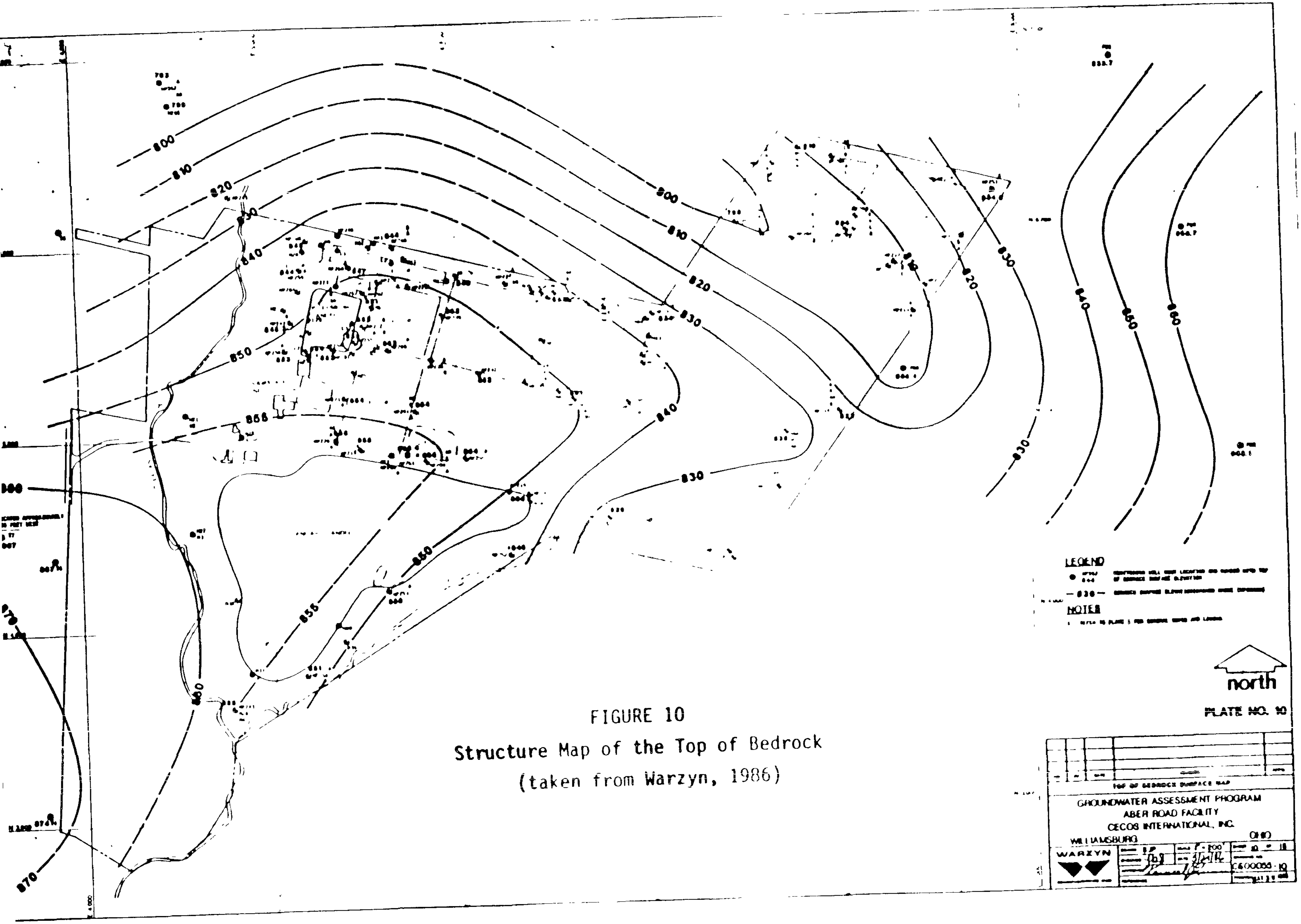


FIGURE 10
Structure Map of the Top of Bedrock
(taken from Warzyn, 1986)

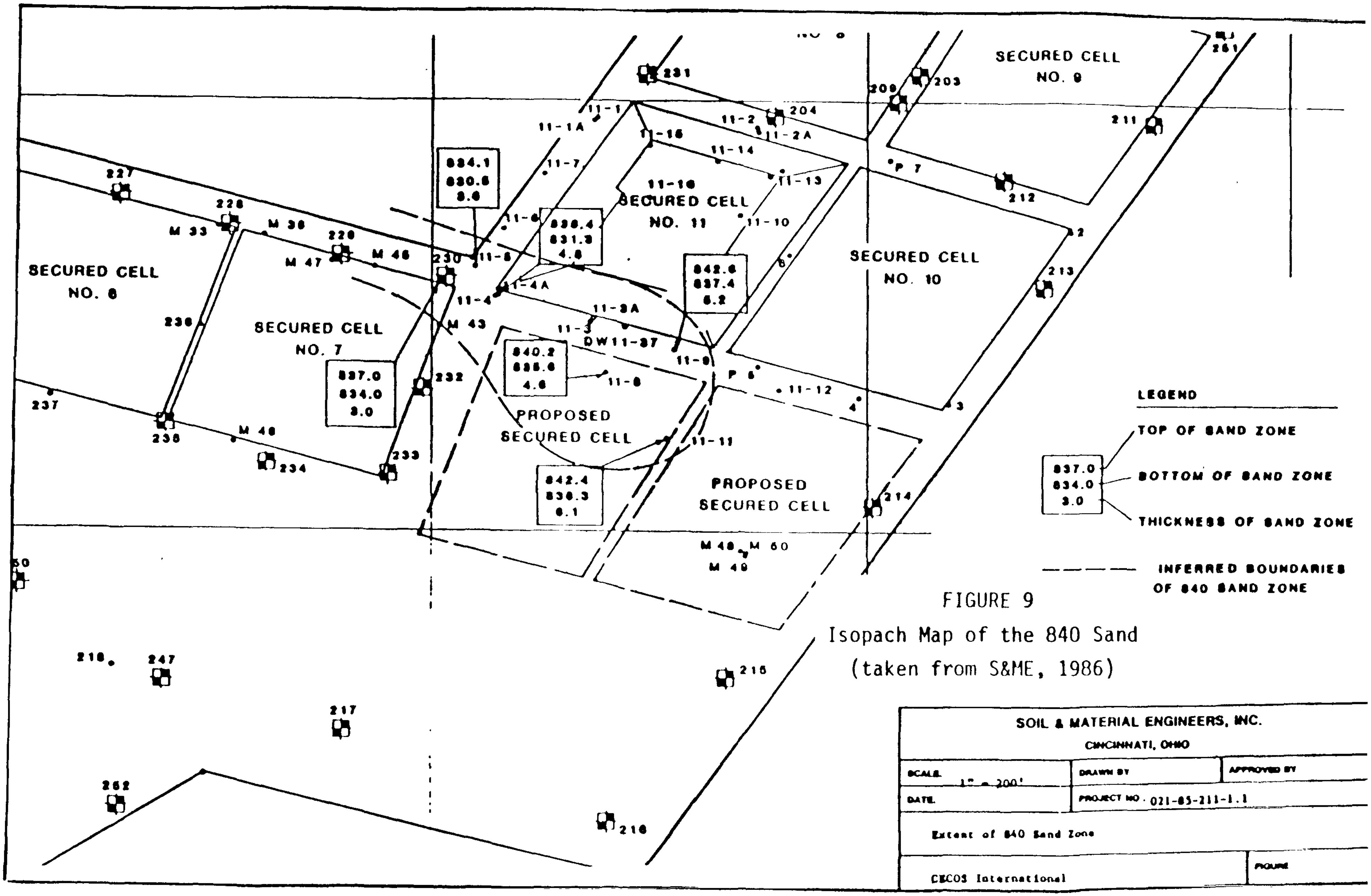


FIGURE 9
Isopach Map of the 840 Sand
(taken from S&ME, 1986)

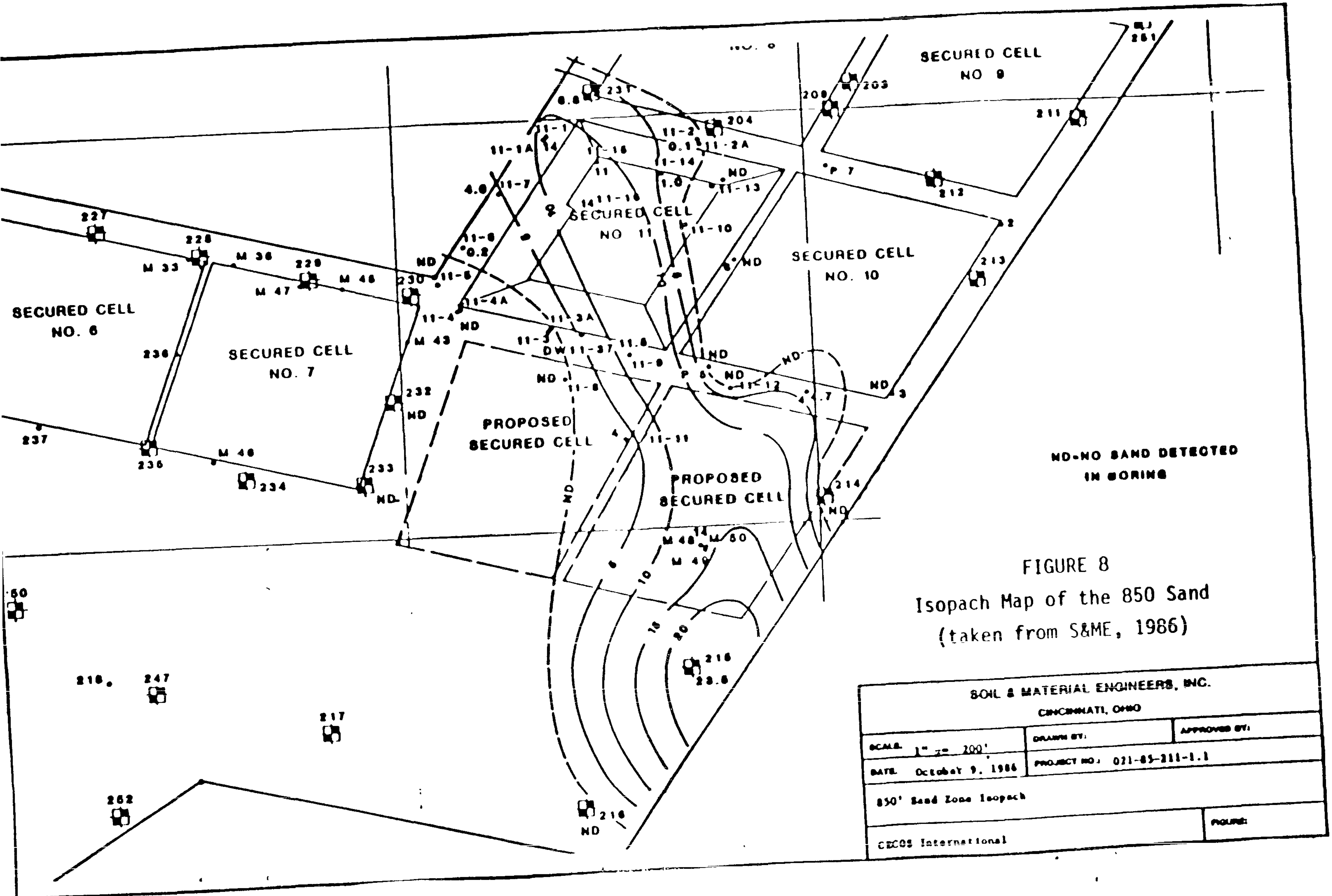


FIGURE 8
Isopach Map of the 850 Sand
(taken from S&ME, 1986)

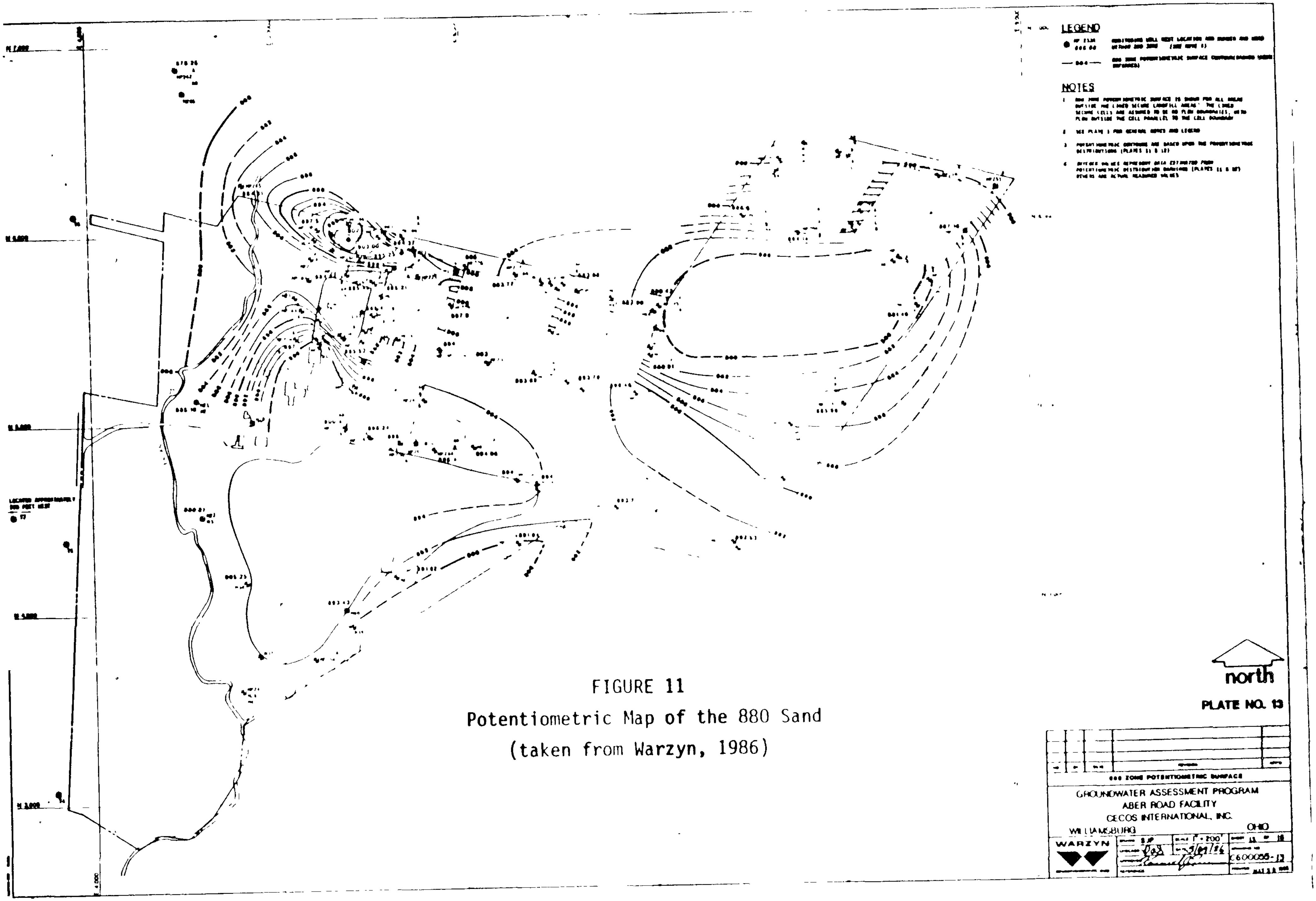


FIGURE 11
Potentiometric Map of the 880 Sand
(taken from Warzyn, 1986)

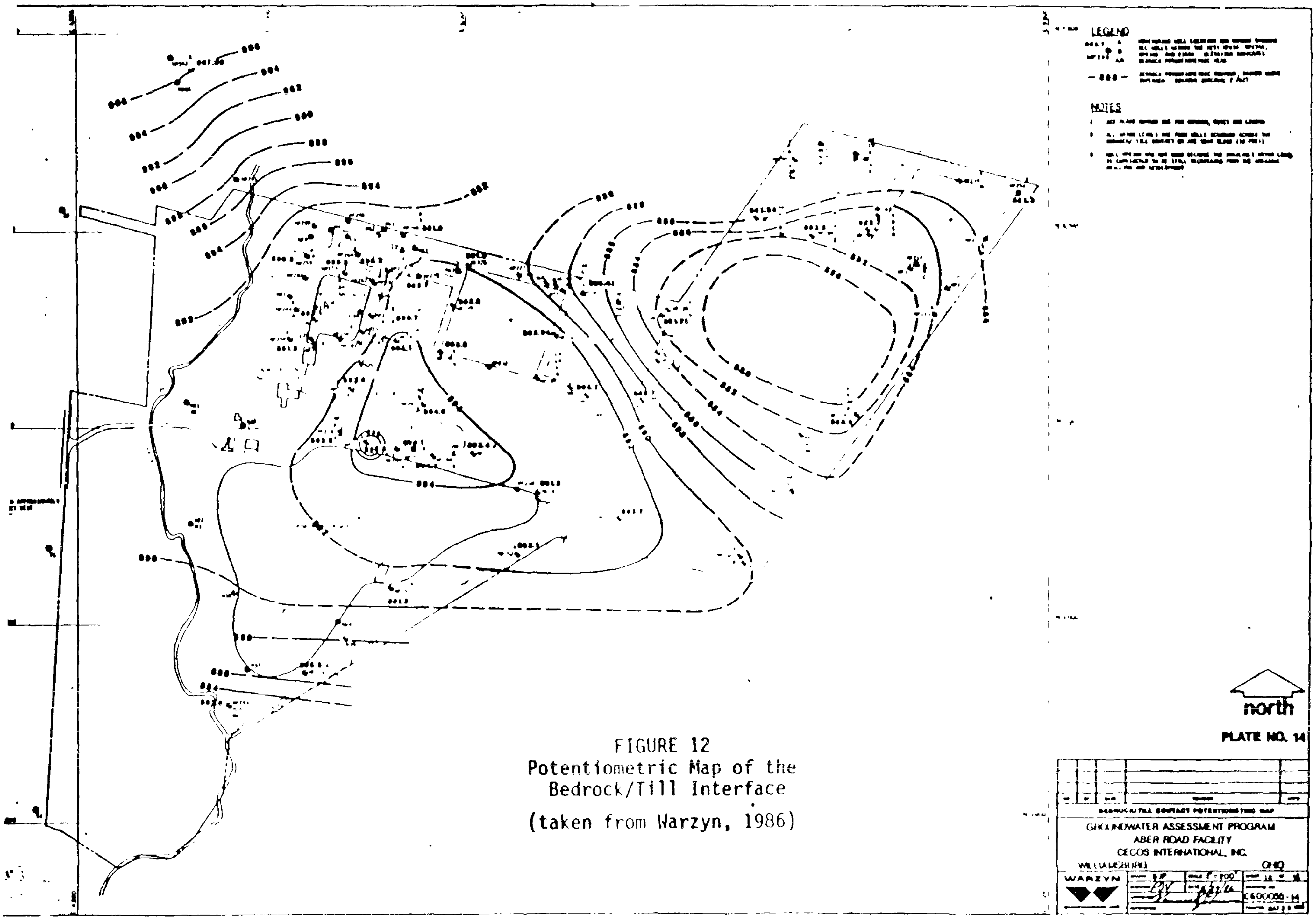
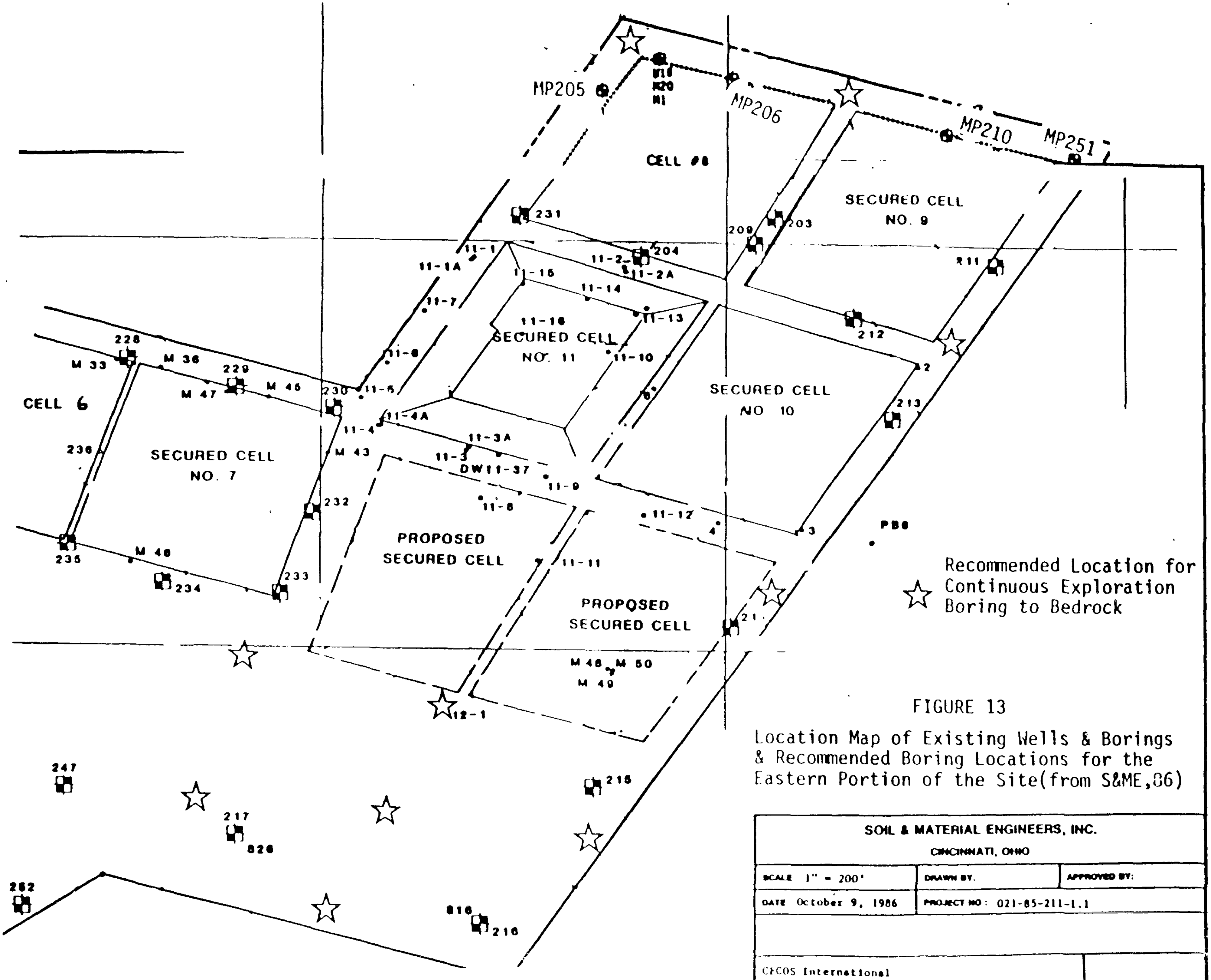


FIGURE 12
Potentiometric Map of the Bedrock/Till Interface
(taken from Warzyn, 1986)



☆ Recommended Location for Continuous Exploration Boring to Bedrock

FIGURE 13

Location Map of Existing Wells & Borings & Recommended Boring Locations for the Eastern Portion of the Site(from S&ME,86)

SOIL & MATERIAL ENGINEERS, INC. CINCINNATI, OHIO		
SCALE 1" = 200'	DRAWN BY.	APPROVED BY:
DATE October 9, 1986	PROJECT NO: 021-85-211-1.1	

CECOS International

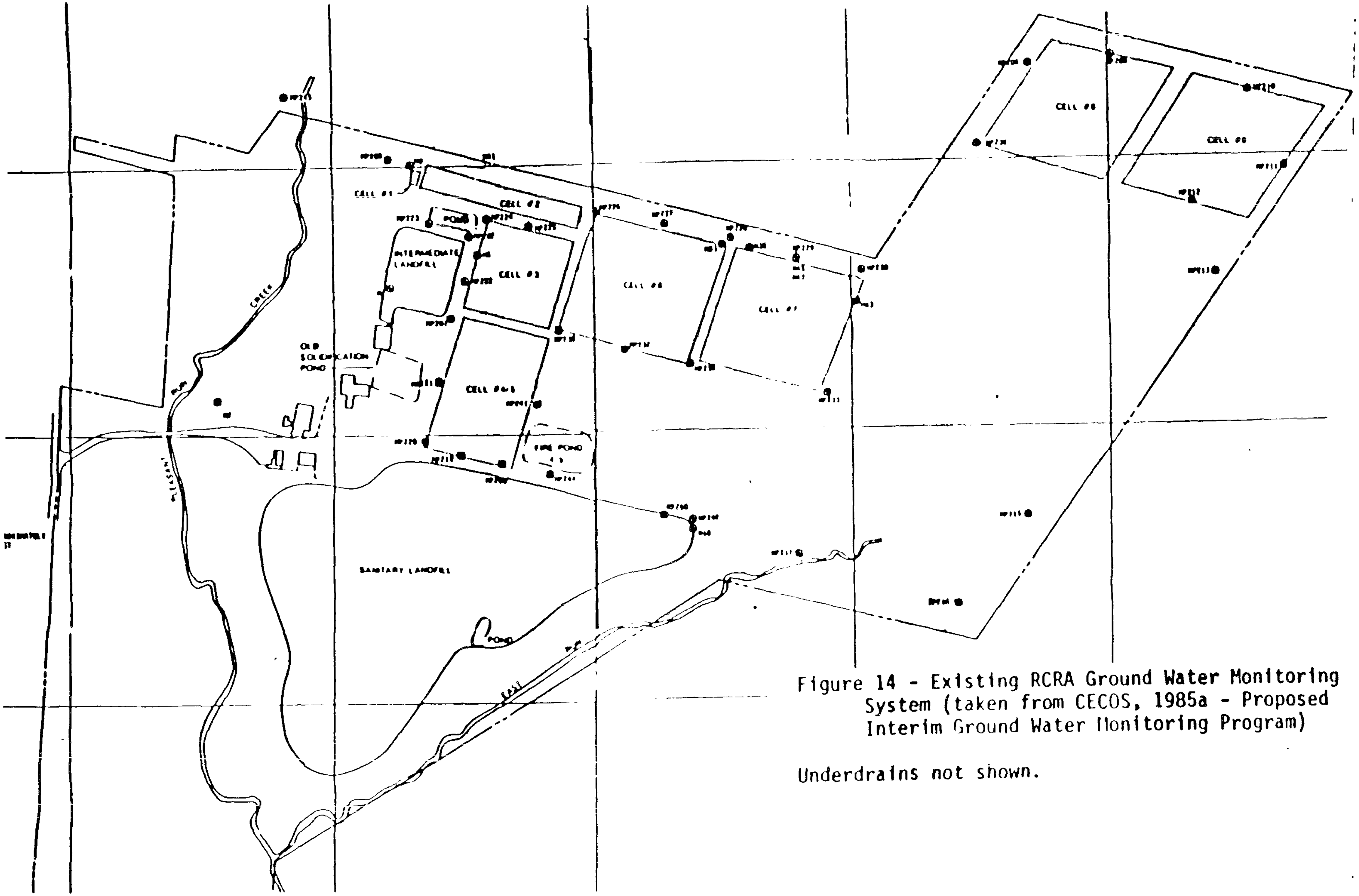


Figure 14 - Existing RCRA Ground Water Monitoring System (taken from CECOS, 1985a - Proposed Interim Ground Water Monitoring Program)

Underdrains not shown.

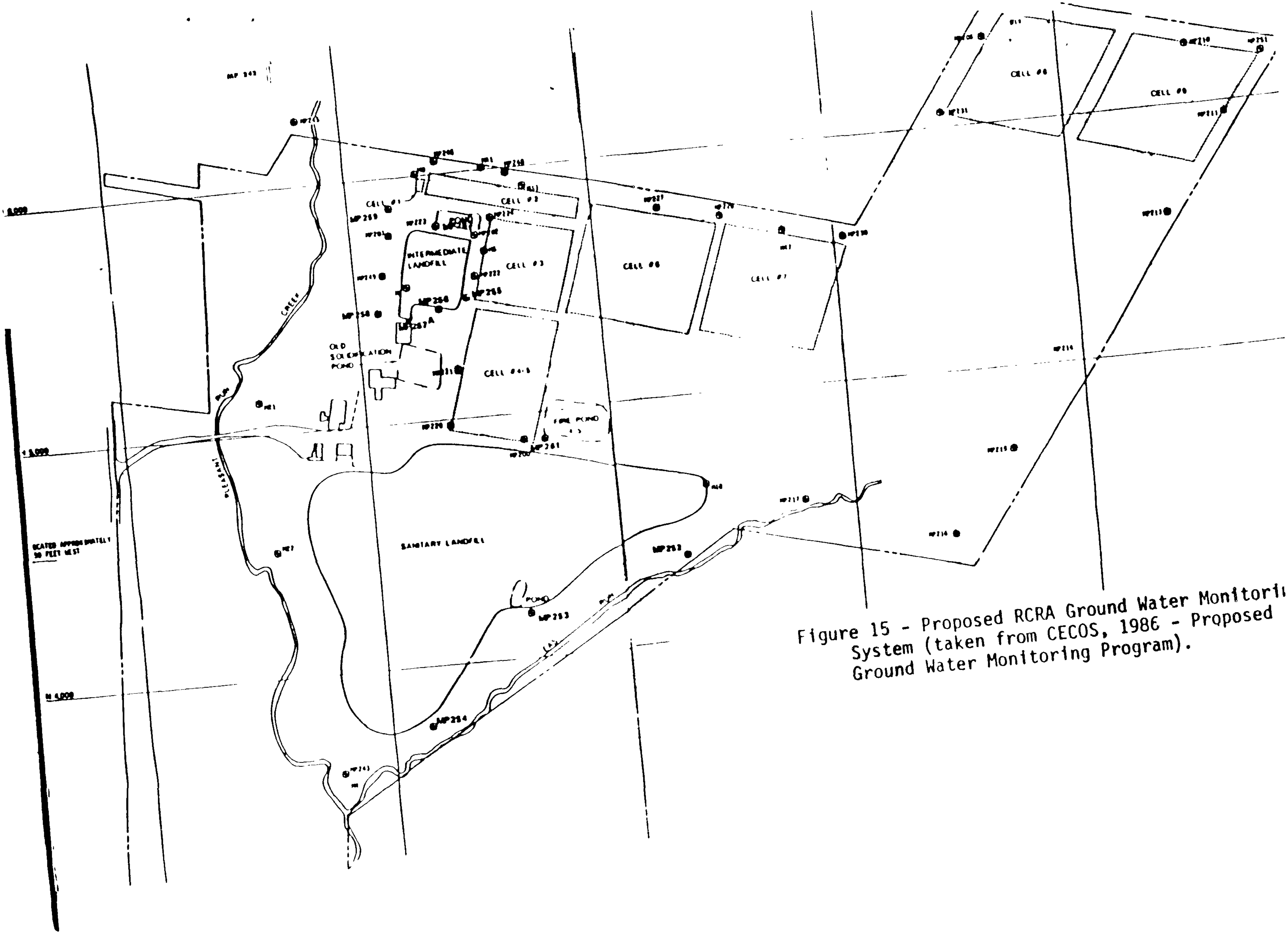
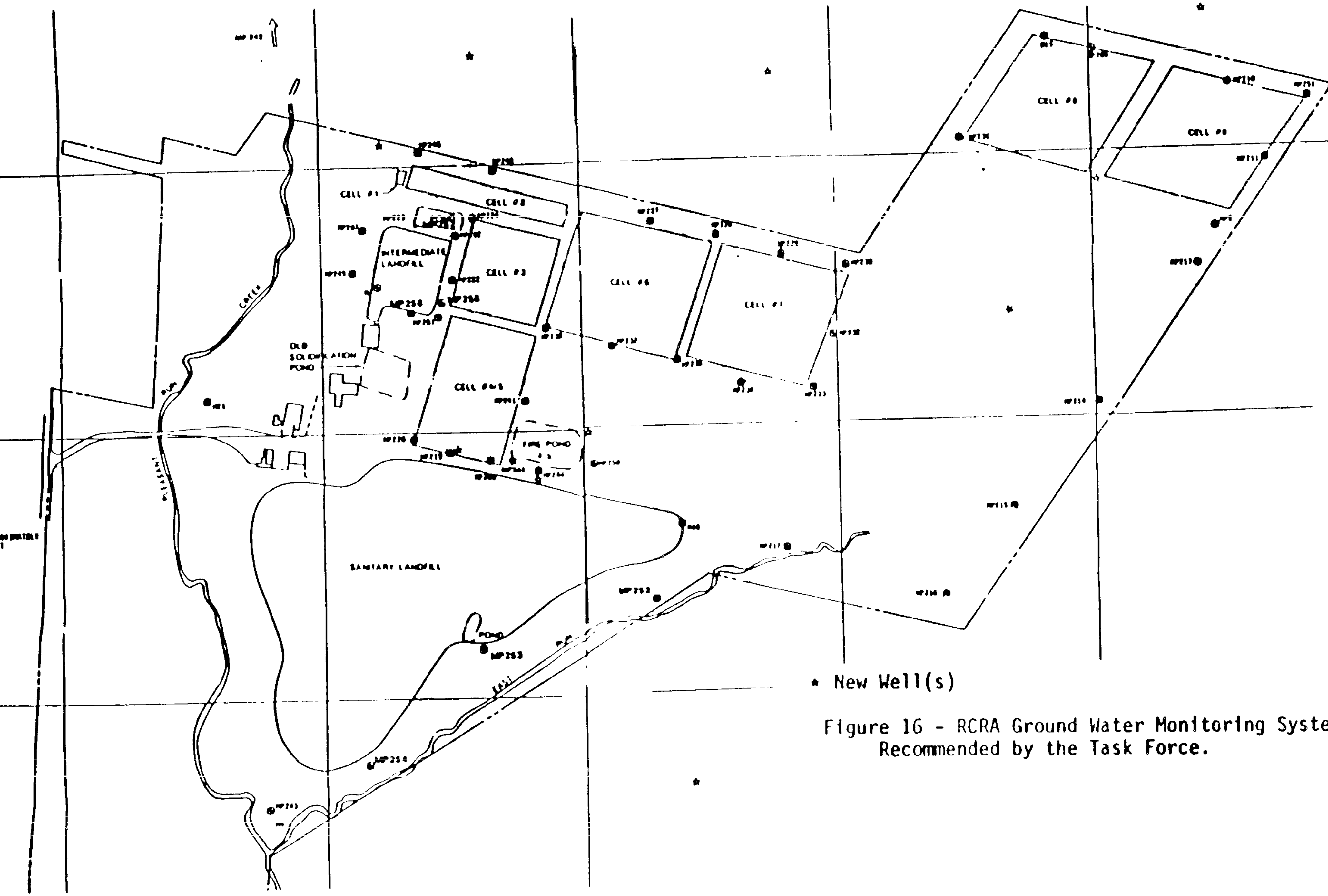


Figure 15 - Proposed RCRA Ground Water Monitoring System (taken from CECOS, 1986 - Proposed Ground Water Monitoring Program).



* New Well(s)

Figure 16 - RCRA Ground Water Monitoring System Recommended by the Task Force.

APPENDIX A

Sampling Information

ČECOS Landfill

Well Number	Depth of Well (ft)	Depth to Water (ft)	Purge Volume Calculated (gal)	Purge Volume Actual (gal)	Purging		Sampling		Remarks
					Date 1986	Time EST	Date	Time EST	
M3	17.95	4.95	101.84	32.0	11/14	1648-1726	11/17	1203-1252	Purge water brown, sample water clearer. In-site aliquot taken after TOC aliquot
M26	18.1	15.77	1.10	1.25	11/17	1150-1155	11/17	1240-1323	VOA samples cloudy, conductivity sample lost (meter failure)
M41	26.58	7.15	38.05	13.0	11/12	1506-1536	11/13	1620-1705	
MP200R	40.25	16.32	46.86	48.0	11/19	1505-1605	11/20	1005-1046	Matrix spike sample taken. Purge water contained in waste drum for safe disposal
MP206	36.9	12.3	12.04	6.25	11/17	1501-1528	11/18	0939-1027	
MP208	27.3	15.82	22.45	8.0	11/12	1410-1435	11/14	1052-1139	
MP215BR	54.43	45.51	17.6	24.0	11/14	1221-1258	11/14	1318-1352	
MP217A	16.53	5.12	22.3	9.0	11/21	0928-0946	11/21	1532-1605	
MP219A	26.97	13.39	26.6	10.0	11/12	1056-1120	11/13	1002-1054	Dust & flumes from truck traffic
MP220AR	23.32	11.47	23.5	10.0	11/12	1005-1112	11/13	1005-1112	

CECOS Landfill (Continued)

Well Number	Depth of Well (ft)	Depth to Water (ft)	Purge Volume Calculated (gal)	Purge Volume Actual (gal)	Purging Date 1986	Purging Time EST	Sampling Date 1986	Sampling Time EST	Remarks
MP222B	21.56	10.05	22.54	22.5	11/17	1540-1625	11/18	0918-1112	Duplicate sample, purge water contained in waste drum for safe disposal. Sweet paint waste odor noted, HNU did not detect anything except background odors.
MP222R	57.88	22.58	69.0	26.75	11/18	1214-1300	11/19	1223-1310	
MP227	62.0	19.3	20.9	7.5	11/14	0954-1013	11/14 11/17	1553-1602 0943-1156	VOA, POX, POC ABN to end of parameters
MP229B	37.35	29.77	14.9	15.0	11/14	1340-1412	11/14	1437-1524	
MP232A	33.9	27.87	11.8	12.0	11/20	1415-1445	11/20	1508-1558	
MP244AR	23.0	18.92	7.89	2.6	11/17	1047-1104	11/18 11/19	1148-1227 0922-1013	VOC-total metals, vehicle dust & fumes noted Dis. metals-SO_4/Cl
MP246	22.11	9.21	6.32	2.25	11/17	1445-1452	11/18 11/19 11/20	1436-1505 0920-1030 1235-1242	VOA-ABN Total metals-TOX Phenols-SO_4/Cl, Purge water contained in waste drum for safe disposal. HNU meter only detected background level volatiles.

CECOS Landfill (Continued)

Well Number	Depth of Well (ft)	Depth to Water (ft)	Purge Volume Calculated (gal)	Purge Volume Actual (gal)	Purging Date 1986	Purging Time EST	Sampling Date 1986	Sampling Time EST	Remarks
MP248B	32.97	27.8	10.1	10.5	11/17	0940-1008	11/17	1630-1716	
MP249B	23.48	4.60	38.93	15.0	11/12	1200-1233	11/13 11/14	1510-1640 0926-0940	VOA-cyanide, duplicate sample $NH_3/NH_4-SO_4/Cl$
MP253A	18.04	7.92	19.8	20.0	11/18	1433-1505	11/18	1533-1623	
MP256A	39.62	9.58	60.0	20.25	11/12	1507-1542	11/13 11/14	1417-1510 1037-1050	VOA-TOX Phenol-SO_4/Cl
MP261	60.7	21.92	75.9	76.0	11/19	1338-1558	11/19	1611-1654	
MP261A	30.57	14.25	31.96	11.0	11/17	1043-1108	11/18 11/21	1555-1616 1022-1047	VOA,POC,POX and field parameters ABN only, only 1.8 gals. in well
U4	----	----	----	200+	11/21	1315-1400	11/21	1410-1438	Dupl.&matrix spike. Purge water contained in waste drum for safe disposal, slight spectic odor.
U12	----	----	----	210	11/21	1530-1615	11/21	1630-1642	Purge water contained in waste drum for safe disposal, no odor detected.

CECOS Landfill (Continued)

Well Number	Depth of Well (ft)	Depth to Water (ft)	Purge Volume Calculated (gal)	Purge Volume Actual (gal)	Purging		Sampling		Remarks
					Date 1986	Time EST	Date 1986	Time EST	
U13	----	----	----	200 est.	11/21	0730-0915	11/21	0933-1005	Water rusty brown colored, clear after filtering.
U17	----	----	----	337	11/21	1055-1130	11/21	1140-1156	Phenol collected last.
U22	----	----	----	225	11/20	1345-1415	11/20	1422-1442	Unidentified odor noted.
U24	----	----	----	----	11/19	1430-1530	11/20	1102-1139	Purged to dryness, dedicated pump. Samples first collected in 2.5 gal. jars then poured into sample containers. Water grey colored with sulfide odor.
Cell II seep	----	----	----	----	----	----	11/21	1215-1243	Bottles for split filled consecutively.

APPENDIX B

QA/QC Summary of Task Force Data

MEMORANDUM

DATE: March 26, 1987

SUBJECT: Evaluation of Quality Control Attendant to the Analysis of Samples from the CECOS, Ohio Facility

FROM: Ken Partymiller, Chemist
PRC Environmental Management

THRU: Paul H. Friedman, Chemist*
Studies and Methods Branch (WH-562B)

TO: HWGWTF: Tony Montrone*
Gareth Pearson (EPA 8231)*
Richard Steimle, HWGWTF*
Joe Fredle, Region V
Maxine Long, Region V
Steve Mangion, Region I

This memo summarizes the evaluation of the quality control data generated by the Hazardous Waste Ground-Water Task Force (HWGWTF) contract analytical laboratories (1). This evaluation and subsequent conclusions pertain to the data from the CECOS, Ohio sampling effort by the Hazardous Waste Ground-Water Task Force.

The objective of this evaluation is to give users of the analytical data a more precise understanding of the limitations of the data as well as their appropriate use. A second objective is to identify weaknesses in the data generation process for correction. This correction may act on future analyses at this or other sites.

The evaluation was carried out on information provided in the accompanying quality control reports (2-3) which contain raw data, statistically transformed data, and graphically transformed data.

* HWGWTF Data Evaluation Committee Member

The evaluation process consisted of three steps. Step one consisted of generation of a package which presents the results of quality control procedures, including the generation of data quality indicators, synopses of statistical indicators, and the results of technical qualifier inspections. A report on the results of the performance evaluation standards analyzed by the laboratory was also generated. Step two was an independent examination of the quality control package and the performance evaluation sample results by members of the Data Evaluation Committee. This was followed by a meeting (teleconference) of the Data Evaluation Committee to discuss the foregoing data and data presentations. These discussions were to come to a consensus, if possible, concerning the appropriate use of the data within the context of the HWGWTF objectives. The discussions were also to detect and discuss specific or general inadequacies of the data and to determine if these are correctable or inherent in the analytical process.

Preface

The data user should review the pertinent materials contained in the accompanying reports (2-3). Questions generated in the interpretation of these data relative to sampling and analysis should be referred to Rich Steimle of the Hazardous Waste Ground-Water Task Force.

I. Site Overview

The CECOS, Ohio facility is located near Williamsburg, Ohio which is approximately 30 miles east of Cincinnati. The facility started operation in the early 1970's as a sanitary landfill and expanded into the hazardous waste business. Today, the facility is strictly a hazardous waste landfill with no active sanitary areas. Presently the landfill is filling its tenth cell and constructing its eleventh. All of the cells are lined. There are a number of dewatering pumps around each cell due to the high water table in the area. The facility accepts just about all types of hazardous waste, including PCBs, which a landfill can be permitted to accept.

The geology of the area is rather complex. Above bedrock there are numerous sand seams intermixed with clay. There are, therefore, a number of sand zones which need to be monitored. The facility has in excess of 200 monitoring wells. During the HWGWTF monitoring study, samples from three wells in the upper sand zone, 18 wells in the intermediate sand (refered to as the 880 sand), several bedrock wells, and a water seep into the eleventh, and as yet unused, cell, were collected. Six underdrains or sumps were also sampled. These sumps, which were required by provisions of the Toxic Substances Control Act, were placed under each cell to allow the monitoring of any leakage.

Ground-water contamination already exists at the facility and, therefore, the facility is under RCRA assessment. Historically, volatile solvents, including methylene chloride, as well as PCBs, and other chemicals have been detected in various of the monitoring wells.

Forty field samples including two field blanks (MQO942/QO942 and MQO969/QO969), two equipment blanks representing the two lots of bailers used at the facility (MQO962/QO962 and MQO976/QO976), a trip blank (MQO939/QO939), a pump blank from the portable venturi pump used to collect samples from the underdrains (MQO965/QO965), a sample bottle blank of the type used by CECOS ?

which was filled with deionized water (MQO972/QO972), and three pairs of duplicate samples (well MP249B, samples MQO945/QO945 and MQO946/QO946, well MP222B, samples MQO955/QO955 and MQO956/QO956, and underdrain U-4, samples MQO977/QO977 and MQO978/QO978) were collected at this facility. Samples MQO955/QO955 and MQO956/QO956 were medium concentration matrix ground-water samples. Samples MQO966/QO966, 968, 971, 973, 975, 977, and 978 were the low concentration matrix samples collected from the waste cell underdrains. Sample MQO966/QO966 corresponded to underdrain U24 which had its own dedicated pump. All other underdrains which were monitored (U4, U12, U13, U17, and U22) required a portable venturi pump for sampling. Sample MQO970/QO970 was the low concentration matrix ground-water seep flowing into the not yet completed cell number 11. All other samples were low concentration matrix ground-water samples from the monitoring wells.

II. Evaluation of Quality Control Data and Analytical Data

1.0 Metals

1.1 Performance Evaluation Standards

Metal analyte performance evaluation standards were not evaluated in conjunction with the samples collected from this facility.

1.2 Metals QC Evaluation

Total and dissolved metal spike recoveries were analyzed for twenty-three metals spiked into three low concentration matrix samples (MQO945, 963, and 977) and one (of two) medium concentration matrix samples (MQO955 or 956). Not all metals were spiked into both of these samples. Twenty-two total and eighteen dissolved metal average spike recoveries from the low concentration matrix samples were within the data quality objectives (DQOs) for this Program. Total and dissolved antimony average (of three values) spike recoveries were outside DQO with values of 67 and 226 percent. Various individual metal spike recoveries from the low concentration matrix samples were also outside DQO. These are listed in Tables 3-1a, 3-1c, 3-2a, and 3-2c of Reference 2 as well as in the following Sections. The dissolved calcium and magnesium spike recoveries were not calculated because the sample concentrations of these metals were greater than four times the concentration of the spike. A listing of which samples were spiked for each analyte is also available in Tables 3-2a and 3-2c of Reference 2.

Fourteen total and seventeen dissolved of twenty-three metal spike recoveries from the medium concentration spiked samples were within Program DQOs. Only one medium concentration matrix sample was spiked for each total and dissolved metal. The total beryllium, cobalt, lead, nickel, selenium, thallium, and zinc and dissolved lead and selenium spike recoveries were outside DQO with values of 72, 70, 41, 70, 762, 36, 62, 48, and 23 percent, respectively. The total iron and manganese and dissolved calcium, iron, manganese, and sodium spike recoveries were not calculated because the sample concentrations of these metals were greater than four times the concentration of the spike. A listing of which samples were spiked for each analyte is available in Tables 3-2b and 3-2d of Reference 2.

The calculable average relative percent differences (RPDs) for all metallic analytes in the low concentration matrix samples, except for total aluminum, were within Program DQOs. The calculable RPDs for all metallic analytes in the medium concentration matrix samples were within the DQOs. RPDs were not calculated for about two-thirds of the metal analytes because the concentrations of many of the metals in the field samples used for the RPD determination were less than the CRDL and thus were not required, or in some cases, not possible to be calculated.

Required analyses were performed on all metals samples submitted to the laboratory.

No metal contamination was reported in the laboratory blanks. Dissolved zinc was found in field blank MQO942 and portable venturi pump blank MQO965. Total zinc was found in pump blank MQO965 and field blank MQO969. Dissolved chromium was found in equipment blank MQO962 and field blank MQO969. Dissolved lead was found in equipment blank MQO962 and pump blank MQO965. Total lead was found in pump blank MQO965. Total iron was found in pump blank MQO965. All of these total and dissolved metals were found at concentrations above their CRDLs. These metals and their concentrations and CRDLs are listed in Section 3.1.4 of Reference 2 as well as in the appropriate Sections below.

1.3 Furnace Metals

The quality control for the graphite furnace metals (antimony, arsenic, cadmium, lead, selenium, and thallium) was generally acceptable.

All three dissolved antimony spike recoveries from the low concentration matrix samples were above DQO with values of 214, 250, and 214 percent. Due to the reproducability of these results, there may have been problems with the preparation of the antimony spike solution. This had no effect on the dissolved antimony data quality as none was detected in any samples. All total and dissolved antimony results for low concentration matrix samples should be considered quantitative. Dissolved antimony duplicate injection precision for medium concentration matrix sample MQO956 was outside DQO. Dissolved antimony results for this sample should be considered semi-quantitative. For medium concentration samples, all total antimony results and dissolved antimony results for sample MQO955 should be considered quantitative.

Duplicate injection precision for total arsenic in medium concentration matrix sample MQO955 was outside DQO. The sample was reanalyzed a second time and the duplicate injection precision was not calculable. Based upon these results, it was not possible to determine if arsenic was present in this sample. High levels of dissolved solids may have caused the problems. Arsenic results for this sample should not be used. Method of standard addition (MSA) analysis should have been run on dissolved arsenic for low concentration matrix sample MQO953. Results for this sample should be considered qualitative. The MSA correlation coefficient for total arsenic in sample MQO949 was below control limits. Arsenic results for this sample should be considered qualitative. The matrix spike recovery of dissolved arsenic from low concentration matrix sample MQO945 was 72 percent which is below DQO. This was considered insignificant as the other two arsenic spike recoveries, as well as the average spike recovery, were all within DQO limits. No reason for this was given. Field duplicate precision for total arsenic in duplicate pair

MQO945/946 was poor. See Note (1) at the end of this Report for a discussion of why field precision results are not used in the determination of data quality. Total and dissolved arsenic results, with exceptions, in the low concentration matrix samples should be considered quantitative. The dissolved arsenic results for the medium concentration matrix samples should also be considered quantitative. Total arsenic results for medium concentration matrix sample MQO956 should be considered quantitative. Total arsenic results for sample MQO949 and dissolved arsenic results for sample MQO953, both low concentration matrix samples, should be considered qualitative. Total arsenic results for medium concentration matrix sample MQO955 should not be used.

The dissolved cadmium matrix spike recovery for low concentration matrix sample MQO963 was above DQO with a value of 128 percent. This was considered insignificant as the other two dissolved cadmium spike recoveries, as well as the average spike recovery, were all within DQO limits. MSA analysis should have been run on total cadmium for medium concentration matrix sample MQO956. These problems were judged not to affect ovelall data quality and all cadmium results should be considered quantitative.

The total and dissolved lead spike recoveries from the medium concentration matrix spiked samples (total lead MQO956 and dissolved lead MQO955) and one dissolved lead spike recovery from one of the three low concentration matrix spiked samples (MQO963) were outside DQO with values of 41, 48, and 154 percent, respectively. The high spike recovery for the low concentration matrix result was considered insignificant as the other two low concentration matrix dissolved lead spike recoveries, as well as the average spike recovery, were all within DQO limits. Dissolved lead contamination was found in equipment blank MQO962 at a concentration of 744 ug/L (CRDL equals 5 ug/L). Total and dissolved lead were also found in pump blank MQO965 at 8.4 and 136 ug/L, respectively. Due to this contamination, dissolved lead results for samples MQO971 and 973 and total lead results for sample MQO968 (all three are underdrain samples) should not be used. See Note (2) at the end of this Report for a discussion of how blank contamination affects sample results. The correlation coefficient for the MSA analysis of total lead in samples MQO944, 948, 950, 957, 965, and 968 and dissolved lead in samples MQO965 and 971 was outside of DQO. Total lead results for samples MQO944, 948, 950, 957, 965, and 968 and dissolved lead results for sample MQO971 should not be used. Dissolved lead results for sample MQO965 should be considered qualitative. Total, with an exception, and dissolved low, with exceptions, concentration matrix lead results should be considered quantitative. Total and dissolved lead results for the medium concentration matrix samples and dissolved lead results for low concentration matrix sample MQO965 should be considered qualitative. Total lead results for medium concentration matrix sample MQO955 and low concentration matrix samples MQO944, 948, 950, 957, 965, and 968 and dissolved lead results for low concentration matrix samples MQO971 and 973 should not be used.

The total and dissolved selenium spike recoveries from the medium concentration matrix spiked samples (total selenium MQO956 and dissolved selenium MQO955) and one dissolved selenium spike recovery from one of the three low concentration matrix spiked samples (MQO945) were outside DQO with values of 762, 23, and 73 percent, respectively. The low spike recovery for the low concentration matrix result was considered insignificant as the other two low concentration matrix dissolved selenium spike recoveries, as well as the average spike recovery, were all within DQO limits. The dissolved selenium analytical spike recovery for medium concentration matrix samples MQO955 and 956 were below control limits with values of 23 and 7 percent, respectively. Selenium results for these samples should be considered to be biased very low and should not be used. All other selenium results should be considered quantitative. Field duplicate precision for total selenium in duplicate pair MQO977/978 was poor. See Note (1) at the end of this Report for a discussion of why field precision results are not used in the determination of data quality.

The total thallium spike recovery from the medium concentration matrix spiked sample (MQO956) and one dissolved thallium spike recovery from one of the three low concentration matrix spiked samples (MQO977) were outside DQO with values of 36 and 131 percent. The high spike recovery for the low concentration matrix result was considered insignificant as the other two low concentration matrix dissolved thallium spike recoveries, as well as the average spike recovery, were all within DQO limits. All thallium results, with one exception, should be considered quantitative. Total thallium results for the medium concentration matrix samples should be considered to be qualitative.

The usability of all total and dissolved graphite furnace analytes is summarized in Sections 4.0 and 4.1 at the end of this Report.

1.4 ICP Metals

Total zinc contamination was found in the portable venturi pump blank (MQO965) and a field blank (MQO969) at concentrations of 53 and 51 ug/L, respectively. Dissolved zinc contamination was found in the pump blank (MQO965) and a field blank (MQO942) at concentrations of 30 ug/L, each. The CRDL for zinc is 20 ug/L. Due to this contamination, total zinc results for samples MQO940, 941, 943, 944, 946, 950, 954, 955, 957, 963, 966, 968, 973, 974, 975, and 977 and the dissolved zinc results for samples MQO943, 944, 945, 946, 947, 948, 949, 951, 953, 954, 955, 956, 957, 959, 967, 971, 973, and 975 should be considered unusable. The remaining low concentration matrix total and dissolved zinc results should be considered quantitative. Dissolved chromium contamination was found in an equipment blank (MQO962) and a field blank (MQO969) at concentrations of 18 and 27 ug/L, respectively. The CRDL for chromium is 10 ug/L. In spite of this contamination, dissolved chromium results for samples MQO970, 971, 977, and 978 should be considered quantitative. The remaining dissolved chromium results should be considered unusable as they are within a factor of five of the highest level of blank contamination. Total iron contamination was found in the portable venturi pump blank (MQO965) at a concentration of 246 ug/L. The CRDL for iron is 200 ug/L. The usability of iron results were not affected by this portable venturi pump contamination and all total iron results should be considered quantitative. Note (2) at the end of this Report contains a discussion of how blank contamination affects sample results.

The low level (twice CRDL) linear range check for total and dissolved chromium, copper, and zinc and dissolved nickel and silver exhibited poor recoveries on various analysis dates (see Section B5 of Reference 3 for inorganics for a detailed listing). The low level linear range check is an analysis of a solution with elemental concentrations near the detection limit. The range check analysis shows the accuracy and recovery which can be expected by the method for results near the detection limits. The relatively poorer accuracy reported for these metals is not unexpected. The recoveries of these metals from the range check solutions determine the biases in the results which are listed below. Total chromium and copper results for samples MQO940 through 954, 957 through 960, and 962 through 964 should be considered to be biased low by approximately 30 to 40 percent. Total chromium results for samples MQO965 and 978 should be considered to be biased low by approximately 60 percent. Total copper results for samples MQO955 and 956 should be considered to be biased low by approximately 30 percent. Total copper was not recovered from samples MQO965 and 978 therefore results for these samples should be considered unreliable. Dissolved chromium and copper results for all samples except MQO955, 956, 961, 963, and 975 should be considered to be biased low by approximately 30 percent. Dissolved chromium results for sample MQO963 should be considered to be biased high by approximately 30 percent. Dissolved copper results for samples MQO955, 956, 963, and 975 should be considered to be biased low by approximately 30 percent. Total zinc results for samples MQO965 and 978 should be considered to be biased low by approximately 45 percent. Dissolved zinc results for sample MQO963 should be considered to be biased low by approximately 25 percent. Dissolved silver results for sample MQO963 should be considered to be biased low by approximately 35 percent. Dissolved nickel results for samples MQO955, 956, and 975 should be considered to be biased low by approximately 10 percent.

Individual matrix spike recoveries, for samples which were designated as low concentration by the sampling team, were outside DQO for dissolved iron in sample MQO963 with 69 percent recovery and for dissolved manganese in sample MQO977 with 74 percent recovery. These results were judged to have no impact on the data quality as they represented only one of three matrix spikes for each metal. Total beryllium, cobalt, nickel, and zinc matrix spike recoveries in medium concentration matrix sample MQO955 were below DQO with recoveries of 72, 70, 70, and 62 percent, respectively. Results for these four total metals in the medium concentration matrix samples should be considered to be biased low and semi-quantitative.

The serial dilution results were greater than 10 percent different from the original determination (outside DQO) for total barium, iron, and manganese in medium concentration matrix sample MQO955 and for dissolved iron, magnesium, manganese, and sodium in low concentration matrix sample MQO963. Poor serial dilution results can be an indication of physical interferences, such as high solids loading of the samples, in the analyses. Such interferences usually yield results with a negative bias and thus a low recovery. Results for these metals in the specified samples should be considered semi-quantitative.

Laboratory duplicate results for total aluminum in low concentration matrix sample MQO945 was outside DQO. This result caused no impact on the aluminum results as it represented only one of three duplicates.

The field duplicate precision for total and dissolved iron in duplicate pair (MQO945/946) was poor with RPDs of 25 and 23 percent, respectively. The field duplicate precision for total zinc in medium concentration matrix duplicate pair (MQO955/956) was poor with 49 ug/L reported in the first sample and no total zinc reported in the other sample. See Note (1) at the end of this Report for a discussion of why field precision results are not used in the determination of data quality.

Usability of all total and dissolved ICP metal analytes is summarized in Sections 4.2 and 4.3 at the end of this Report.

1.5 Mercury

One of three individual matrix spike recoveries was outside DQO for total mercury in low concentration matrix sample MQO977 with 60 recovery. This was considered insignificant as the other mercury matrix spike recoveries were within DQO limits. All mercury results should be considered quantitative.

2.0 Inorganic and Indicator Analytes

2.1 Performance Evaluation Standard

Inorganic and indicator analyte performance evaluation standards were not evaluated in conjunction with the samples collected from this facility.

2.2 Inorganic and Indicator Analyte QC Evaluation

The average spike recoveries of all of the inorganic and indicator analytes, except for chloride in the medium concentration matrix sample were within the accuracy DQOs (accuracy DQOs have not been established for bromide and nitrite nitrogen matrix spikes). The chloride spike recovery (only one sample spiked) was 87 percent in the medium concentration matrix sample The bromide and nitrite nitrogen average spike recoveries were 98 and 100 percent in the low concentration matrix samples and 112 and 118 percent in the medium concentration matrix sample.

Average RPDs for all inorganic and indicator analytes were within Program DQOs. The RPDs were not calculated if either one or both of the duplicate values were less than the CRDL. Precision DQOs have not been established for bromide and nitrite nitrogen.

Requested analyses were performed on all samples for the inorganic and indicator analytes. The ion chromatography (IC) sample bottle for sample MQO950 was not received by the laboratory.

No laboratory blank contamination was reported for any inorganic or indicator analyte. Sampling blank contamination involving POX, TOX, and/or total phenols was found in one or more of the sampling blanks at levels above CRDL. These contaminants and their concentrations are listed below, as well as in Section 3.2.4 (page 3-3) of Reference 2.

2.3 Inorganic and Indicator Analyte Data

All results for bromide, chloride, sulfate, cyanide, ammonia nitrogen, and TOC should be considered quantitative with an acceptable probability of false negatives.

The matrix spike recovery for nitrite nitrogen from the medium concentration matrix spiked sample was above DQO with a value of 118 percent. This was not judged to have a significant impact on the quality of the data. The holding times for the nitrate and nitrite nitrogen analyses ranged from 3 to 15 days from receipt of samples which is longer than the recommended 48 hour holding time for unpreserved samples. Nitrate and nitrite nitrogen results for samples MQO940, 943, 945 through 949, 951 through 959, 963, 964, 966, 968, and 969 should be considered semi-quantitative. All other nitrate and nitrite nitrogen results should be considered to be quantitative. The laboratory received no ion chromatography (IC) sample MQO950, therefore, there were no nitrate and nitrite nitrogen results for this sample.

The matrix spike recovery of chloride from one of three low concentration matrix spiked samples was above DQO with a value of 115 percent. This was not judged to have a significant impact on the quality of the data as the other two chloride matrix spike recoveries were within DQO limits. Two of the three sets of chloride field duplicates (low concentration matrix duplicate pair MQO977/978 and medium concentration matrix duplicate pair MQO955/956) had large RPDs of 19 and 24 percent. See Note (1) at the end of this Report for a discussion of why field precision results are not used in the determination of data quality. All chloride results should be considered quantitative. The laboratory received no ion chromatography (IC) sample MQO950, therefore, there were no chloride results for this sample.

All bromide results should be considered quantitative. The laboratory received no ion chromatography (IC) sample MQO950, therefore, there were no bromide results for this sample.

Two of the three sets of sulfate field duplicates (low concentration matrix duplicate pair MQO945/946 and medium concentration matrix duplicate pair MQO955/956) had excessive RPDs of 27 and 22 percent. See Note (1) at the end of this Report for a discussion of why field precision results are not used in the determination of data quality. All sulfate results should be considered quantitative. The laboratory received no ion chromatography (IC) sample MQO950, therefore, there were no bromide results for this sample.

The trip blank and both of the equipment blanks contained total phenols contamination at levels of 13, 13, and 17 ug/L which are greater than the total phenols CRDL of 10 ug/L. Due to this blank contamination (see Note (2) at the end of this Report for further explanation), total phenols results for samples MQO941, 943, 945 through 951, 954, 957, 958, 960, 968, 975, 977, and 978 should be considered unusable. All other total phenols results should be considered quantitative.

Calibration verification standards for POC were not analyzed. A POC spike solution was run during the analytical batch but the "true" value of the spike was not provided by the laboratory. EPA needs to supply the inorganic laboratory with a POC calibration verification solution. Until then, the instrument calibration can not be assessed. One of three low concentration POC laboratory duplicates was outside DQO with an RPD of 11 percent. This was not judged to affect overall POC data quality as results for the other laboratory duplicates were acceptable. One of three sets of field duplicates (medium concentration matrix duplicate pair MQO955/956) showed poor precision with an RPD of 11 percent. See Note (1) at the end of this Report for a discussion of why field precision results are not used in the determination of data quality. POC holding times ranged from 9 to 12 days. Although the EMSL/Las Vegas data reviewers recommend a seven day holding time, the laboratory has been

::e that a 14 day holding time is
:ered qualitative.

·oratory duplicates was outside DQO
.dged to affect overall TOX data
..plicates were acceptable. Both
pump blank, and the bottle blank
, 18, 18, and 6.6 ug/L which are
to the blank contamination (see Note
samples MQO977 and 978 should be
.mples MQO941, 943, 944, 950
.gh 975 should not be used. TOX
.tions of chloride above 500 mg/L
ave enhanced the TOX results for
.ered quantitative except for
.nsidered qualitative and samples
.., 968, 971, and 973 through 975

.ed POX contamination at a level of
. of 5 ug/L. Due to this blank
Report) POX results for samples
.e POX holding times ranged from 5
.a reviewers recommend a seven day
.ed by the EPA Sample Management
.le. The POX results should be
.MQO975, 977 and 978 which should not

.rds were not evaluated in conjunction
.y.

cept 1,1-dichloroethene, were
.cy. Individual matrix spike
DQO will be discussed in the
.ke average recoveries were within
. acid fraction of the semivolatiles
. samples. Surrogate spike
DQO will be discussed in the

.. average RPDs were within Program
. RPDs which were outside the
.priate Sections below. All average
precision.

.quested.

Laboratory blank contamination was reported for organics and is discussed in Reference 3 (for organics) as well as the appropriate Sections below.

Detection limits for the organic fractions are summarized in Reference 3 (for organics) as well as the appropriate Sections below.

3.3 Volatiles

Quality control data indicate that volatile organics were determined acceptably. The chromatograms appear acceptable. Initial and continuing calibrations, tunings and mass calibrations, matrix spikes and matrix spike duplicates (with an exception), surrogate spikes, and holding times were acceptable. Some laboratory blank contamination was reported.

The 1,1-dichloroethene matrix spike and matrix spike duplicate recoveries for samples QO963 and 977 were in the range of 160 to 176 percent, which is above the DQO range of 61 to 145 percent for 1,1-dichloroethene. As 1,1-dichloroethene was only detected in sample QO960 at a concentration of 10 ug/L, this value should be considered qualitative and biased high.

Estimated method detection limits were CRDL for all samples except QO960 (2 times CRDL), QO956 (333 times CRDL), and QO955 (417 times CRDL). Dilution of these samples was required due to high concentrations of organics. The high dilutions of samples QO955 and 956 may results in false negatives.

Six laboratory blanks contained methylene chloride. Three laboratory blanks contained acetone, and one laboratory blank contained total xylenes. These common laboratory contaminants were present at levels in the vicinity of the CRDL. Acetone results for sample QO957 and methylene chloride results for samples QO951, 952, 957, 958, 961, 962, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, and 978 should not be used due to this laboratory blank contamination. Methylene chloride results for samples QO956, 960, 963, 965, and 966 should be considered qualitative due to the blank contamination. According to contract procedures, VOA instrument blank CD861122A12 was unacceptable because total xylenes contamination (8.1 ug/L) above the CRDL (5 ug/L) was detected. The blank was not rerun as no samples contained this compound. There was no impact on the data.

The volatiles data are acceptable. The volatile compound results should be considered quantitative with the exceptions mentioned above for acetone and methylene chloride. False negatives for the medium concentration matrix samples (QO955 and 956) should be considered a possibility due to large sample dilutions. The probability of false negative results for all other compounds in all low concentration samples is acceptable.

3.4 Semivolatiles

Initial and continuing calibrations and chromatograms were acceptable for the semivolatiles. In some instances, problems were encountered with tunings and mass calibrations, blanks, matrix spikes and matrix spike duplicates, surrogate spike recoveries, and holding times.

The estimated detection limits for the semivolatiles were approximately twice the CRDL.

The matrix spike (MS) and/or matrix spike duplicate (MSD) recoveries of pyrene from samples QO963MS and 977MSD were above the DQO range of 26 to 127 percent with values of 130 percent each. The matrix spike (MS) and/or matrix spike duplicate (MSD) recoveries of pentachlorophenol from samples QO945MS and MSD and 2-chlorophenol from sample QO977MSD were below their DQO ranges of 9 to 103 and 27 to 123 percent with values of 6, 4, and 23 percent, respectively. The RPD between the MS and MSD for pentachlorophenol in sample pair QO945MS/MSD and phenol in sample pair QO977MS/MSD exceeded the DQO limit.

One or more of the phenol-D5, 2-fluorophenol, and 2,4,6-tribromophenol (acid) surrogate spikes in samples QO945, 951, 953, 953RE (reanalysis), 954, 954RE, 955, 955RE, 956, 956RE, 960, 966, 971, 971RE, 972, 975, 975RE, 977, 978, and 978RE were either not recovered or their recovery was below the DQO range. The terphenyl-D14 surrogate spike recoveries from samples QO939, 960, and 963MS (matrix spike sample analysis) were above the DQO range with recoveries of 158, 147, and 146 percent, respectively. A systematic error may have caused the high recovery of the terphenyl-D14 surrogate spike in these three samples.

One of the semivolatile instrument blanks contained an unknown contaminant at a concentration of 11 ug/L. The list of semivolatile tentatively identified compounds was not submitted for samples QO943 and 977.

The semivolatile holding time for sample QO971 was exceeded by three days. This did not affect data quality for this sample.

The semivolatile data are acceptable and the results should be considered quantitative for all samples with exceptions. All semivolatile acid fraction results for samples QO945, 951, 960, 966, 972, 977, and 978 should be considered semi-quantitative due to poor surrogate recoveries. All semivolatile base/neutral fraction results for samples QO939 and 960 should also be considered semi-quantitative due to poor surrogate recoveries. The acid fraction results for samples QO953, 954, 955, 956, 971, and 975 and the reanalysis of all of these samples should be considered unreliable due to the lack of surrogate recovery data. Results for sample QO971 should be considered unreliable because of the lack of surrogate data and the absence of a tune prior to analysis. The probability of false negatives for all samples, with the exception of the acid fraction results for the samples mentioned above is acceptable.

3.5 Pesticides

The initial and continuing calibrations, blanks, matrix spike/matrix spike duplicates, surrogate spikes, holding times, and chromatography for pesticides were acceptable.

The estimated pesticide method detection limits were approximately CRDL for all samples. The probability of false negative results for all samples is acceptable.

Non-pesticide contamination was present in samples QO952 (packs 03 and 07), QO966, 971, and 973 (pack 03).

4.3 Dissolved ICP Metals

Quantitative:	all aluminum, barium, beryllium, calcium, cobalt, copper, nickel, potassium, silver, and vanadium results for both matrices; all iron, magnesium, manganese, and sodium results for the medium concentration matrix samples; all zinc results with exceptions; chromium results for low concentration samples MQO970, 971, 977, and 978
Semi-quantitative:	all low concentration matrix results for iron, magnesium, manganese, and sodium
Unusable:	all medium concentration matrix zinc results; low concentration matrix zinc results for samples MQO943 through 949, 951, 953, 954, 957, 959, 967, 971, 973, and 975; all chromium results with exceptions

4.4 Mercury

Quantitative:	all mercury results

4.5 Inorganic and Indicator Analytes

Quantitative:	all bromide, chloride, sulfate, cyanide, ammonia nitrogen, and TOC results; nitrate nitrogen, nitrite nitrogen, total phenols, TOX, and POX results with exceptions listed below
Semi-quantitative:	nitrate and nitrite nitrogen results for samples MQO940, 943, 945 through 949, 951 through 959, 964, 966, 968, and 969; POX results for samples MQO939, 960, 961, 963, 965, 966, 967, 969, and 970 through 978
Qualitative:	all POC results; TOX results for samples MQO977 and 978
Unusable:	total phenols results for samples MQO941, 943, 945 through 951, 954, 957, 958, 960, 968, 975, 977, and 978; TOX results for samples MQO941, 943, 944, 950 through 953, 958, 960, 968, 971, and 973 through 975; POX results for samples MQO975, 977, and 978

4.6 Organics

Quantitative:	all volatile and pesticide results; semivolatile results with exceptions
Semi-quantitative:	semivolatile acid fraction results for samples QO945, 951, 960, 966, 972, 977, 977MSD, and 978; semivolatile base/neutral fraction results for samples QO039 and 960
Qualitative:	acetone (volatile) results for sample QO957 and methylene chloride results for samples QO956, 960, 963, 966, and 965
Unreliable:	semivolatile acid fraction results for samples QO953, 954, 955, 956, 971, and 975 and the reanalyses of these samples; all semivolatile results for sample QO971
Unusable:	methylene chloride (volatile) results for samples QO951, 952, 957, 958, 961, 962, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, and 978

The pesticides results should be considered quantitative with an acceptable probability of false negatives.

<u>Notes:</u>

(1) The comparative precision of field duplicate results is not used in the evaluation of sample results. It is not possible to determine the source of this imprecision. This poor precision may be reflective of sample to sample variation rather than actual sampling variations. Thus, field duplicate precision is reported for informational purposes only.

(2) Blank contamination is judged to have the following affect on sample results <u>for the contaminant only</u>. All negative sample results and positive sample results greater than ten times the concentration of the highest blank concentration (for the contaminant) should be considered quantitative unless there are other data quality problems. All positive sample results greater than five but less than ten times the concentration of the highest blank concentration should be considered qualitative. All positive sample results less than five times the highest blank concentration should be considered unusable. The detection limit for the contaminant should be considered to be raised to five times the level of the highest blank contamination. Other data quality problems may further reduce the quality of these determinations.

III. Data Usability Summary

4.0 Total Graphite Furnace Metals

Quantitative:	all antimony, cadmium, selenium, and thallium low concentration matrix results; arsenic and lead low concentration matrix results with exceptions; all antimony, cadmium, and selenium medium concentration matrix results; arsenic medium concentration matrix results for sample MQO956
Qualitative:	lead and thallium medium concentration matrix results; arsenic low concentration matrix results for sample MQO949
Unusable:	arsenic medium concentration matrix results for sample MQO955; lead low concentration matrix results for samples MQO944, 948, 950, 957, 965, and 968

4.1 Dissolved Graphite Furnace Metals

Quantitative:	all antimony, cadmium, selenium, and thallium low concentration matrix results; arsenic and lead low concentation matrix results with exceptions; all arsenic, cadmium, and thallium medium concentration matrix results; antimony medium concentration results for sample MQO955
Semi-quantitative:	antimony medium concentration matrix results for sample MQO956
Qualitative:	all lead medium concentration matrix results; arsenic low concentration matrix results for sample MQO953; lead low concentration matrix results for sample MQO965
Unusable:	all selenium results for medium concentration matrix samples; lead results for low concentration matrix samples MQO971 and 973

4.2 Total ICP Metals

Quantitative:	all aluminum, calcium, chromium, copper, iron, magnesium, potassium, silver, sodium, and vanadium results for both matrices; manganese and zinc results for both matrices with exceptions
Semi-quantitative:	all barium, beryllium, cobalt, nickel, iron, and manganese medium concentration matrix results
Unusable:	zinc results for medium concentration sample MQO955; zinc results for low concentration samples MQO940, 941, 943, 944, 946, 950, 954, 957, 963, 966, 968, 973 through 975, and 977

4.3 Dissolved ICP Metals

Quantitative:	all aluminum, barium, beryllium, calcium, cobalt, copper, nickel, potassium, silver, and vanadium results for both matrices; all iron, magnesium, manganese, and sodium results for the medium concentration matrix samples; all zinc results with exceptions; chromium results for low concentration samples MQO970, 971, 977, and 978
Semi-quantitative:	all low concentration matrix results for iron, magnesium, manganese, and sodium
Unusable:	all medium concentration matrix zinc results; low concentration matrix zinc results for samples MQO943 through 949, 951, 953, 954, 957, 959, 967, 971, 973, and 975; all chromium results with exceptions

4.4 Mercury

Quantitative:	all mercury results

4.5 Inorganic and Indicator Analytes

Quantitative:	all bromide, chloride, sulfate, cyanide, ammonia nitrogen, and TOC results; nitrate nitrogen, nitrite nitrogen, total phenols, TOX, and POX results with exceptions listed below
Semi-quantitative:	nitrate and nitrite nitrogen results for samples MQO940, 943, 945 through 949, 951 through 959, 964, 966, 968, and 969; POX results for samples MQO939, 960, 961, 963, 965, 966, 967, 969, and 970 through 978
Qualitative:	all POC results; TOX results for samples MQO977 and 978
Unusable:	total phenols results for samples MQO941, 943, 945 through 951, 954, 957, 958, 960, 968, 975, 977, and 978; TOX results for samples MQO941, 943, 944, 950 through 953, 958, 960, 968, 971, and 973 through 975; POX results for samples MQO975, 977, and 978

4.6 Organics

Quantitative:	all volatile and pesticide results; semivolatile results with exceptions
Semi-quantitative:	semivolatile acid fraction results for samples QO945, 951, 960, 966, 972, 977, 977MSD, and 978; semivolatile base/neutral fraction results for samples QO039 and 960
Qualitative:	acetone (volatile) results for sample QO957 and methylene chloride results for samples QO956, 960, 963, 966, and 965
Unreliable:	semivolatile acid fraction results for samples QO953, 954, 955, 956, 971, and 975 and the reanalyses of these samples; all semivolatile results for sample QO971
Unusable:	methylene chloride (volatile) results for samples QO951, 952, 957, 958, 961, 962, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, and 978

IV. *References*

1. Organic Analyses: CompuChem Laboratories, Inc.
P.O. Box 12652
3308 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709
(919) 549-8263

Inorganic and Indicator Analyses:
Centec Laboratories
P.O. Box 956
2160 Industrial Drive
Salem, VA 24153
(703) 387-3995

2. Draft Quality Control Data Evaluation Report (Assessment of the Usability of the Data Generated) for site 58, CECOS, Ohio, 2/3/1987, Prepared by Lockheed Engineering and Management Services Company, Inc., for the US EPA Hazardous Waste Ground-Water Task Force.

3. Draft Inorganic Data Usability Audit Report and Draft Organic Data Usability Report, for the CECOS, Ohio facility, Prepared by Laboratory Performance Monitoring Group, Lockheed Engineering and Management Services Co., Las Vegas, Nevada, for US EPA, EMSL/Las Vegas, 2/13/1987.

APPENDIX C

Analytical Results of Task Force Sampling

CECOS Landfill

Location	Initial In Situ Field Parameters				Final In Situ Field Parameters				Meters*
	temp.	pH	Sp Cond.**	Date/Time	temp.	pH	Sp Cond.**	Date/Time	
MP220AR	12°C	6.6	1095 umhos	11-13/0933	11.0°C	7.0	1034 umhos	11-13/1112	1,3
MP249B	13°C	6.5	1576 umhos	11-13/1433	10.3°C	6.7	2943 umhos	11-13/	1,3
MP208	11.8°C	6.7	1625 umhos	11-14/1030	11°C	6.7	1638 umhos	11-14/1139	1,3
MP229B	11.8°C	6.8	1139 umhos	11-14/1420	11.8°C	6.8	1136 umhos	11-14	1,3
MP219A	13.4°C	6.7	1000 umhos	11-13/0930	14.0°C	7.0	950 umhos	11-13/1100	2,4
MP256A	9.0°C	7.6	1100 umhos	11-13/1417	11.8°C	7.4	900 umhos	11-14/1100	2,4
M41	12.4°C	7.3	650 umhos	11-13/1622	13.2°C	7.3	650 umhos	11-13/1718	2,4
MP215BR	11.7°C	7.0	950 umhos	11-14/1303	11.0°C	6.9	1000 umhos	11-14/1400	2,4
MP227	11.0°C	10.9	1050 umhos	11-14/1604	12.4°C	10.9	1000 umhos	11-17/1000	2,4 1st 2,3 2nd
M3	14.1°C	7.1	1263 umhos	11-17/1235	13.5°C	7.2	1153 umhos	11-17/	1,4
M26	13.5°C	6.9	meter not operating	11-17/1225	13.7°C	6.8	561 umhos	11-17/1319	1,3
MP248B	13.3°C	6.7	2071 umhos	11-17/1610	12.8°C	6.6	2527 umhos	11-17/1726	1,3
MP206	14.9°C	6.6	1050 umhos	11-18/0912	13.4°C	6.7	1000 umhos	11-18/1025	2,3
MP222B	14.7°C	6.7	>50000 umhos (off scale)	/0947	14.7°C	6.0	>50000 umhos (off scale)	11-18/1120	1,4
	(end 1st sample event)								
MP244AR	14.7°C	7.1	825 umhos	11-18/1225					2,3
MP253A	14.0°C	6.8	700 umhos	11-18/1507	13.3°C	6.8	750 umhos	11-18/1632	2,3
MP246	13.4°C	6.8	1413 umhos	11-19/0900	12.7°C	6.9	850 umhos	11-19/1239	1,4/ 2,3
MP261A	13.7°C	7.0		11-18/					4
MP222R	13.6°C	7.7	771 umhos	11-19/	12.8°C	7.9	856 umhos	11-19/	1,4
MP261	12.8°C	7.3	750 umhos	11-19/	11.9°C	7.3	800 umhos	11-19/1654	2,3

* 1-YSI Cond Meter 10855 2-Cole Parmer Cond Meter #1273 3-pH Cole Parmer #433290 4-pH Cole Parmer #433251.

CECOS Landfill (Continued)

Location	Initial In Situ Field Parameters				Final In Situ Field Parameters				
	temp.	pH	Sp Cond.**	Date/Time	temp.	pH	Sp Cond.**	Date/Time	Meters*
MP200R	14.5°C	6.4	900 umhos	11-20/0947	13.9°C	6.5	800 umhos	11-20/104	2,3
U-24	----	---	---------	----------	10.9°C	6.6	1779 umhos	11-20/1149	1,4
U-22	----	---	---------	----------	----	---	----------	----------	----
MP232A	12.1°C	6.7	850 umhos	11-20/1446	12.4°C	6.8	900 umhos	11-20/1505	2,3
Seep at Cell II	----	---	---------	----------	7.2°C	7.5	1000 umhos	11-21/1304	2,3
U-17	----	---	---------	----------	----	---	----------	----------	----
U-13	14.5°C	6.9	1626 umhos	11-21/	14.0°C	6.9		11-21/	1,4
U-4	----	---	---------	----------	10.3°C	6.6	1529 umhos	11-21/	1,4
MP217A	12.0°C	6.7	900 umhos (at 1623)	11-21/1517	13.0°C	6.8	900 umhos	11-21/1625	2,3
U-12	----	---	---------	----------	11.1°C	6.6	1317 umhos	11-21/	1,4

** Actual units are in umhos/cm.

SUMMARY OF CONCENTRATIONS FOR COMPOUNDS FOUND
IN GROUND-WATER AND SAMPLING
BLANK SAMPLES AT SITE 58, CECOS, OH

The following table lists the concentrations for compounds analyzed for and found in samples at the site. Table A2-1 is generated by listing all compounds detected and all tentatively identified compounds reported on the organic Form I, Part B. All tentatively identified compounds with a spectral purity greater than 850 are identified by name and purity in the table. Those with a purity of less than 850 are labeled, unknown.

Sample numbers are designated by the inorganic and corresponding organic sample number. Inorganic sample numbers are preceded by the prefix "MQO" organic sample numbers are preceded by the prefix "QO."

Samples Q0955 and Q0956 were re-extracted and reanalyzed for BNAs. The TICs detected in the reanalyses of these samples are not reported in the following table.

TABLE KEY

A value without a flag indicates a result above the contract required detection limit (CRDL).

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicated the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero. If the limit of detection is 10 μg and a concentration of 3 μg is calculated, then report as 3J.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

GW = ground-water
SW = surface-water
low and medium are indicators of concentration.

The pesticides results should be considered quantitative with an acceptable probability of false negatives.

Notes:

(1) The comparative precision of field duplicate results is not used in the evaluation of sample results. It is not possible to determine the source of this imprecision. This poor precision may be reflective of sample to sample variation rather than actual sampling variations. Thus, field duplicate precision is reported for informational purposes only.

(2) Blank contamination is judged to have the following affect on sample results for the contaminant only. All negative sample results and positive sample results greater than ten times the concentration of the highest blank concentration (for the contaminant) should be considered quantitative unless there are other data quality problems. All positive sample results greater than five but less than ten times the concentration of the highest blank concentration should be considered qualitative. All positive sample results less than five times the highest blank concentration should be considered unusable. The detection limit for the contaminant should be considered to be raised to five times the level of the highest blank contamination. Other data quality problems may further reduce the quality of these determinations.

ASE NO: 6553/SAS/1944HQ

MPLE NO:		N00939/D0939	N00942/D0942	N00962/D0962	N00965/D0965	N00969/D0969	N00972/D0972
MPLE LOCATION:		TRIP BLANK	FIELD BLANK	EQUIP. BLANK	PUMP BLANK	FIELD BLANK	BOTTLE BLANK
MPLE TYPE:		GW-LOW	@ MP22D	GW-LOW	GW-LOW	@ FIRE POND	GW-LOW
JA	ACETONE						
	BENZENE						
	2-BUTANONE						
	CHLOROETHANE						
	1,1-DICHLOROETHANE						
	1,2-DICHLOROETHANE						
	1,1-DICHLOROETHENE						
	METHYLENE CHLORIDE	49		11 B	31 B	14 B	15 B
	TETRACHLOROETHENE						
	TOLUENE						
	TRANS-1,2-DICHLOROETHENE						
	TRICHLOROETHENE						
	VINYL CHLORIDE						
EMI-VOA	BIS(2-ETHYLHEXYL)PHTHALATE						
	BENZYL ALCOHOL						
	BENZOIC ACID						
	1,4-DICHLOROBENZENE						
	DI-N-OCTYLPHTHALATE						
	PHENOL						
PEST/PCB	NO HITS						
TIC-VOA-PT	METHANE, DICHLOROFLUORO						
	1-BUTANOL						
	2-PROPANOL						
TIC-SEMI-VOA	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANE,1,2-BIS(2-CHLOROETHOXY)						
	HEXANOIC ACID						
	HEXANOIC ACID						
	2,4-PENTADIOL, 2-METHYL						
	PHENOL, 3-(1,1-DIMETHYLETHYL)						
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN				19 J	9 J	45 J
	UNKNOWN						24 J
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						

ITE: 58 CECOS, OH
A.. NO: 6553/SAS/1944HQ

AMPLE NO:		MD0939/D0939	MD0942/D0942	MD0962/D0962	MD0965/D0965	MD0969/D0969	MD0972/D0972
AMPLE LOCATION:		TRIP BLANK	FIELD BLANK	EQUIP. BLANK	PUMP BLANK	FIELD BLANK	BOTTLE BLANK
AMPLE TYPE:		GW-LOW	@ MP220	GW-LOW	GW-LOW	@ FIRE POND	GW-LOW
OTAL	ALUMINUM					107	
ETALS	ANTIMONY						
	ARSENIC						
	BARIUM					5	
	BERYLLIUM						
	CADMIUM						
	CALCIUM	91	440	87	1200	204	118
	CHROMIUM						
	COBALT						
	COPPER						
	IRON			52	246	30	
	LEAD				8.4		
	MAGNESIUM		159			88	
	MANGANESE						
	MERCURY						
	NICKEL						
	POTASSIUM						
	SELENIUM						
	SILVER						
	SODIUM	423	511	468	530	935	464
	THALLIUM						
	VANADIUM						
	ZINC				53	51	
IS.	ALUMINUM				141		
ETALS	ANTIMONY						
	ARSENIC						
	BARIUM		22		16		
	BERYLLIUM						
	CADMIUM						
	CALCIUM		145	131	1580	95	104
	CHROMIUM			18	10	27	
	COBALT	9			15	44	
	COPPER						
	IRON						
	LEAD			744	136		
	MAGNESIUM	90					
	MANGANESE						
	MERCURY						
	NICKEL				39		
	POTASSIUM		552	690	1800	1870	
	SELENIUM						
	SILVER						
	SODIUM	252	499	655	1750	263	374

CASE NO: [illegible]

		M00939/D0939	M00942/D0942	M00943/D0943	M00945/D0945	M00948/D0948	M00972/D0972
SAMPLE LOCATION:		TRIP BLANK	FIELD BLANK	EQUIP. BLANK	PUMP BLANK	FIELD BLANK	BOTTLE BLANK
SAMPLE TYPE:		GW-LOW	@ MP220	GW-LOW	GW-LOW	@ FIRE POND	GW-LOW
	THALLIUM						
	VANADIUM						
	ZINC		30		30		
INORG.	AMMONIA NITROGEN						
INDIC.	BROMIDE						
	CHLORIDE						
	CYANIDE						
	NITRATE NITROGEN						
	NITRITE NITROGEN						
	POC						
	POX	5			30		
	SULFATE						
	TOC						
	TOTAL PHENOLS	13		13			NR
	TOX			9.9	18		6.6

SITE: 59 CECOS, OH
CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		M00976/Q0976	M00945/Q0945	M00946/Q0946	M00955/Q0955	M00956/Q0956	M00977/Q0977
SAMPLE LOCATION:		EQUIP. BLANK	WELL MP249B	WELL MP249B	WELL MP222B	WELL MP222B	WELL U-4
SAMPLE TYPE:		GW-LOW	GW-LOW DUP	GW-LOW DUP	GW-MED DUP	GW-MED DUP	GW-LOW DUP
VOA	ACETONE				66000	74000 B	
	BENZENE						
	2-BUTANONE						
	CHLOROETHANE						4.1 J
	1,1-DICHLOROETHANE						28
	1,2-DICHLOROETHANE					1800	
	1,1-DICHLOROETHENE						
	METHYLENE CHLORIDE	10 B			5200	5000 B	5.2 B
	TETRACHLOROETHENE						
	TOLUENE						
	TRANS-1,2-DICHLOROETHENE						120
	TRICHLOROETHENE						38
	VINYL CHLORIDE						
SEMI-	BIS(2-ETHYLHEXYL)PHTHALATE				RERERERE	REREREPE	
VOA	BENZYL ALCOHOL				24/24	22/21	
	BENZOIC ACID				130/150	150/150	
	1,4-DICHLOROBENZENE						
	DI-N-OCTYLPHTHALATE						
	PHENOL	2.2 J				9.8 J	
PEST/	NO HITS						
PCB							
TIC-	METHANE, DICHLOROFLUORO						
VOA-PT	1-BUTANOL					PUR 966 4000J	
	2-PROPANOL					PUR 891 450J	
TIC-	ETHANOL, CHLOROETHOXY SUBST.				PUR 865 240 J	PUR 938 73 J	
SEMI-	ETHANOL, CHLOROETHOXY SUBST.				PUR 929 40 J	PUR 866 270 J	
VOA	ETHANOL, CHLOROETHOXY SUBST.				PUR 956 270 J	PUR 949 210 J	
	ETHANE,1,2-BIS(2-CHLOROETHOXY)				PUR 879 24 J		
	HEXANOIC ACID				PUR 919 25 J		
	HEXANOIC ACID				PUR 921 68 J		
	2,4-PENTADIOL, 2-METHYL				PUR 954 340 J	PUR 953 370 J	
	PHENOL, 3-(1,1-DIMETHYLETHYL)						
	UNKNOWN CARBOXYLIC ACID				PUR 898 200 J	2900 J	
	UNKNOWN CARBOXYLIC ACID				200 J	180 J	
	UNKNOWN	47 J	15 J	15 J	44 J	25 J	
	UNKNOWN				2700 J	94 J	
	UNKNOWN				58 J	150 J	
	UNKNOWN				70 J	80 J	
	UNKNOWN				220 J	250 J	
	UNKNOWN				73 J	190 J	
	UNKNOWN				44 J	130 J	
	UNKNOWN				79 J	24 J	
	UNKNOWN				55 J	41 J	
	UNKNOWN				3200 J	74 J	
	UNKNOWN				48 J	49 J	
	UNKNOWN					24 J	
	UNKNOWN					3000 J	
	UNKNOWN					50 J	

ALL CONCENTRATIONS ARE IN µg/l

[illegible]
CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		N00976/Q0976	N00945/Q0945	N00946/Q0946	N00955/Q0955	N00956/Q0956	N00977/Q0977
SAMPLE LOCATION:		EQUIP. BLANK	WELL MP249B	WELL MP249B	WELL MP222B	WELL MP222B	WELL U-4
SAMPLE TYPE:		GW-LOW	GW-LOW DUP	GW-LOW DUP	GW-MED DUP	GW-MED DUP	GW-LOW DUP
TOTAL	ALUMINUM	156	333	274	620	819	291
METALS	ANTIMONY						
	ARSENIC		11.9				31.2
	BARIUM		12	10	1140	1120	48
	BERYLLIUM						
	CADMIUM						
	CALCIUM	103	396000	348000	4170000	4160000	205000
	CHROMIUM		13	20	89	100	10
	COBALT			9	52	58	15
	COPPER				24	19	
	IRON		4820	3760	31100	30700	10900
	LEAD						
	MAGNESIUM		192000	168000	1820000	1820000	86200
	MANGANESE		391	345	12400	13600	1500
	MERCURY						
	NICKEL			31	68	75	
	POTASSIUM		5020	4940	77400	80200	2540
	SELENIUM						
	SILVER					5	
	SODIUM	415	134000	111000	335000	364000	67400
	THALLIUM						
	VANADIUM				48	57	8
	ZINC			41	49		33
DIS.	ALUMINUM				400	366	
METALS	ANTIMONY						
	ARSENIC		17.9	12.9			32.8
	BARIUM		37	19	1320	1190	58
	BERYLLIUM						
	CADMIUM						
	CALCIUM		397000	394000	4400000	4380000	247000
	CHROMIUM		17	18	117	119	
	COBALT			9	54	55	
	COPPER						
	IRON		3850	3060	36200	34300	12500
	LEAD	130					
	MAGNESIUM		196000	197000	1930000	1920000	99500
	MANGANESE		369	394	14700	14000	1680
	MERCURY						
	NICKEL				44	56	
	POTASSIUM		5570	5450	70400	64200	3060
	SELENIUM						
	SILVER						
	SODIUM	234	115000	133000	373000	356000	92000

SITE: 58 CECOS, OH
CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		MQ0976/Q0976	MQ0945/Q0945	MQ0946/Q0946	MQ0955/Q0955	MQ0956/Q0956	MQ0977/Q0977
SAMPLE LOCATION:		EQUIP. BLANK	WELL MP249B	WELL MP249B	WELL MP222B	WELL MP222B	WELL I-4
SAMPLE TYPE:		GW-LOW	GW-LOW DUP	GW-LOW DUP	GW-MED DUP	GW-MED DUP	GW-LOW DUP
	THALLIUM						
	VANADIUM			13	33	36	
	ZINC		46	34	41	40	
INORG.	AMMONIA NITROGEN		300	400	9400000	9200000	
INDIC.	BROMIDE		120	140			590
	CHLORIDE		16000	14000	52000000	41000000	38000
	CYANIDE						
	NITRATE NITROGEN						
	NITRITE NITROGEN						
	POC				101000	113000	430
	POX				8360	8070	104
	SULFATE		1700000	1300000	400000	500000	450000
	TOC		1300	1500	1660000	1730000	3400
	TOTAL PHENOLS	17	10	18	650	600	40
	TOX	18			14600	14000	128

ALL CONCENTRATIONS ARE IN ug/l

CASE NO: 6553/SAS/1944HQ

		M00978/90978	M00940/90940	M00941/90941	M00943/90943	M00944/90944	M00947/90947
SAMPLE LOCATION:		WELL U-4	WELL MP219A	WELL MP220AR	WELL M41	WELL MP256A	WELL MP208
SAMPLE TYPE:		GW-LOW DUP	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
VOA	ACETONE						
	BENZENE						
	2-BUTANONE						
	CHLOROETHANE						
	1,1-DICHLOROETHANE	32					
	1,2-DICHLOROETHANE						
	1,1-DICHLOROETHENE						
	METHYLENE CHLORIDE	9.6 J				4.2 J	
	TETRACHLOROETHENE						
	TOLUENE						
	TRANS-1,2-DICHLOROETHENE	140					
	TRICHLOROETHENE	41					
	VINYL CHLORIDE						
SEMI-VOA	BIS(2-ETHYLHEXYL)PHTHALATE						
	BENZYL ALCOHOL						
	BENZOIC ACID						
	1,4-DICHLOROBENZENE						
	DI-N-OCTYLPHTHALATE						
	PHENOL						
PEST/PCB	NO HITS						
TIC-VOA-PT	METHANE, DICHLOROFLUORO			PUR 905 6 J			
	1-BUTANOL						
	2-PROPANOL						
TIC-SEMI-VOA	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANE,1,2-BIS(2-CHLOROETHOXY)						
	HEXANOIC ACID						
	HEXANOIC ACID						
	2,4-PENTADIOL, 2-METHYL						
	PHENOL, 3-(1,1-DIMETHYLETHYL)	PUR 909 15 J					
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN	49 J			54 J		7 J
	UNKNOWN	20 J					
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						

SITE: 58 CECOS, OH
ASE NO: 6553/SAS/1944HQ

SAMPLE NO:		H00978/Q0978	H00940/Q0940	H00941/Q0941	H00943/Q0943	H00944/Q0944	H00947/Q0947
SAMPLE LOCATION:		WELL U-4	WELL MP219A	WELL MP220AR	WELL M41	WELL MP256A	WELL MP208
SAMPLE TYPE:		GW-LOW DUP	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
TOTAL	ALUMINUM		157	433	400	2950	164
METALS	ANTIMONY		5.2				
	ARSENIC	34.2	27:3			69	
	BARIUM	48	76	63	79		44
	BERYLLIUM						
	CADMIUM						
	CALCIUM	200000	178000	139000	98100	163000	198000
	CHROMIUM	8				7	13
	COBALT	8					
	COPPER						
	IRON	10700	3480	806	627	6300	3910
	LEAD					5.6	
	MAGNESIUM	84800	83700	62100	38100	75600	93600
	MANGANESE	1490	191	400	446	337	213
	MERCURY						
	NICKEL						
	POTASSIUM	2350	3680	1900	890	10100	12300
	SELENIUM	5.1					
	SILVER						
	SODIUM	65800	53600	40000	22900	109000	63000
	THALLIUM						
	VANADIUM					8	9
	ZINC		46	27	42	37	
DIS.	ALUMINUM						
METALS	ANTIMONY						
	ARSENIC	36	35.9			3.4	12.3
	BARIUM	62	77	62	124	82	59
	BERYLLIUM						
	CADMIUM						
	CALCIUM	264000	199000	150000	105000	147000	236000
	CHROMIUM		20	23	57	15	27
	COBALT						
	COPPER						
	IRON	13900	2590				3770
	LEAD						
	MAGNESIUM	119000	93500	66400	41300	72500	109000
	MANGANESE	2010	208	452	519	227	232
	MERCURY						
	NICKEL		24		24	23	32
	POTASSIUM	3190	4310	2530	1630	11100	14700
	SELENIUM						
	SILVER						
	SODIUM	85700	576000	41100	25000	119000	70800

ALL CONCENTRATIONS ARE IN ug/l

CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		MQ0978/Q0978	MQ0940/Q0940	MQ0941/Q0941	MQ0943/Q0943	MQ0944/Q0944	MQ0947/Q0947
SAMPLE LOCATION:		WELL U-4	WELL MP219A	WELL MP220AF	WELL M41	WELL MP256A	WELL MP208
SAMPLE TYPE:		GW-LOW DUP	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
	THALLIUM						
	VANADIUM						
	ZINC				27	45	21
INORG.	AMMONIA NITROGEN	300	400			700	400
INDIC.	BROMIDE	590	270				120
	CHLORIDE	46000	30000	12000	34000	42000	11000
	CYANIDE						
	NITRATE NITROGEN		60			1210	
	NITRITE NITROGEN						
	POC	360	870	540	230		
	POX	92					
	SULFATE	400000	150000	150000	80000	470000	560000
	TOC	3200	2100		1900	2100	1400
	TOTAL PHENOLS	46		20	30		19
	TOX	137		62	9.4	6.5	

SITE: 58 CECOS, OH
CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		MQ0948/Q0948	MQ0949/Q0949	MQ0950/Q0950	MQ0951/Q0951	MQ0952/Q0952	MQ0953/Q0953
SAMPLE LOCATION:		WELL MP215BR	WELL MP229B	WELL MP227	WELL M3	WELL M26	WELL MP205
SAMPLE TYPE:		GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
VOA	ACETONE					13	
	BENZENE			1.1 J			
	2-BUTANONE						
	CHLOROETHANE						
	1,1-DICHLOROETHANE						
	1,2-DICHLOROETHANE						
	1,1-DICHLOROETHENE						
	METHYLENE CHLORIDE				4.5 JB	7.5 B	4.9 J
	TETRACHLOROETHENE						
	TOLUENE			2.4 J			
	TRANS-1,2-DICHLOROETHENE						
	TRICHLOROETHENE						
	VINYL CHLORIDE						
SEMI-VOA	BIS(2-ETHYLHEXYL)PHTHALATE			3.1 J			2.6 J
	BENZYL ALCOHOL						
	BENZOIC ACID						
	1,4-DICHLOROBENZENE						
	DI-N-OCTYLPHTHALATE						
	PHENOL			3.3 J			
PEST/PCB	NO HITS						
TIC-VOA-PT	METHANE, DICHLOROFLUORO						
	1-BUTANOL						
	2-PROPANOL						
TIC-SEMI-VOA	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANE,1,2-BIS(2-CHLOROETHOXY)						
	HEXANOIC ACID						
	HEXANOIC ACID						
	2,4-PENTADIOL, 2-METHYL						
	PHENOL, 3-(1,1-DIMETHYLETHYL)						
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN				19 J	53 J	
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						

CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		MQ0948/Q0948	MQ0949/Q0949	MQ0950/Q0950	MQ0951/Q0951	MQ0952/Q0952	MQ0953/Q0953
SAMPLE LOCATION:		WELL MP215BR	WELL MP229B	WELL MP227	WELL M3	WELL M26	WELL MP206
SAMPLE TYPE:		GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
TOTAL	ALUMINUM	256	245	8440	192	156	208
METALS	ANTIMONY			7.6			
	ARSENIC		10.4				3
	BARIUM	64	29	193	124	98	43
	BERYLLIUM						
	CADMIUM						
	CALCIUM	167000	122000	154000	152000	84000	238000
	CHROMIUM			8			
	COBALT	9	12				
	COPPER						
	IRON	4100	2050	14900	20600	3090	2250
	LEAD	6.6		14.7			
	MAGNESIUM	79900	52900	22900	69200	32000	68200
	MANGANESE	40	124	292	480	37	1090
	MERCURY						
	NICKEL						28
	POTASSIUM	2630	2130	10400	1170	5010	13300
	SELENIUM						
	SILVER						
	SODIUM	57300	60800	57000	23800	8980	88500
	THALLIUM						
	VANADIUM			14			
	ZINC			64			
DIS.	ALUMINUM			489			
METALS	ANTIMONY						
	ARSENIC	5.1	12				
	BARIUM	35	46	160	111	86	65
	BERYLLIUM						
	CADMIUM			1			
	CALCIUM	190000	139000	97100	158000	44900	253000
	CHROMIUM	29	24	11	21	22	33
	COBALT			21	8		
	COPPER						
	IRON	3820	1540		10500		2010
	LEAD						
	MAGNESIUM	93900	58200		72800	30800	78000
	MANGANESE	38	129		513		1250
	MERCURY						
	NICKEL		29		50		29
	POTASSIUM	3580	3170	10600	1990	5990	16600
	SELENIUM						
	SILVER						
	SODIUM	67400	69700	64500	24500	8760	102000

SITE: 58 CECOS, OH
ASE NO: 6553/SAS/1944HQ

SAMPLE NO:		MQ0948/Q0948	MQ0949/Q0949	MQ0950/Q0950	MQ0951/Q0951	MQ0952/Q0952	MQ0953/Q0953
SAMPLE LOCATION:		WELL MP215BR	WELL MP229R	WELL MP227	WELL M3	WELL M26	WELL MP206
SAMPLE TYPE:		GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
	THALLIUM						
	VANADIUM						
	ZINC	65	21		70		24
INORG.	AMMONIA NITROGEN	1400	400	1500			1400
INDIC.	BROMIDE	150	150	NR	600		120
	CHLORIDE	21000	22000	NR	61000	7000	22000
	CYANIDE			NR			
	NITRATE NITROGEN			NR			
	NITRITE NITROGEN			NR			
	POC						650
	POX						
	SULFATE	410000	260000	NR	210000	29000	410000
	TOC	1800	1200	2300	2400	1900	2100
	TOTAL PHENOLS	17	14	22	15		
	TOX			28	9.9	20	7.2

SE NO: 6553/SAS/1944HQ

MPLE NO:		MQ00954/Q0954	MQ00957/Q0957	MQ00958/Q0958	MQ00959/Q0959	MQ00960/Q0960	MQ00961/Q0961
MPLE LOCATION:		WELL MP248B	WELL MP244AR	WELL MP222P	WELL MP253A	WELL MP246	WELL MP261A
MPLE TYPE:		GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
A	ACETONE		100 B	270			
	BENZENE						
	2-BUTANONE						
	CHLOROETHANE						
	1,1-DICHLOROETHANE						
	1,2-DICHLOROETHANE					60	
	1,1-DICHLOROETHENE					10 J	
	METHYLENE CHLORIDE		2.7 JB	3 J		30	4.2 JB
	TETRACHLOROETHENE					290	
	TOLUENE						
	TRANS-1,2-DICHLOROETHENE						
	TRICHLOROETHENE					13	
	VINYL CHLORIDE					38	
EMI-A	BIS(2-ETHYLHEXYL)PHTHALATE	8.8 J		5.6 J			
	BENZYL ALCOHOL						
	BENZOIC ACID						
	1,4-DICHLOROBENZENE						
	DI-N-OCTYLPHTHALATE			5 J			
	PHENOL						
EST/CB	NO HITS						
IC-OA-PT	METHANE, DICHLOROFLUORO						
	1-BUTANOL						
	2-PROPANOL						
TIC-SEMI-VOA	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANE,1,2-BIS(2-CHLOROETHOXY)						
	HEXANOIC ACID						
	HEXANOIC ACID						
	2,4-PENTADIOL, 2-METHYL						
	PHENOL, 3-(1,1-DIMETHYLETHYL)						
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN	12 J	14 J			33 J	14 J
	UNKNOWN	20 J					25 J
	UNKNOWN	11 J					
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						

SITE: 56 CECOS, OH
CASE NO: 6553/SAS/1944HQ

SAMPLE NO: SAMPLE LOCATION: SAMPLE TYPE:		MQ0954/Q0954 WELL MP248B GW-LOW	MQ0957/Q0957 WELL MP244AF GW-LOW	MQ0958/Q0958 WELL MP222R GW-LOW	MQ0959/Q0959 WELL MP253A GW-LOW	MQ0960/Q0960 WELL MP246 GW-LOW	MQ0961/Q0961 WELL MP261A GW-LOW
TOTAL METALS	ALUMINUM	8510	3010	191	236	183	NO ALIQUOT
	ANTIMONY						NO ALIQUOT
	ARSENIC	19.5	3.2				NO ALIQUOT
	BARIUM	169	76	43	136	115	NO ALIQUOT
	BERYLLIUM						NO ALIQUOT
	CADMIUM						NO ALIQUOT
	CALCIUM	311000	80100	48900	126000	147000	NO ALIQUOT
	CHROMIUM	42	17				NO ALIQUOT
	COBALT	17		8			NO ALIQUOT
	COPPER	33					NO ALIQUOT
	IRON	28400	6180	709	273	246	NO ALIQUOT
	LEAD	19.4	15.5				NO ALIQUOT
	MAGNESIUM	136000	37700	32500	51100	68000	NO ALIQUOT
	MANGANESE	1670	221	96	335	81	NO ALIQUOT
	MERCURY						NO ALIQUOT
	NICKEL	72		29			NO ALIQUOT
	POTASSIUM	10500	8440	4940	1480		NO ALIQUOT
	SELENIUM			15	2.6	5.5	NO ALIQUOT
	SILVER						NO ALIQUOT
	SODIUM	68600	153000	89200	31600	40200	NO ALIQUOT
	THALLIUM						NO ALIQUOT
	VANADIUM	35	8				NO ALIQUOT
	ZINC	209	51				NO ALIQUOT
DIS. METALS	ALUMINUM						NO ALIQUOT
	ANTIMONY						NO ALIQUOT
	ARSENIC	4.1	6.8				NO ALIQUOT
	BARIUM	149	78	54	164	67	NO ALIQUOT
	BERYLLIUM						NO ALIQUOT
	CADMIUM				1.2		NO ALIQUOT
	CALCIUM	233000	91400	60600	139000	67700	NO ALIQUOT
	CHROMIUM	34	14	22	24	22	NO ALIQUOT
	COBALT	10				14	NO ALIQUOT
	COPPER						NO ALIQUOT
	IRON	1360			33		NO ALIQUOT
	LEAD						NO ALIQUOT
	MAGNESIUM	103000	45700	41200	57200	98700	NO ALIQUOT
	MANGANESE	1160	321	108	382		NO ALIQUOT
	MERCURY						NO ALIQUOT
	NICKEL	29		32	33		NO ALIQUOT
	POTASSIUM	8800	8510	8200	2410	5650	NO ALIQUOT
	SELENIUM						NO ALIQUOT
	SILVER	5					NO ALIQUOT
	SODIUM	59900	115000	119000	33700	59600	NO ALIQUOT

SE NO: 6553/SAS/1944HQ

MPLE NO: MPLE LOCATION: MPLE TYPE:	MQ0954/90954 WELL MP248B GW-LOW	MQ0957/90957 WELL MP244AP GW-LOW	MQ0958/90958 WELL MP222R GW-LOW	MQ0959/90959 WELL MP253A GW-LOW	MQ0960/90960 WELL MP246 GW-LOW	MQ0961/90961 WELL MP261A GW-LOW
THALLIUM						NO ALIQUOT
VANADIUM			11			NO ALIQUOT
ZINC	51	25		28		NO ALIQUOT
ORG. AMMONIA NITROGEN	13000	200	1200		200	NR
NIC. BROMIDE	2800		750		120	NR
CHLORIDE	410000	13000	58000	8600	22000	NR
CYANIDE						NR
NITRATE NITROGEN		190				NR
NITRITE NITROGEN						NR
POC	8300				160	
POX					349	
SULFATE	440000	140000	160000	130000	330000	NR
TOC	16000	1900	2100	1600	1200	NR
TOTAL PHENOLS	20	23	21		16	NR
TOX	247		9.4	24	53	NR

SITE: 58 CECOS, OH
CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		MQ0963/Q0963	MQ0964/Q0964	MQ0966/Q0966	MQ0967/Q0967	MQ0968/Q0968	MQ0970/Q0970
SAMPLE LOCATION:		WELL MP200P	WELL MP261	WELLU-24	WELL MP232A	WELL U-22	SEEP @WELL 11
SAMPLE TYPE:		GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
VOA	ACETONE		13				
	BENZENE						
	2-BUTANONE						
	CHLOROETHANE						
	1,1-DICHLOROETHANE						
	1,2-DICHLOROETHANE						
	1,1-DICHLOROETHENE						
	METHYLENE CHLORIDE	22 B		24 B	4.4 JB	4.8 J	6.2 B
	TETRACHLOROETHENE						
	TOLUENE						
	TRANS-1,2-DICHLOROETHENE						
	TRICHLOROETHENE						
	VINYL CHLORIDE	17					
SEMI-VOA	BIS(2-ETHYLHEXYL)PHTHALATE						
	BENZYL ALCOHOL						
	BENZOIC ACID						
	1,4-DICHLOROBENZENE						
	DI-N-OCTYLPHTHALATE						
	PHENOL						
PEST/PCB	NO HITS						
TIC-VOA-PT	METHANE, DICHLOROFLUORO						
	1-BUTANOL						
	2-PROPANOL						
TIC-SEMI-VOA	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANOL, CHLOROETHOXY SUBST.						
	ETHANE,1,2-BIS(2-CHLOROETHOXY)						
	HEXANOIC ACID						
	HEXANOIC ACID						
	2,4-PENTADIOL, 2-METHYL						
	PHENOL, 3-(1,1-DIMETHYLETHYL)						
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN CARBOXYLIC ACID						
	UNKNOWN			32 J		13 J	
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						
	UNKNOWN						

ITE: 58 CECOS- OH
ASE NO: 6553/SAS/1944HQ

MPLE NO:		MQ0963/Q0963	MQ0964/Q0964	MQ0966/Q0966	MQ0967/Q0967	MQ0968/Q0968	MQ0970/Q0970
AMPLE LOCATION:		WELL MP200R	WELL MP261	WELLU-24	WELL MP232A	WELL U-22	SEEP @WELL 11
MPLE TYPE:		GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
TAL	ALUMINUM	121		786	113	1290	374
TALS	ANTIMONY						
	ARSENIC	12.3			22	6	3.7
	BARIUM	46	45	77	38	116	37
	BERYLLIUM						
	CADMIUM						
	CALCIUM	164000	68000	225000	129000	82800	165000
	CHROMIUM			20	10	12	
	COBALT			17	8	20	11
	COPPER						
	IRON	6430	920	10200	2440	2860	1440
	LEAD					6.1	
	MAGNESIUM	62300	38300	102000	55200	21900	66900
	MANGANESE	212	37	1390	124	484	113
	MERCURY						
	NICKEL						
	POTASSIUM	7060	5060	13800	1540	8000	1600
	SELENIUM			12.2		7.6	
	SILVER						
	SODIUM	44200	108000	95400	51900	14800	62600
	THALLIUM						
	VANADIUM				8		
	ZINC	36		79		67	
DIS.	ALUMINUM		106	97	174	94	
METALS	ANTIMONY						
	ARSENIC	11.7	3	4.6	21.7		7.1
	BARIUM	82	53	94	93	124	61
	BERYLLIUM						
	CADMIUM						
	CALCIUM	189000	78200	280000	158000	87400	190000
	CHROMIUM	9	17	33	33	29	
	COBALT	7	8	19	27	22	
	COPPER						
	IRON	5750	874	10400	2230	421	
	LEAD						
	MAGNESIUM	73400	43600	135000	73500	24000	78300
	MANGANESE	239	36	1760	166	501	117
	MERCURY						
	NICKEL	24					
	POTASSIUM	8570	7500	19700	4070	11900	2300
	SELENIUM						
	SILVER						
	SODIUM	49800	135000	132000	70600	17800	76500

SITE: 58 CECOS· OH
CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		MQ0963/Q0963	MQ0964/Q0964	MQ0966/Q0966	MQ0967/Q0967	MQ0968/Q0968	MQ0970/Q0970
SAMPLE LOCATION:		WELL MP200R	WELL MP261	WELLU-24	WELL MP232A	WELL U-22	SEEP @WELL 11
SAMPLE TYPE:		GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW	GW-LOW
	THALLIUM						
	VANADIUM				8		
	ZINC				27		
INORG.	AMMONIA NITROGEN	300	700	800		400	200
INDIC.	BROMIDE	400	710	400	220	100	200
	CHLORIDE	33000	97000	53000	25000	9600	30000
	CYANIDE						
	NITRATE NITROGEN						
	NITRITE NITROGEN					700	
	POC	4800					
	POX	11		8			
	SULFATE	160000	120000	490000	220000	170000	350000
	TOC	2500	1000	4700	2000	5000	1600
	TOTAL PHENOLS					22	
	TOX	7.6	5.8	12		7.9	

	MPLE NO:	MQ0971/Q0971	MQ0973/Q0973	MQ0974/Q0974	MQ0975/Q0975
	MPLE LOCATION:	WELL U-13	WELL U-17	WELL MP217A	WELL U-12
	AMPLE TYPE:	GW-LOW	GW-LOW	GW-LOW	GW-LOW
VOA	ACETONE				
	BENZENE				2.1 J
	2-BUTANONE				65
	CHLOROETHANE				
	1,1-DICHLOROETHANE				3.1 J
	1,2-DICHLOROETHANE				
	1,1-DICHLOROETHENE				
	METHYLENE CHLORIDE	8.8 B	12 B	12 B	9.9 B
	TETRACHLOROETHENE				
	TOLUENE				
	TRANS-1,2-DICHLOROETHENE				140
	TRICHLOROETHENE				4.9 J
	VINYL CHLORIDE				35
SEMI-VOA	BIS(2-ETHYLHEXYL)PHTHALATE				
	BENZYL ALCOHOL				
	BENZOIC ACID				
	1,4-DICHLOROBENZENE				
	DI-N-OCTYLPHTHALATE				
	PHENOL				
PEST/PCB	NO HITS				
TIC-VOA-PT	METHANE, DICHLOROFLUORO				PUR 968 8 J
	1-BUTANOL				
	2-PROPANOL				
TIC-SEMI-VOA	ETHANOL, CHLOROETHOXY SUBST.				
	ETHANOL, CHLOROETHOXY SUBST.				
	ETHANOL, CHLOROETHOXY SUBST.				
	ETHANE,1,2-BIS(2-CHLOROETHOXY)				
	HEXANOIC ACID				
	HEXANOIC ACID				
	2,4-PENTADIOL, 2-METHYL				
	PHENOL, 3-(1,1-DIMETHYLETHYL)				
	UNKNOWN CARBOXYLIC ACID				
	UNKNOWN CARBOXYLIC ACID				
	UNKNOWN	22 J	49 J	28 J	43 J
	UNKNOWN	11 J	70 J		46 J
	UNKNOWN	16 J			17 J
	UNKNOWN				
	UNKNOWN				
	UNKNOWN				
	UNKNOWN				
	UNKNOWN				
	UNKNOWN				
	UNKNOWN				
	UNKNOWN				
	UNKNOWN				
	UNKNOWN				
	UNKNOWN				

SITE: 58 CECOS, OH
CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		MQ0971/Q0971	MQ0973/Q0973	MQ0974/Q0974	MQ0975/Q0975
SAMPLE LOCATION:		WELL U-13	WELL U-17	WELL MP217A	WELL U-12
SAMPLE TYPE:		GW-LOW	GW-LOW	GW-LOW	GW-LOW
TOTAL METALS	ALUMINUM	128	136	223	1020
	ANTIMONY				
	ARSENIC	10.6		13.9	
	BARIUM	217	14	49	42
	BERYLLIUM				
	CADMIUM				
	CALCIUM	187000	470000	182000	360000
	CHROMIUM		17	11	17
	COBALT	11	22	8	24
	COPPER				18
	IRON	4540	5300	3090	19600
	LEAD				
	MAGNESIUM	74900	138000	85200	134000
	MANGANESE	1680	1580	317	2490
	MERCURY				
	NICKEL		30		
	POTASSIUM	3460	12900	4640	16700
	SELENIUM	10.5	22.9		
	SILVER				
	SODIUM	50800	104000	62500	96300
	THALLIUM				
	VANADIUM				9
	ZINC		57	36	113
DIS. METALS	ALUMINUM				
	ANTIMONY				
	ARSENIC	26		19.7	6.1
	BARIUM	23	27	76	254
	BERYLLIUM				
	CADMIUM				
	CALCIUM	345000	533000	202000	211000
	CHROMIUM		6	10	7
	COBALT	10	13		18
	COPPER				
	IRON	1040	6410	2550	5120
	LEAD	12.9	17.8		
	MAGNESIUM	131000	177000	96900	84100
	MANGANESE	2330	1990	355	1910
	MERCURY				
	NICKEL				
	POTASSIUM	14900	14200	5190	4030
	SELENIUM				
	SILVER				
	SODIUM	90300	128000	68600	55600

[illegible]
CASE NO: 6553/SAS/1944HQ

SAMPLE NO:		MQ0971/Q0971	MQ0973/Q0973	MQ0974/Q0974	MQ0975/Q0975
SAMPLE LOCATION:		WELL U-13	WELL U-17	WELL MP217A	WELL U-12
SAMPLE TYPE:		GW-LOW	GW-LOW	GW-LOW	GW-LOW
	THALLIUM				
	VANADIUM				[illegible]
	ZINC	69	71		39
INORG.	AMMONIA NITROGEN	300	900	900	
INDIC.	BROMIDE	300	590	180	330
	CHLORIDE	36000	74000	20000	28000
	CYANIDE				
	NITRATE NITROGEN	340	90		
	NITRITE NITROGEN				
	POC		120		2300
	POX				90
	SULFATE	1250000	1300000	410000	130000
	TOC	2100	3500	1800	1900
	TOTAL PHENOLS				17
	TOX	6	19	11	63

APPENDIX D

Task Force Sampling Parameters

SAMPLING PARAMETERS

Field Parameters

pH

Specific conductance

Temperature

Turbidity

Other Parameters

TOC	METHOD	9060
TOX	METHOD	9020
Chloride	METHOD	9252
Total phenols	METHOD	9066
Sulfate	METHOD	9036 or 9038
Nitrate	METHOD	9200
Ammonia	"Methods for Chemical Analysis of Water and Waste" USEPA - EMSL (Cincinnati, 3/83, Method 350.1 or 350.3	
POX	EPA 600/4-84-008	
POC	Ground Water, vol. 22, p. 18-23, 1984	
Dissolved metals	Total metals, and	
Cyanide	IFB-WA 84-T092	

Appendix VIII METALS

METHOD 6010

Aluminum
Barium
Beryllium
Boron
Cadmium
Chromium
Iron
Lead
Nickel
Thallium
Vanadium
Zinc

Selenium*
Arsenic*

*These elements are not approved for 6010 but they are approved for CLP metals ICP method. The CLP metals ICP method is identical to the SW-846/6010.

Method 7470

Mercury

Sample Number
0C347

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: CompuChem
Lab Sample ID No: CN089905A18
Sample matrix: liquid
Data Release
Authorized By: ______

Case: 6016SAS1
QC Report No: ______
Contract No: 68-01-7263
Date Sample
Received: 06-11-86

Volatile Compounds
Concentration: low
Date extracted/prepared: 06-17-86
Date analyzed: 06-17-86
Conc/Dil Factor: 1.00 pH: N/A
Percent moisture (not decanted): N/A

CAS Number		ug/l		CAS Number		ug/l	
74-87-3	Chloromethane	10.	U	10061-02-6	trans-1,3-Dichloropropene	5.0	U
74-83-9	Bromomethane	10.	U	79-01-6	Trichloroethene	5.0	U
75-01-4	Vinyl Chloride	10.	U	124-48-1	Dibromochloromethane	5.0	U
75-00-3	Chloroethane	10.	U	79-00-5	1,1,2-Trichloroethane	5.0	U
75-09-2	Methylene Chloride	5.0	U	71-43-2	Benzene	5.0	U
67-64-1	Acetone	10.	U	10061-01-5	cis-1,3-Dichloropropene	5.0	U
75-15-0	Carbon Disulfide	5.0	U	110-75-8	2-Chloroethyl Vinyl Ether	10.	U
75-35-4	1,1-Dichloroethene	5.0	U	75-25-2	Bromoform	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U	108-10-1	4-Methyl-2-pentanone	10.	U
156-60-5	trans-1,2-Dichloroethene	5.0	U	591-78-6	2-Hexanone	10.	U
67-66-3	Chloroform	5.0	U	127-18-4	Tetrachloroethene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U	79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
78-93-3	2-Butanone	10.	U	108-88-3	Toluene	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U	108-90-7	Chlorobenzene	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U	100-41-4	Ethyl Benzene	5.0	U
108-05-4	Vinyl Acetate	10.	U	100-42-5	Styrene	5.0	U
75-27-4	Bromodichloromethane	5.0	U		Total Xylenes	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U				

DATA REPORTING QUALIFIERS

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit then report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicated the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J). If limit of detection is 10ug and a concentration of 3ug is calculated, then report as 3J.

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides >/= 10ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

oratory Name: [illegible]
6016SAS1

Sample Number
90378

Organics Analysis Data Sheet
(Page 2)

Semivolatile Compounds

ncentration: low
te extracted/prepared: 04-17-86
te analyzed: 04-19-86
nc/Dil Factor: 2.00
rcent moisture (decanted): N/A

GPC Cleanup: No
Separatory Funnel Extraction: Yes
Continuous Liquid - Liquid Extraction: No

CAS Number		ug/l		CAS Number		ug/l	
108-95-2	Phenol	20.	U	83-32-9	Acenaphthene	20.	U
111-44-4	bis(2-Chloroethyl) ether	20.	U	51-28-5	2,4-Dinitrophenol	100	U
95-57-8	2-Chlorophenol	20.	U	100-02-7	4-Nitrophenol	100	U
541-73-1	1,3-Dichlorobenzene	20.	U	132-64-9	Dibenzofuran	20.	U
106-46-7	1,4-Dichlorobenzene	20.	U	121-14-2	2,4-Dinitrotoluene	20.	U
100-51-6	Benzyl Alcohol	20.	U	606-20-2	2,6-Dinitrotoluene	20.	U
95-50-1	1,2-Dichlorobenzene	20.	U	84-66-2	Diethylphthalate	20.	U
95-48-7	2-Methylphenol	20.	U	7005-72-3	4-Chlorophenyl Phenyl ether	20.	U
39638-32-9	bis(2-Chloroisopropyl) ether	20.	U	86-73-7	Fluorene	20.	U
106-44-5	4-Methylphenol	20.	U	100-01-6	4-Nitroaniline	100	U
621-64-7	N-Nitroso-Dipropylamine	20.	U	534-52-1	4,6-Dinitro-2-methylphenol	100	U
67-72-1	Hexachloroethane	20.	U	86-30-6	N-nitrosodiphenylamine (1)	20.	U
98-95-3	Nitrobenzene	20.	U	101-55-3	4-Bromophenyl Phenyl ether	20.	U
78-59-1	Isophorone	20.	U	118-74-1	Hexachlorobenzene	20.	U
88-75-5	2-Nitrophenol	20.	U	87-86-5	Pentachlorophenol	100	U
105-67-9	2,4-Dimethylphenol	20.	U	85-01-8	Phenanthrene	20.	U
65-85-0	Benzoic Acid	100	U	120-12-7	Anthracene	20.	U
111-91-1	bis(2-Chloroethoxy) methane	20.	U	84-74-2	Di-n-butylphthalate	20.	U
120-83-2	2,4-Dichlorophenol	20.	U	206-44-0	Fluoranthene	20.	U
120-82-1	1,2,4-Trichlorobenzene	20.	U	129-00-0	Pyrene	20.	U
91-20-3	Naphthalene	20.	U	85-68-7	Butyl Benzyl Phthalate	20.	U
106-47-8	4-Chloroaniline	20.	U	91-94-1	3,3'-Dichlorobenzidine	40.	U
87-68-3	Hexachlorobutadiene	20.	U	56-55-3	Benzo(a)anthracene	20.	U
59-50-7	4-Chloro-3-methylphenol	20.	U	117-81-7	bis(2-ethylhexyl)phthalate	20.	U
91-57-6	2-Methylnaphthalene	20.	U	218-01-9	Chrysene	20.	U
77-47-4	Hexachlorocyclopentadiene	20.	U	117-84-0	Di-n-octyl Phthalate	20.	U
88-06-2	2,4,6-Trichlorophenol	20.	U	205-99-2	Benzo(b)fluoranthene	20.	U
95-95-4	2,4,5-Trichlorophenol	100	U	207-08-9	Benzo(k)fluoranthene	20.	U
91-58-7	2-Chloronaphthalene	20.	U	50-32-8	Benzo(a)pyrene	20.	U
88-74-4	2-Nitroaniline	100	U	193-39-5	Indeno(1,2,3-cd)pyrene	20.	U
131-11-3	Dimethyl Phthalate	20.	U	53-70-3	Dibenz(a,h)anthracene	20.	U
208-96-8	Acenaphthylene	20.	U	191-24-2	Benzo(g,h,i)perylene	20.	U
99-09-2	3-Nitroaniline	100	U				

(1) Cannot be separated from diphenylamine

Sample Number
Q0398

Organics Analysis Data Sheet
(Page 3)

Pesticide/PCBs

Concentration: [Low] Medium (Circle One)
Date Extracted/Prepared: ___06/14/86___________
Data Analyzed: _______________06/22/86___________
Conc/Dil Factor ____________ 1.00___________

CAS Number		[ug/l] or ug/Kg (Circle One)
319-84-6	Alpha - BHC	05 U
319-85-7	Beta - BHC	.05 U
319-86-8	Delta - BHC	.05 U
58-89-9	Gamma - BHC(Lindane)	05 U
76-44-8	Heptachlor	05 U
309-00-2	Aldrin	05 U
1024-57-3	Heptachlor Epoxide	05 U
959-98-8	Endosulfan I	05 U
60-57-1	Dieldrin	.10 U
72-55-9	4-4' - DDE	.10 U
72-20-8	Endrin	.10 U
33213-65-9	Endosulfan II	.10 U
72-54-8	4-4' - DDD	.10 U
1031-07-8	Endosulfan Sulfate	.10 U
50-29-3	4-4' - DDT	.10 U
72-43-5	Methoxychlor	.50 U
53494-70-5	Endrin Ketone	.10 U
57-74-9	Chlordane	.50 U
8001-35-2	Toxaphene	1.0 U
12674-11-2	Aroclor - 1016	.50 U
11104-28-2	Aroclor - 1221	.50 U
11141-16-5	Aroclor - 1232	.50 U
53469-21-9	Aroclor - 1242	.50 U
12672-29-6	Aroclor - 1248	.50 U
11097-69-1	Aroclor - 1254	1.0 U
11096-82-5	Aroclor - 1260	1.0 U

V(i) = Volume of extract injected (ul)
V(s) = Volume of water extracted (ml)
W(s) = Weight of sample extracted (g)
V(t) = Volume of total extract (ul)

(s) _ 1000.00_ or W(s) ___________ V(t) _10000.00_ V(i) _ 5.0_

Form 1

APPENDIX E

History of Waste Treatment, Storage, and Disposal Units

CECOS INTERNATIONAL

TO: Scott Thomas
USEPA Region V Hazardous Waste Ground Water Task Force

FROM: Mark Monroe/Gary Saylor/John Stirnkorb

SUBJECT: Site Design - Construction - of all inactive and active disposal cells at the permitted Aber Road Facility

DATE: November 14, 1986

The following is a summary of our joint on-site meeting Tuesday, November 11, 1986, to discuss the history of design, construction, use, and closure of each secure chemical management facility (SCMF), the Solid Waste Sanitary Landfill, fire ponds, the spray irrigation system and the solidification basin.

Attendees at the joint on-site meeting were:

1. Joe Fredle, USEPA Region V
2. Scott Thomas, USEPA Region V
3. David Petrovski, USEPA Region V
4. Bruce Sypniewski, USEPA Region V
5. Stephen Mangion, USEPA
6. John Stirnkorb, CECOS
7. Gary Saylor, CECOS
8. Mark Monroe, CECOS
9. John Oneacre, BFI
10. Jim Veith, S & ME

<u>Secure Chemical Management Facility No. 1</u>

1. General Description

   a. Date of Construction:
      ° Construction began: 1977
      ° Construction completed: 1977

   b. Date of use: 1977

   c. Size of the disposal cell: 30' wide x 50' long x 18' deep

   d. Purpose: Disposal of "Industrial Waste" not suitable for sanitary landfill disposal.

e. East end of SCMF No. 1 cut out and extended into and made a part of SCMF No. 2.

2. Construction Performance Standard

a. Liner construction:

(1) Natural soil material --- no compaction on the bottom nor the sidewalls.

(2) No synthetic liner.

b. Detection Systems:

(1) TSCA --- none.

(2) Leak detection --- none.

c. Leachate Collection:

(1) Design --- no leachate collection system installed.

d. Subcell Layout:

(1) No subcells constructed within disposal cell no. 1.

(2) Disposal cell no. 1 was an open trench design.

e. Cap Closure Design:

(1) Compacted fill and 3' thick clay material graded to drain and seeded with fescue for erosion control.

3. Types of Waste Material Disposed within SCMF No. 1.

a. Permits:

(1) TSCA --- none.

(2) Pre RCRA.

b. Waste streams received and disposed:

(1) Paint sludge material contained within 55 gallon drums.

c. Reconfiguration:

(1) None.

4. No Dewatering Systems.

Secure Chemical Management Facility No. 2

1. General Description

a. Date of Construction:
- Construction began: 1977
- Construction completed: 1978

b. Date of use: 1978

c. Size of the disposal cell:
- 90' wide at the west end.
- 60' wide at the east end.
- 515' long
- 25' deep.

d. Purpose: Disposal of "Industrial Waste" not suitable for disposal in a sanitary landfill.

2. Construction Performance Standard

a. Liner construction:

(1) Natural soil material --- no compaction on the bottom nor on the sidewalls.

(2) No synthetic liner installed.

b. Detection System:

(1) TSCA --- none.

(2) Leak detection --- none.

c. Leachate Collection:

(1) Design --- No leachate collection system installed.

Two (2) 24" reinforced concrete standpipes installed within the disposal cell.

d. Subcell Layout:

(1) No subcells constructed within disposal cell no. 2.

(2) Disposal cell no. 2 was an open trench design.

e. Cap Closure Design.

5' of compacted clay graded to drain and seeded with fescue to control erosion.

Intermediate Landfill (Series of individual trenches)

1. General Description

a. Date of Construction
- Construction of the first of the series of individual trenches began in the fall of 1977.
- The last intermediate landfill trench was constructed in July 1979.

b. Date of Use: Fall of 1977 to 1979.

c. Estimated size of each intermediate landfill trench: 12' wide x 30' long x 25' deep.

d. Purpose: To dispose select/specific waste material within each individual intermediate landfill trench.

2. <u>Construction Performance Standard</u>

a. Liner Construction

(1) Natural soil material --- no compaction on the bottom or the sidewalls. Trenches excavated by a track excavator (back hoe) --- shear sidewalls.

(2) No synthetic liner installed.

b. Detection Systems

(1) TSCA --- none.

(2) Leak detection --- none.

c. Leachate Collection

(1) Design --- no leachate collection system installed.

d. Subcell layout --- none.

Individual trenches were excavated for each specific waste stream.

e. Cap Closure Design

Individual trenches were covered with 3' of compacted clay. The entire area was covered with 2' of soil material and seeded in 1979.

3. Types of waste material disposed within the Intermediate Landfill Trenches

a. Permits

(1) TSCA --- none.

(2) Pre RCRA.

b. Waste streams received and disposed:

- Bulk material --- i.e. phenol, cyanuric acid, asbestos, sludge, debris.

c. Reconfiguration --- none.

Solid Waste Sanitary Landfill

1. General Description

a. Date of Construction
° Contruction began: 1972
° Construction completed: 1982

b. Date of Use: 1972 to 1982.
We ceased disposal operations for the solid waste sanitary landfill in 1982. However, we renew our solid waste sanitary landfill permit each year with the Clermont County Health Department.

c. Estimated size of the sanitary landfill: 19 acres.

d. Purpose: Disposal of general household waste, landscape debris, construction debris, and uncontaminated packaging material and machine components.

2. Construction Performance Standard

a. Construction began in 1972. Initial construction of the sanitary landfill was an open trench method. In 1978 we began area fill disposal operation.

b. Liner Construction

(1) Natural soil material --- no compaction on the bottom or the sidewalls.
(2) No synthetic liner installed.

c. No leachate collection system installed. However, three leachate standpipes were installed in 1985 and we will be installing 3 additional leachate standpipes on the north side of the Sanitary Landfill in 1986.

d. Cap Closure Design

(1) A passive methane venting system was installed in 1981. We are planning to install a methane extraction system (passive) for the sanitary landfill at Aber Road March 1987.

(2) Two feet of cap (glacial till soil material compacted to at least 90 percent Modified Proctor Laboratory Moisture - Density, ATSM D 698) was reapplied in the fall of 1984 and spring of 1985.

3. Types of waste material disposed within the sanitary landfill.

a. Permit --- Ohio EPA permit to install (PTI) dated November 4, 1976.

RE: Clermont County, Jackson Township, application for expansion of the Clermont Environmental Reclamation, Inc., Landfill for disposal of various industrial waste liquids and sludges.

b. Waste streams received and disposed.

(1) Sanitary Solid Waste
(2) Household Waste
(3) Bio sludge from DuPont
(4) Water treatment sludge from GM Plant, Norwood
(5) Bio sludge from Proctor and Gamble (filter media non-hazardous).

Secure Chemical Management Facility No. 3

1. General Description

   a. Date of construction
      ° Construction began: 1978
      ° Construction completed: 1978

   b. Date of use: Early 1979 to Spring of 1981.

   c. Size of the disposal cell:

      300' wide x 300' long x 26' deep.

   d. Purpose: Disposal of Hazardous Waste Material.

   e. This disposal cell is the first cell at the Aber Road Facility to be authorized for "crowning" of the landfill. Refer to: Report on permit to install application and detail plans of proposed modifications to the Clermont Environmental Reclamation Company Landfill, an attachment, to the Ohio PTI dated November 12, 1980.

2. Construction Performance Standard

   a. Liner Construction

      (1) Recompacted bottom of the disposal cell with 5 feet of clay soil material.

      (2) 30 mil. nylon reinforced "Hypalon" liner was installed on the bottom and the sidewalls of the disposal cell and secured at the top of the cell by an anchor trench.

      (3) 2:1 side slopes non-recompacted soil material --- insitu material.

      (4) Two feet of soil buffer material was placed on top of the synthetic liner on the sidewalls and on the bottom.

   b. Detection Systems.

      (1) TSCA - 8 - 4" perforated PVC pipes installed under the recompacted soil liner.
      (2) Leak detection. No leak detection system installed within this disposal cell.

   c. Leachate Collection.

      (1) Design --- no leachate collection system installed.

      (2) Three 24" diameter precast concrete standpipes were installed.

d. Subcell Layout

(1) SCMF No. 3 was constructed with 3 subcells: Amphoteric, Heavy Metals and General. One (1) standpipe in each subcell.

e. Cap closure design

3' thick compacted soil layer. 20 mil. PVC synthetic liner attached to primary synthetic liner. 2½ feet thick root material placed on top of the primary synthetic liner. The slope of the finished/final graded cap is 7%. Gas vent system is installed within the 3 feet of compacted soil layer.

3. Types of waste material disposed within SCMF No. 3:

a. Permits

(1) TSCA --- yes.

(2) RCRA --- yes.

b. Waste streams received and disposed:

(1) Waste water treatment sludges.
(2) Acid sludges.
(3) Organic still bottoms.
(4) PCB --- Bulk, transformer carcasses, capacitors.
(5) Paint sludges.
(6) Cyanides.
(7) Arsenic.
(8) Lab Paks.

4. Reconfiguration of subcells --- None.

Secure Chemical Management Facility No. 4/5

1. General Description

a. Date of construction
- Construction began: July 1979.
- Construction of completed: February 1980.

b. Date of use: February 1980 through July 1981.

c. Size of the disposal cell: 500' long x 300' wide x 26' deep.

d. Purpose: Disposal of hazardous waste material.

2. Construction Performance Standard

a. Liner Construction

(1) Recompacted soil material placed on the bottom and the sidewalls at 5' thick. 2:1 side slopes.
(2) 30 mil. nylon reinforced "Hypalon" liner installed on the bottom and on the sidewalls and secured at the top of the disposal cell by an anchor trench.
(3) Two feet of soil buffer material placed on top of the "Hypalon" installed on the sidewalls and the bottom.

b. Detection System.

(1) TSCA underdrain system consist of a 4" PVC perforated section adapted to an 8" ABS truss wall at the riser pipe.

c. Leachate Collection.

(1) Design --- the leachate collection system installed within disposal cell 4/5 was not designed to the latest standards.

The leachate collection system has four 24" perforated reinforced concrete pipes installed with geotextile filter wrap and gravel packed (gravel basket) around each leachate standpipe.

d. Subcell Layout.

(1) Three subcells constructed within the disposal cell that are separated by a 4' thick soil berms: Amphoteric, Heavy Metals, and General. 2 standpipes in general cell, 1 in heavy metals and 1 in amphoteric.
(2) Reconfiguration of the subcells --- none.

e. Cap Closure Design.

(1) 3' thick compacted soil layer.
(2) 20 mil. PVC synthetic liner attached to primary synthetic liner.

(3) Gas Vent System.
(4) 2½' thick root zone material.
(5) Finished cap slope 7%.

3. Types of waste materials disposed within SCMF No. 4/5.

a. Permits

(1) TSCA --- Yes.
(2) RCRA --- Yes.

b. Waste streams received and disposed:

(1) PCB contaminated soil.
(2) Waste water treatment sludge.
(3) Acid Sludge.
(4) Organic still bottom.
(5) Paint sludges.
(6) Cyanides.

4. Dewatering Systems --- None.

Secure Chemical Management Facility No. 6

1. General Description

   a. Dates of construction: Fall 1980 to completion in Spring of 1981.

   b. Dates of Use: April 1981 to August 1983.

   c. Size of Facility: 520' x 460' x 50' deep.

   d. Purpose: Disposal of Hazardous Waste.

2. Construction Performance Standards

   a. Liner Systems

   (1) Natural Liners
   7½ feet recompacted sidewalls on a 1.5:1 slope.
   5 feet recompacted bottom.
   (2) Synthetic Liner
   60 mil. HDPE liner installed (heat welded) bottom and sidewalls and anchor trench.
   2 feet soil buffer material on the sidewalls and the bottom.

   b. Detection Systems

   (1) TSCA System
   Four (4") PVC perforated pipe underdrain in a sand bed system led into 8" ABS truss wall riser.
   (2) No "Leak Detection" system installed.

   c. Leachate Collection

   Five leachate standpipes 36" reinforced concrete perforated wrapped with geotextile and crushed stone in place surrounding the leachate standpipes.

   d. Subcell lay-out

   3 subcells --- amphoteric, heavy metals and general. Separated by 4' thick divider berms, 1 standpipe - amphoteric, 2 standpipes - heavy metals, 2 standpipes - general.

   e. Cap Design

   (1) 3 feet thick compacted soil layer.
   (2) 20 mil. PVC synthetic liner attached to primary synthetic liner.
   (3) Perimeter sand drainage fingers.
   (4) Gas vent system.
   (5) Finished cap slope 7%.
   (6) 2½ feet thick root zone material.

3. Types of waste accepted.

a. Permits

(1) TSCA --- Yes.
(2) RCRA --- Yes.

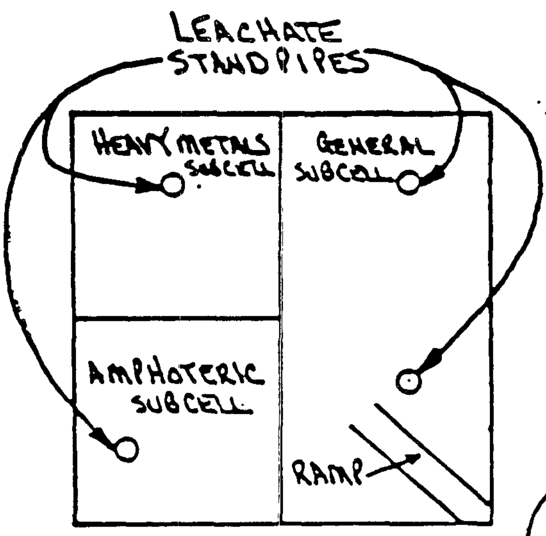
b. Type of waste material disposed within Cell No. 6:

PCB contaminated soils.
Waste water treatment.
Acid Sludge.
Organic Still Bottoms.
Paint Sludges.
Cyanides.
Arsenic.
Lab Paks.

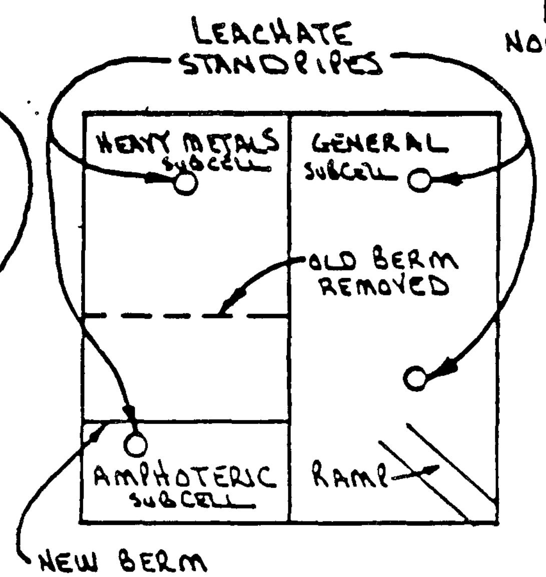
c. Reconfiguration

SCMF No. 6 reconfiguration construction requirements:

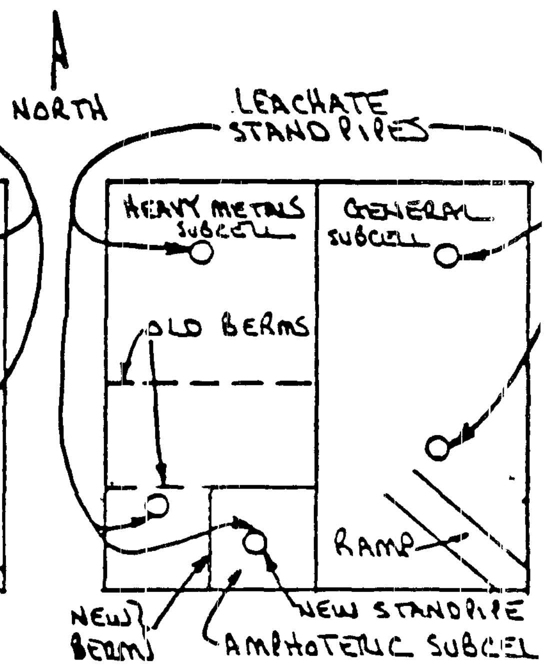
- Subcell reconfiguration performed two times. During the operation of the disposal cell (SCMF No. 6).
- Heavy metal subcell made 80% larger, amphoteric decreased 80% in size.
- Standpipe added during 2nd reconfiguration (L-14).
- 2nd reconfiguration accomplished after several layers of waste was disposed in SCMF No. 6.



ORIGINAL SUBCELL CONFIGURATION SCMF No. 6



1ST CHANGE OF AMPHOTERIC SUBCELL CONFIGURATION SCMF No. 6



2ND CHANGE OF AMPHOTE SUBCELL CONFIGURATIO SCMF No. 6

4. Dewatering Systems --- None.

Water encountered during excavation - insignificant quantity to affect construction.

Secure Chemical Management Facility No. 7

1. General Description

a. Construction of this disposal cell began in summer of 1981 and completed March 1982.
b. Dates SCMF No. 7 was in operation November 1982 to June 1984.
c. Size of the Facility is approximately 500' x 550' x 50' deep.
d. Purpose: Land disposal of TSCA and RCRA, and other waste material.

2. Construction Performance Standards

a. Liner Systems

(1) Natural liner. Recompacted soil material placed in the bottom and sidewalls. 1.5:1 side slopes no toe berms. Cut off walls (clay plug) at sand seams intercepted on the side wall.

(2) Synthetic liner. 80 mil. HDPE liner (heat welded) installed on the sidewalls and bottom --- anchor trench. Two feet of soil buffer material in place on top of the liner on the sidewalls and the bottom.

b. Detection Systems

(1) TSCA Systems. Four 4-inch PVC perforated pipe tied into an 8"

ABS truss wall riser for under drains and sand blanket on bottom of cell.

(2) No "Leak Detected System".

c. Leachate Collection System

(1) Five leachate collection standpipes 36" reinforced concrete perforated with geotextile filter wrap and gravel surrounding each leachate standpipe.

d. Subcell Layout

(1) Three subcells: amphoteric, general and heavy metals. Each subcell divided by a 4' thick berm. 1 standpipe - amphoteric, 3 standpipes - heavy metals, 1 standpipe - general.

e. Cap Design

(1) 3 feet thick compacted soil layer.
(2) 20 mil. PVC synthetic liner attached to primary synthetic liner.
(3) 6" thick sand drainage blanket or synthetic drainage media.
(4) Gas Vent System.
(5) 2½ feet to thick root zone material.
(6) Finished cap slope 7%.

3. Types of waste accepted

a. Permits

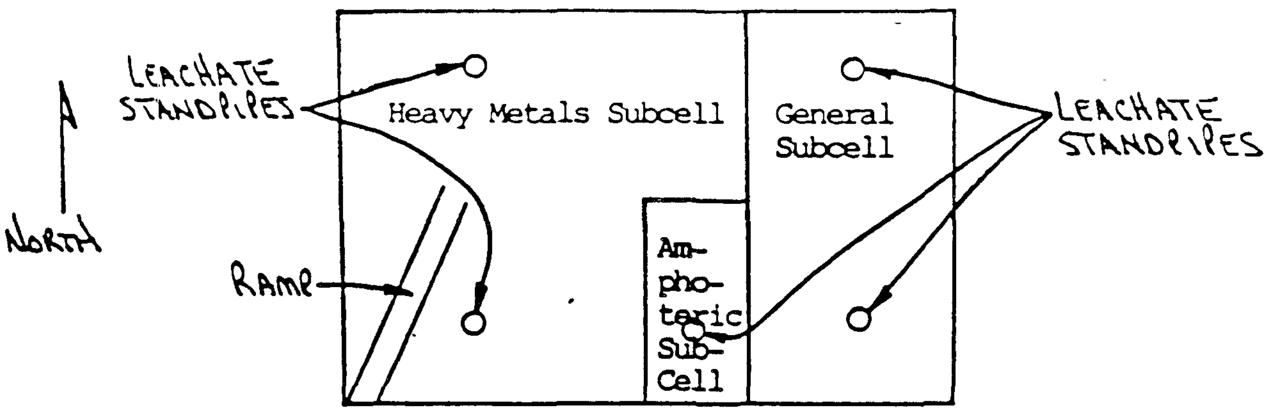
(1) RCRA
(2) TSCA

b. Types of Waste Stream disposed within Cell No. 7:

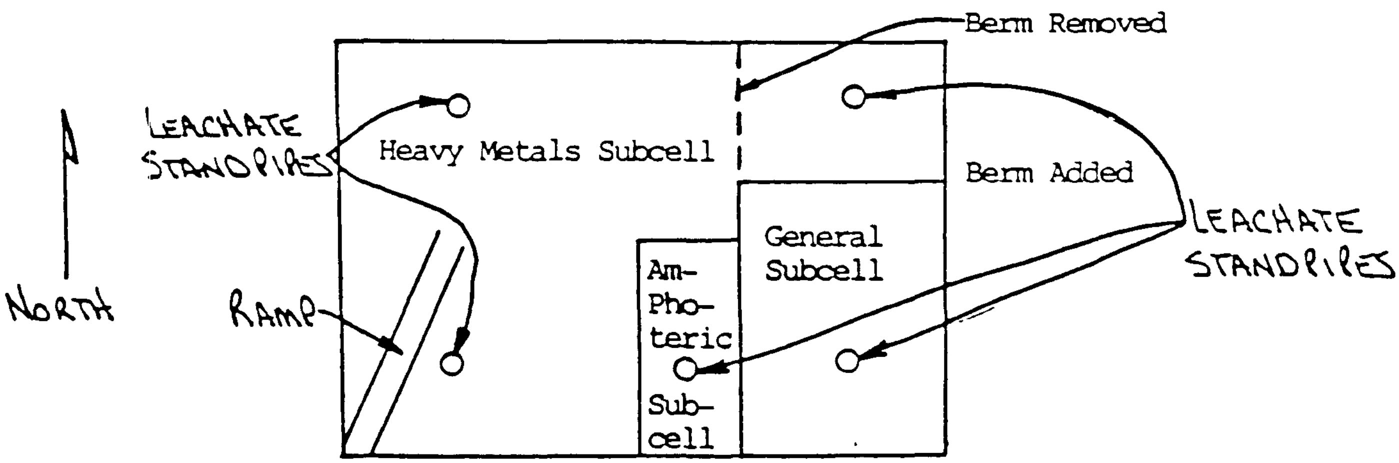
- PCB contaminated soils.
- Waste water treatment sludge.
- Acid sludge.
- Organic still bottoms.
- Paint sludges.
- Cyanides.
- Arsenic.
- Lab Paks.
- Phenols.

c. SCMF No. 7 Reconfiguration Construction Requirement

- Subcell reconfiguration construction was performed one time during the operation of the disposal cell (SCMF No. 7).
- Heavy metals subcell enlarged and general subcell reduced by one half its original design size/reconfiguration.



ORIGINAL SUBCELL CONFIGURATION SCMF No.7



RECONFIGURED GENERAL SUBCELL SCMF No 7

4. Dewatering Systems.

a. System specifications.

(1) 4 wells --- 12" gravel pack with 6" PVC casing and screens.
(2) Screen internal 860' - 880' msl.
(3) Pumping mechanism: submersible pumps with floats.
(4) Gallons output: 2 - 40 GPM.

b. Water encountered during excavation. Impacted construction and required dewatering wells to slow in flow to allow clay plugs to be installed before reconstruction began.

Secure Chemical Management Facility No. 8

1. General Information

a. Construction of this disposal cell began in summer of 1983 and completed in December 1983 and remediated Spring 1984.

b. Dates of Use: June 1984/February 1985.
Capped: March 1985.

c. Estimated size of disposal cell 550' wide x 550' long x 50' deep.
d. Used for disposal of RCRA, TSCA and other waste materials.

2. Construction Performance Standards

a. Liner Systems

(1) Natural liner. Recompacted soil material placed in the bottom and sidewalls.

- 5' thick bottom.
- 7½' thick sidewalls.

Cut off walls (clay plug) of sand seams intercepted on the side wall.

° Side slopes:
- South wall --- 1.5:1.
- West wall --- 1.9:1.
- North wall --- 1.7:1.
- East wall --- 1.5:1.

Top berms and eductor dewatering system were added to ensure sidewall stability.

(2) Synthetic Liner. 80 mil. HDPE liner (heat welded) installed on the sidewalls and bottom and secured by an anchor trench on top of the cell. Two feet of soil buffer material in place on the top of the liner installed in the sidewalls and one foot of soil buffer material on top of the leachate collection system on the cell bottom.

b. Detection Systems

(1) TSCA system 4" perforated PVC in a sand blanket over the bottom tied into a 10" ABS truss wall riser.

(2) No "Leak Detection" System.

c. Leachate Collection System

(1) Leachate collection system installed on the bottom of Cell No 8 --- sand and piping. Five 36" leachate collection standpipes --- reinforced concrete perforated wrapped with geotextile filter media and gravel material surrounding each leachate standpipe.

d. Subcell Configuration.

(1) Three subcells: amphoteric, heavy metals and general divided by 4' thick soil berms. 2 standpipes in heavy metals, 2 standpipes in general, and 1 standpipe in amphoteric.

e. Cap Design:

(1) 3 feet thick compacted soil layer.
(2) 40 mil. HDPE synthetic liner attached to primary synthetic liner.
(3) 6" thick sand drainage blanket.
(4) Gas Vent System.
(5) 2½ feet thick root zone material.
(6) Finished cap slope 7%.

3. Types of Waste Accepted

a. Permits

(1) TSCA
(2) RCRA

b. Waste stream disposed in Cell No. 8:

- PCB contaminated soils.
- Waste water treatment sludge.
- Organic still bottoms.
- Paint sludges.
- Cyanide.
- Arsenic.
- Lab Paks.
- Phenol.

c. Reconfiguration --- None.

4. Dewatering Systems

a. System specifications

(1) 56 perimeter dewatering wells installed --- 16" sand pack with 6" PVC casing and screens.
(2) Screened internal 860 - 900 msl.
(3) Pumping mechanism eductor system.
(4) Gallons output by system - 15 GPM.

b. Water encountered during excavation - None.

Secure Chemical Management Facility No. 9

1. General Information

   a. Date construction started: August 1984.
   Date construction completed: March 1985.

   b. Dates of Use: March 1985.
   Still actively used. (General subcell --- estimated 10,000 cubic yards of air space remaining).

   c. Estimated size of disposal cell:
   - 550' wide x 550' long x 50' deep.

   d. Purpose: Land disposal of RCRA, TSCA, and other waste material.

2. Construction Performance Standards

   a. Liner Construction

   (1) Natural Liner.

   Recompacted soil material. Two soil liners installed on the bottom separated by a leak detection system. Combined thickness of the two soil liners is 6½ feet. Side walls consist of compacted soil liner 7½ feet. Cut off walls (clay plug) sand seams intercepted on the side wall. Side slopes --- 2:1. No toe berms.

   (2) Synthetic Liner.

   80 mil. HDPE (heat welded) single synthetic liner.

   b. Detection Systems

   (1) Leak detection system consist of sand and pipe installed on the bottom of the disposal cell between the two soil liners.

   (2) TSCA under drain monitoring system installed on the bottom of the disposal cell underneath the bottom clay liner consists of sand and pipe. Size of the sidewall discharge pipes --- 10" ABS truss wall pipe.

   c. Leachate Collection Systems

   (1) Leachate collection system installed on the bottom and side walls consists of sand and piping on the bottom.

   (2) Three 36" leachate collection standpipes installed --- reinforced concrete wrapped with geotextile filter media material and gravel basket surrounding each standpipe.

   (3) Eight contingency leachate removal riser pipes installed on the sidewalls.

   d. Subcell configuration

(1) 3 subcells --- amphoteric, general and heavy metals divided 4' thick soil berms. 1 standpipe per subcell.

e. Cap Design

(1) 3' thick compacted soil layer.
(2) 80 mil. HDPE synthetic liner attached to primary synthetic liner.
(3) 6" thick sand drainage blanket or synthetic drainage media.
(4) 2½' to 3' - 0" thick root zone material.
(5) Gas vent system.
(6) Finished cap slope 6 - 8%.

3. Types of waste accepted

a. Permits

(1) TSCA
(2) RCRA

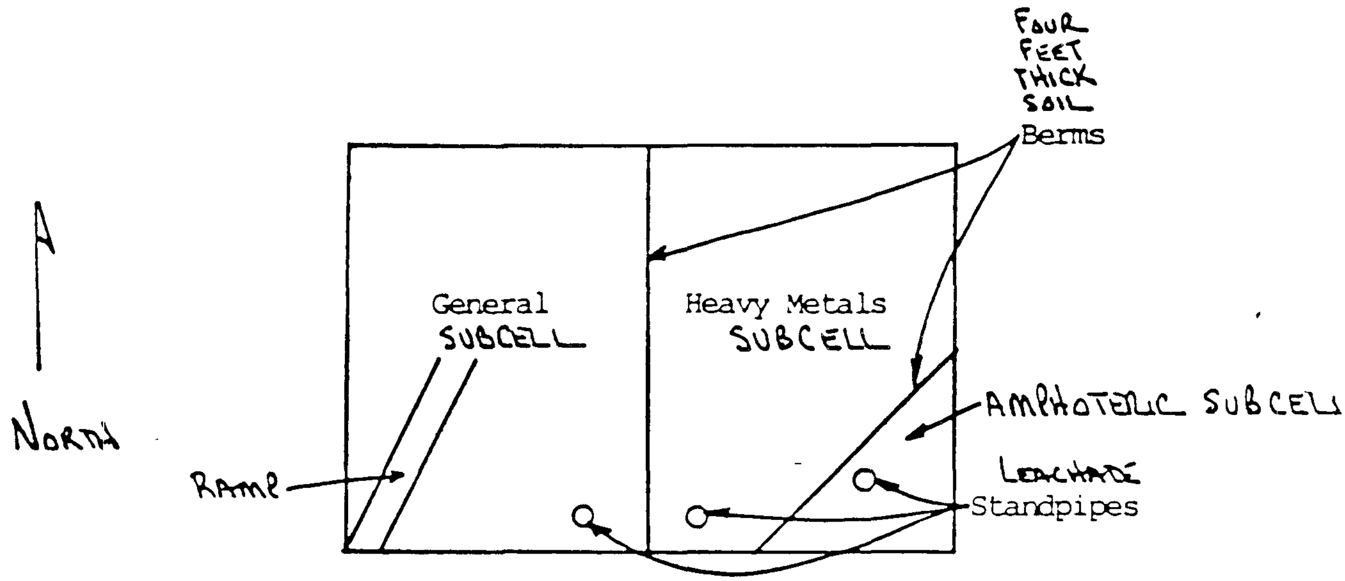
b. Types of waste stream disposed within Cell No. 9

- PCB contaminated soils.
- Waste water treatment sludge.
- Organic still bottoms.
- Paint sludge.
- Cyanide.
- Arsenic.
- Lab Paks.
- Phenol, Sludges.

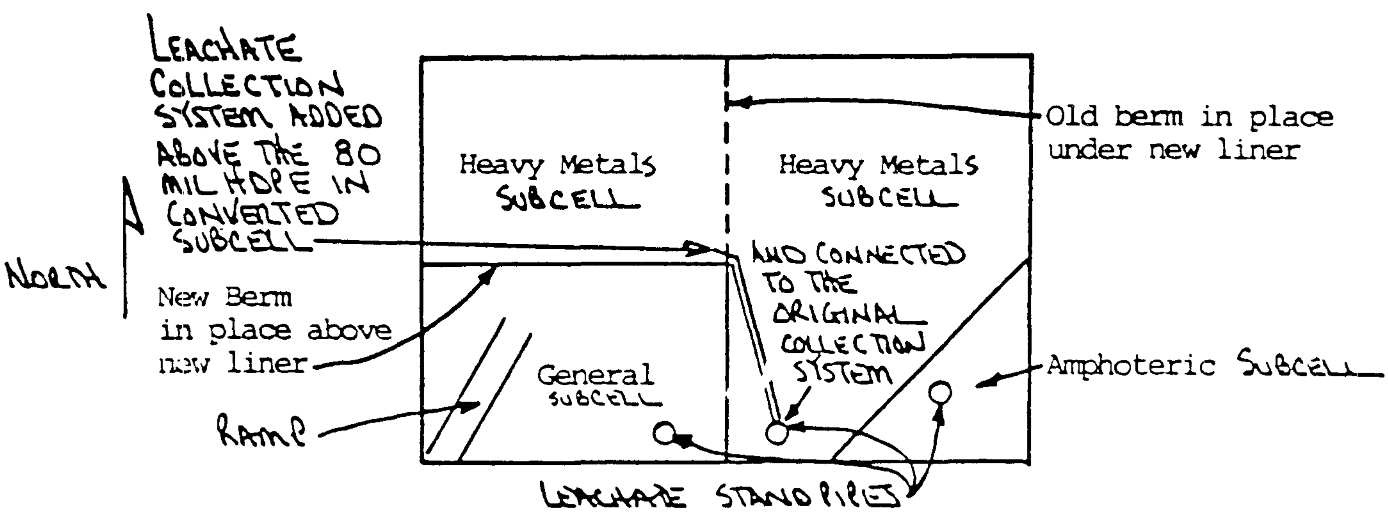
Reconfiguration SCMF No. 9

c. SCMF No. 9 reconfiguration construction requirement.

- General subcell converted to heavy metals/PCB subcell after several layers of waste disposed within the general subcell.
- Additional 80 mil. HDPE FML & Leachate Collection System added and tied to the original Leachate Collection Systems.



Original Configuration of SCMF No. 9



Revised Configuration of General Subcell SCMF No. 9
Project Completed September 3, 1986

4. Dewatering System

a. System Specification

(1) No. wells installed on the periphery of SCMF No. 9 is 51.
(2) 40 wells --- 12" sand pack with a 4" PVC casing and screens. The remaining 11 wells are part of SCMF No. 8 dewatering system --- common dewatering wells for SCMF No. 8 and No. 9.
(3) Screened internal is from 860 to 900 feet mean sea level.
(4) Pumping mechanism eductor dewatering system installed.
(5) Water output 15 - 20 GPM for entire system.

b. Water encountered during excavation - no significant volumes flowing into the excavation. Minor wet spots on slopes.

Secure Chemical Management Facility No. 10

1. General Information

a. Date construction started: October 1985.
   Date construction completed: September 1986.

b. Dates of Use: First waste stream disposed on October 24, 1986. Still active.

c. Size of the disposal cell 510' wide x 550' long x 50' deep.

d. Purpose: Land disposal of RCRA, TSCA, and other waste materials.

2. Construction Performance Standards

a. Liner construction

(1) Natural liners.

Recompacted soil material. Two soil liners installed on the bottom separated by a leak detection system on the bottom and the sidewalls. The combined thickness of the soil liner is 7½' on the bottom and 7½' on the sidewalls.

No cut off walls installed within the entire cell because the entire cell was over excavated.

Side slopes: --- 2:1.

No toe berms.

(2) Synthetic Liners

(1) Primary synthetic liner is 80 mil. HDPE --- on the bottom, and up the sidewalls and secured on the top of the cell by an anchor trench.

(2) Secondary synthetic liner is 80 mil., HDPE installed --- on the bottom of the cell and terminates 12 feet up the side walls. This liner is installed below the leak detection system.

b. Detection Systems

(1) The leak detection system consist of sand and pipe on the bottom of the cell, and non woven geotextile on the side walls.

(2) TSCA monitoring system installed below the bottom of the soil liner consists of sand and pipe and some 70 oz., non woven geotextile.

c. Leachate Collection System

(1) Leachate collection system is installed on the bottom and the sidewalls. On the bottom the system consists of sand and

(2) Three 36" diameter reinforced concrete perforated leachate collection standpipes wrapped with geotextile filter material media and gravel basket surrounding each standpipe.

d. Subcell Configuration

(1) 3 subcells --- amphoteric, general and heavy metal divided by 4' thick soil berms. 1 standpipe per subcell.

e. Cap Design

(1) 3 feet thick compacted soil layer.
(2) 80 mil. HDPE synthetic liner attached to primary synthetic liner.
(3) 6" thick sand drainage blanket or synthetic drainage media.
(4) $2\frac{1}{2}$' to 3' thick root zone material.
(5) Gas vent system.
(6) Finished cap slope 6.6%.

3. Types of waste accepted:

a. Permits
(1) RCRA
(2) TSCA

b. Type of waste stream disposed within Cell No. 10:

- PCB contaminated soils.
- Waste water treatment sludge.
- Organic still bottoms.
- Paint sludge.
- Non-hazardous non-PCB soil material with vegetation excavated from Aber Road.

c. Reconfigurations of subcells --- None.

4. Dewatering Systems(Perimeter dewatering system installed prior to excavation).

a. System specifications

(1) No. of wells installed is 58, 12" gravel pack with 6" PVC casings and screens.
(2) Screened internal is 845 to 900 feet mean sea level.
(3) Pumping mechanisms --- submersible pump connected to a timer system.
(4) Gallons out put --- 40 GPM total system.

b. Water encountered during excavation --- seeps along east wall --- no significant volume of water in flowing.

Secure Chemical Management Facility No. 11

1. Basic Cell Design Concept for SCMF No. 11

- Approximate size 550' x 550'.
- Approximate Depth - 45 to 50'.
- Side slopes 2:1.
- Primary synthetic liner - 80 mil. HDPE will cover bottom and sidewalls.
- Secondary synthetic liner - 80 mil. HDPE will cover bottom and terminate approximately 10 to 15 feet up the sidewall.
- Primary leachate collection system will cover bottom and sidewalls - sand and piping system on the bottom, synthetic drainage media on the sidewalls.
- Secondary leachate collection system will cover bottom and sidewalls - sand and piping system on the bottom, synthetic drainage media on the bottom.
- Compacted soil liners on the bottom and sidewalls of the cell. Primary sand liner will be minimum 4 to 6 inches thick. Secondary soil liner will be 3'-0" thick.
- All collection/detection systems will have minimum 2% slope and designed to limit head on the synthetic liner to one (1) foot.
- Cut off wall (clay plug) of sand seams intercepted in the sidewalls of the excavation.
- Dewatering wells installed on 40 feet centers on the perimeter of the cell during initiated excavation. Extend to about elevation 835 and are fully penetrating from about elevation 890. Well depths about 75 feet below present grades.
- During excavation seapage from the 880 sand zone.

2. Capping Design Concept

- 3 feet thick compacted soil layer.
- 80 mil. HDPE synthetic liner attached to primary synthetic liner.
- 6" thick sand drainage blanket or synthetic drainage media.
- 2' - 6" to 3' - 0" thick root zone material
- Finished cap slope 6.6%.

3. Design Modification

- Discussion during excavation of the SCMF, the 850 sand zone was encountered in the proposed bottom of the cell in the southeast corner of the cell. The top of the sand was excavated to about elevation 860. Excavation to design elevations could not be completed because of water in the sand zone. A well point dewatering system was installed across the south toe of the cell which permitted excavation to continue to about elevation 856 and its lowest points, still above original design elevation. Based upon the results of more extensive hydrogeologic investigation, redesign of the cell has been implemented. The following are the significant factors of the redesign.

- The well point system will be replaced with a dewatering header constructed across the south toe of the cell in the 850 sand zone. The header will be connected to inclined discharge lines installed in original ground behind the sidewall compacted soil liners. The toe dewatering system will be designed to function through the construction and operation period of the SCMF.

- The design bottom elevation of the cell will be raised from the original design elevation. Very little, if any, excavation will be made in the bottom of the cell below current elevations.

- A low permability soil barrier will be constructed between the 850 sand zone and the TSCA monitoring system. The soil barrier will be 2 feet thick constructed of on-site soils having permability of 1 x 10^{-7} cm/sec or less.
- 80 mil. thick HDPE synthetic liner will be installed above the 2 feet thick compacted soil liner and will terminate approximately 10 to 15 feet up the side slopes.
- The TSCA monitoring system will be constructed on the bottom of the cell above the synthetic liner. The monitoring system will consist of sand and piping system.
- Construction above the TSCA system will be as presented in the Basic Cell Design Concepts above.
- Conclusions. The presented redesign concept will permit construction operation and monitoring system of the cell consistent with recent past practices. The perimeter dewatering system and 850 sand zone dewatering system are to control groundwater during construction and operations and will remain functional through construction and partial filling of the cell to prevent bottom heave or sidewall stability failures. This concept of protection is consistent with previous cells 8, 9 and 10. It will be possible to monitor groundwater quality in the secondary leachate collection system and TSCA system consistent with current practices and permits. If desired the 850 sand zone dewatering system could also be monitored through the closure period. The design rationale (leachate collection system, secondary leachate collection system, and TSCA system) will provide protection of the environment equal to that of cells 9 and 10. The performance of the primary leachate collection system in cell no. 9 has demonstrated the ability to operate the secured cell and control leachate. Based upon the redesign of the cell, the TSCA system will function more as a detection system of potential contaminants migrating vertically downward than a groundwater collection system during the construction, operation, closure

and post-closure periods.

A summary of the dewatering systems installed on the perimeter of each Secure Chemical Management Facility is shown at enclosure 1.

A summary of the capping requirements for the closure of each Secure Chemical Management Facility is shown at enclosure 2.

Firepond No. 1 (Firepond No. 1, Firepond No. 1/2)

1. General

° Constructed for fire protection water containment in 1977 at the same time as SCMF No. 1.

° Approximate size 80' x 80' x 8' deep.

° Dates of use: 1977 to October 1985.

° Purpose: Originally to hold water supply for fire protection. Later it was used to store and treat leachate from close disposal cells.

° Firepond No. 1 was combined with firepond No. 2 by removal of a separation berm in 1980.

° Current status: Closure plan approved, scheduled to be closed upon completion of leachate storage tank farm.

2. Construction Performance Standard

° Trench excavated in native clay soils.

° No soil or synthetic liner systems installed.

° Firepond No. 1 was combined with firepond No. 2 to form one (1) large impoundment by removal of the separation berm.

Firepond No. 2 (Firepond No. 1/2, Firepond No. 1)

1. **General**

- Constructed in late 1977 at the same time as SCMF No. 2.
- Approximate size: 80' x 80' x 8'.
- Dates of use: 1978 to October 1985.
- Purpose: Originally to contain a water supply for fire protection. Later used to store and treat leachate from inactive cells.
- Firepond No. 2 was combined with firepond No. 1 in 1980 by removal of the separation berm. The combined firepond No. 1 and firepond No. 2 is titled: Firepond No. 1.
- Current status: Closure Plan approved, scheduled to be closed upon completion of leachate storage tank farm.

2. Construction Performance Standard

- Trench excavated in native clay soils.
- No soil or synthetic liner systems installed.
- Combined with firepond No. 1 to form one larger impoundment by removal of the separation berm.

Firepond No. 3

1. General

   - Constructed in conjunction with SCMF No. 3 in 1978.
   - Approximate size: 250' x 100' x 8' deep.
   - Dates of use: 1978 until firepond No. 4/5 was constructed (approx. Sept. 1979).
   - Used for storage of collected storm water within SCMF No. 3.

2. Construction Performance Standards

   - Trench excavation in natural clay soils.
   - No recompacted soil liner or synthetic liner installed.
   - Removed in September 1979 during excavation of SCMF 4/5.

Solidification Basin

1. General

   - Constructed in the early summer of 1981.
   - Used from July 1981 through December 1981.
   - Size of Facility approximately 200' x 200' x 2' deep below grade with 3' - 4' high berms for a total depth of 5' - 6'.
   - Purpose: To solidify leachate from firepond No.1.
   - Located west of SCMF 4/5 and east of the truck dock.

2. Construction Performance Standards

   - A shallow excavation into natural soils at a depth of 2 feet.
   - Three (3) to four (4) feet thick soil berms were constructed on all 4 sides of the excavated open trench.
   - A series of 2 interior soil divider berms were later constructed to divide the basin into 3 sections.
   - No soil or synthetic liner systems installed within the solidification basin.

3. Material Treated and Processed

   - Leachate from firepond No. 1 was treated due to the lack of alternate disposal methods at the Aber Road Facility.
   - Leachate pumped from firepond No. 1 through a ribbon mixer with high calcium oxide lime and sodium silicate was added to solidify the leachate.
   - The solidified material was pumped from the mixer to the solidification basin for curing.
   - The cured solidified material was disposed within SCMF No. 6 during the period of August to December 1981.

4. Status of the Solidification Basin

   - All cured material and contaminated soils were removed and disposed in SCMF No. 6.
   - The solidification basin area was back filled with clean on-site soil material December 1981.

5. Location of the closed solidification basin at the Aber Road Facility is shown at enclosures 3 and 4.

Firepond 4/5

1. General

   - Constructed in fall of 1979 as part of SCMF No. 4/5 construction.

   - Approximate size: 220' x 170' x 13' deep.

   - Dates of Use: Fall 1979 through October 1985.

   - Purpose of this impoundment was to store potentially contaminated rain water which fell into the active cell and was pumped from the surface of the daily cover shortly after accumulation.

   - Current Status: Not in use. For emergency use only. Closure plan being completed for submittal to approving agencies. (USEPA Region V and Ohio EPA). Firepond 4/5 will be replaced by the leachate storage tank farm.

2. Construction Performance Standards

   - Trench excavated in natural clay soils.

   - No soil or synthetic liner systems installed.

Spray Irrigation

1. Introduction:

The spray irrigation system was developed to treat lightly contaminated rain water generated at the Aber Road Facility. This water was stored within firepond 4/5 and pumped via irrigation pipe to specific locations on the permitted area of Aber Road Facility. At these specific locations sprinkler heads were set up to broadcast the water over approved areas. CECOS submitted a permit application in July 1980 and received approval from the Ohio EPA in September 1980 for the spray irrigation system. This method of treatment was used from the fall of 1980 to October 1984.

2. Treatment Methods

Waste water to be treated was broadcast via sprinkler heads over irrigation field "D" and a portion of irrigation field "C" now occupied by SCMF No. 7 (See Figure 1 at enclosure 5). The fields were sprinkled to near saturation point.
Organics were degraded by biological/photo chemical action to harmless byproducts. Water was eliminated through evapotranspiration and percolation within the topsoil (See Table 3 at enclosure 6). Metals concentrations were limited to prevent toxic boil ups within the areas sprayed. Run off was controlled by alternating areas sprayed to prevent over saturation.

3. Material Treated

Potentially contaminated waste from firepond 4/5 was the predominant material treated. Also treated was "Tri Pit" water, (which was sanitary landfill leachate) and Clermont County Sewer sludge, which was left over from a previous irrigation program run by Clermont County.

All materials treated were tested to assure compliance with limits set in the permit to operate (PTO) issued by Ohio EPA. (See figure 3 shown at enclosure 7).

4. Treatment Areas Status

The irrigation permit set up 4 fields for irrigation. Fields A, B, C, and D. (See figure 1 at enclosure 5). Field A and B were never used. All of field "D" was used and the portion of field "C" was used which is now occupied by SCMF No. 7. Material from the top 6" of field "D" was stripped and placed within SCMF No. 8 and 9 as daily cover. The disposition of the material from field "C" is unknown. Firepond 4/5 is presently slated to be closed.

The spray irrigation of waste water was halted in October 1984 by revocation of our PTO by Ohio EPA. The system afforded CECOS International an efficient method of treatment of lightly contaminated water during its life.

The Ohio EPA letter dated July 21, 1977, shown at enclosure 8 summarizes the activities leading up to the approval of the CER hazardous waste disposal site (Aber Road Facility).

Please contact me, Gary Saylor or John Stirnkorb if you have any questions on this historical summary of our facilities described in this memorandum.

Mark A. Moore

MAM/bjd
Attachments

SUMMARY OF DEWATERING SYSTEMS AT THE CECOS INTERNATIONAL, INC.
ABER ROAD FACILITY

	SCMF No. 7	SCMF No. 8	SCMF No. 9	SCMF No. 10	SCMF No. 11	SCMF	SC
BER OF LS *	4	56	51 (40 + 11*)	58 * (44 + 14)	57 * (41 + 16)		
EENED ERVAL	860 - 880	860 - 890	860 - 900	845-900	840 - 900		
CING	Varies	20' on center west side 50' on center E, N, & S side	40' on center E, N, S, 50' on center W.	40' on center.	40' on center.		
LONS PUT SYSTEM	2 - 40 GPM	15 GPM	15 - 20 GPM	40 GPM	40 GPM		
PING HANISMS	Submers-ible pump & float	Eductor systems	Eductor system	Submers-ible pump w/timer	Submers-ible pump w/floats		

Includes common wells.

Enclosure 1

CECOS INTERNATIONAL INC. OHIO DISTRICT CAP SPECIFICATIONS

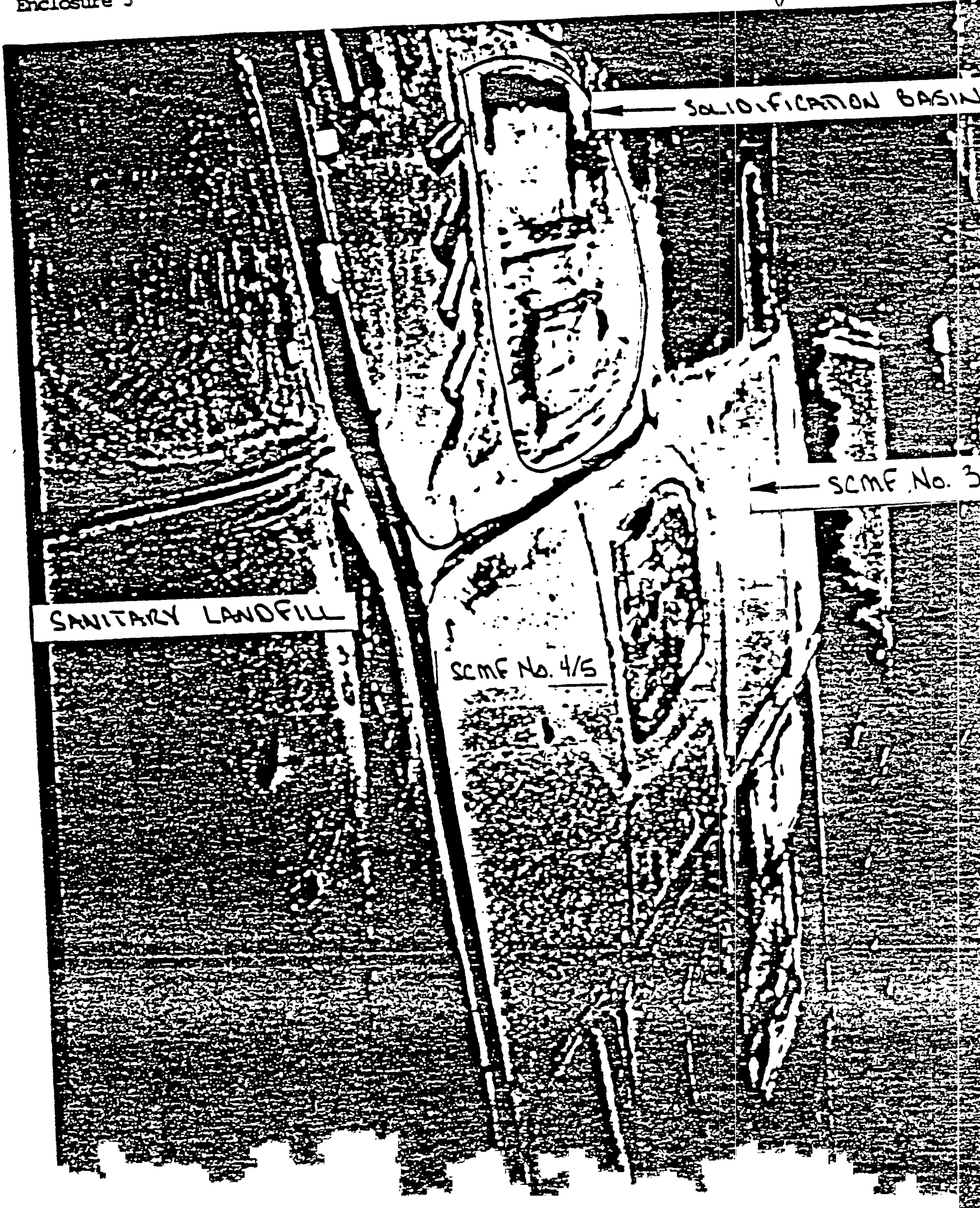
	3 FEET RE-COMPACTED CLAY	20 MIL PVC CAP LINER	40 MIL HDPE CAP LINER	80 MIL HDPE CAP LINER	30" ROOT ZONE	PERIMETER FINGER DRAINS	6" SAND DRAINAGE LAYER	GEONET DRAINAGE LAYER	GAS VENT SYSTEM	6-8% CAP SLOPE	36" ROOT ZONE**
INTERMEDIATE	●										
SCMF NO.1	●										
SCMF NO.2	●										
SCMF NO.3	●	●			●				●	●	
SCMF NO.4/5	●	●			●				●	●	
SCMF NO.6	●	●			●	●			●	●	
SCMF NO.7	●	●				●	●		●	●	●
SCMF NO.8	●		●			●	●		●	●	●
SCMF NO.9	●			●		●	○	○	●	●	●
SCMF NO.10	●			●		●	○	○	●	●	●
SCMF NO.11	●			●		●	○	○	●	●	●

** ROOT ZONE INCLUDES 6" SAND LAYER IF GEONET DRAINAGE LAYER NOT USED.

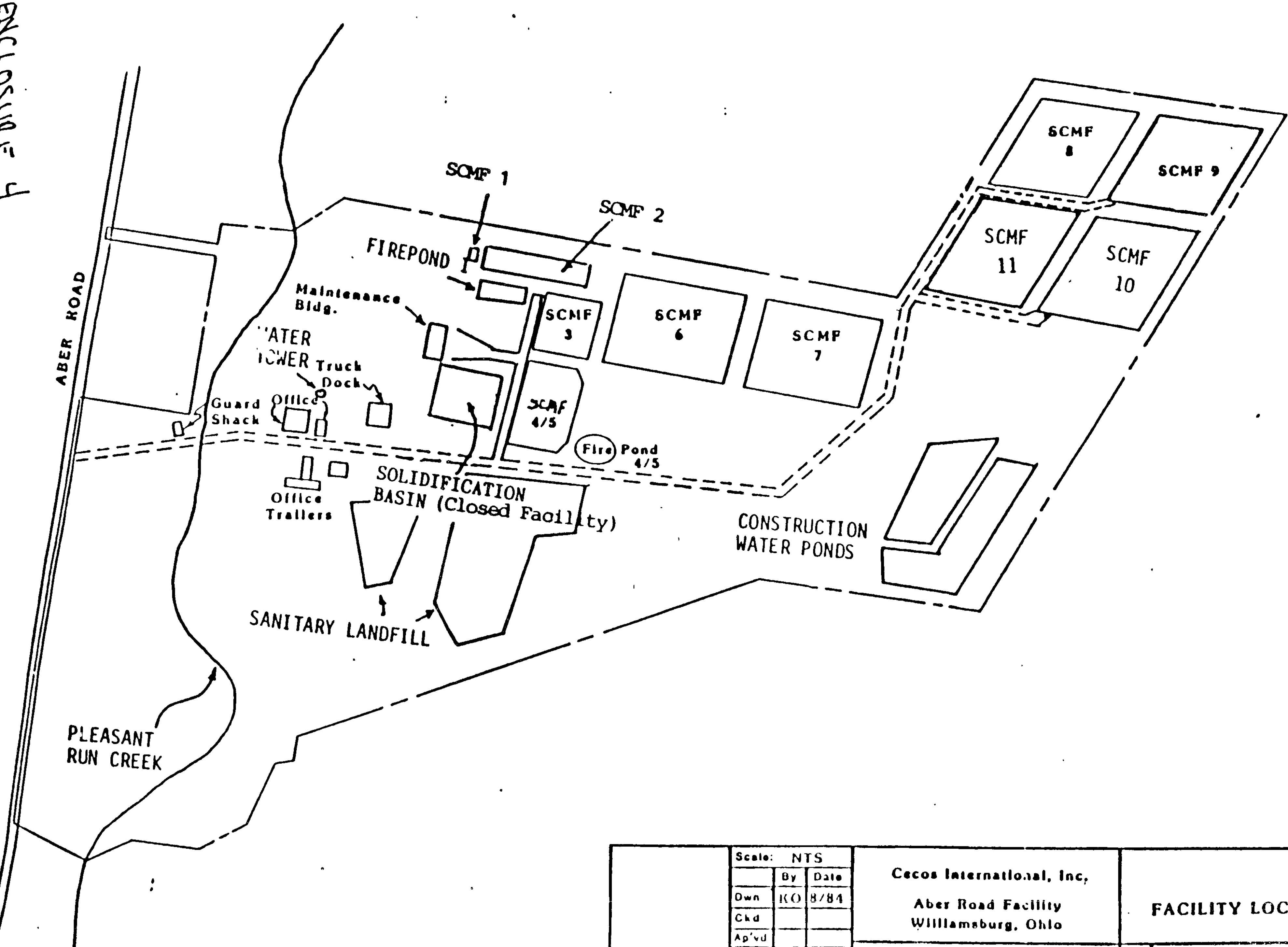
○ EITHER GEONET OR 6" SAND DRAINAGE LAYER WILL BE USED.

Location of the closed solification basin that was backfilled with clean on-site soil material in December 1981.

Enclosure 3



ENCLOSURE 4



Scale: NTS	By	Date	Cecos International, Inc, Aber Road Facility Williamsburg, Ohio	FACILITY LOCATIONS
Dwn	KO	8/84		
Ckd				
Ap'vd				
Rev.	JS	10-86	Project No.	B

ENCLOSURE 5

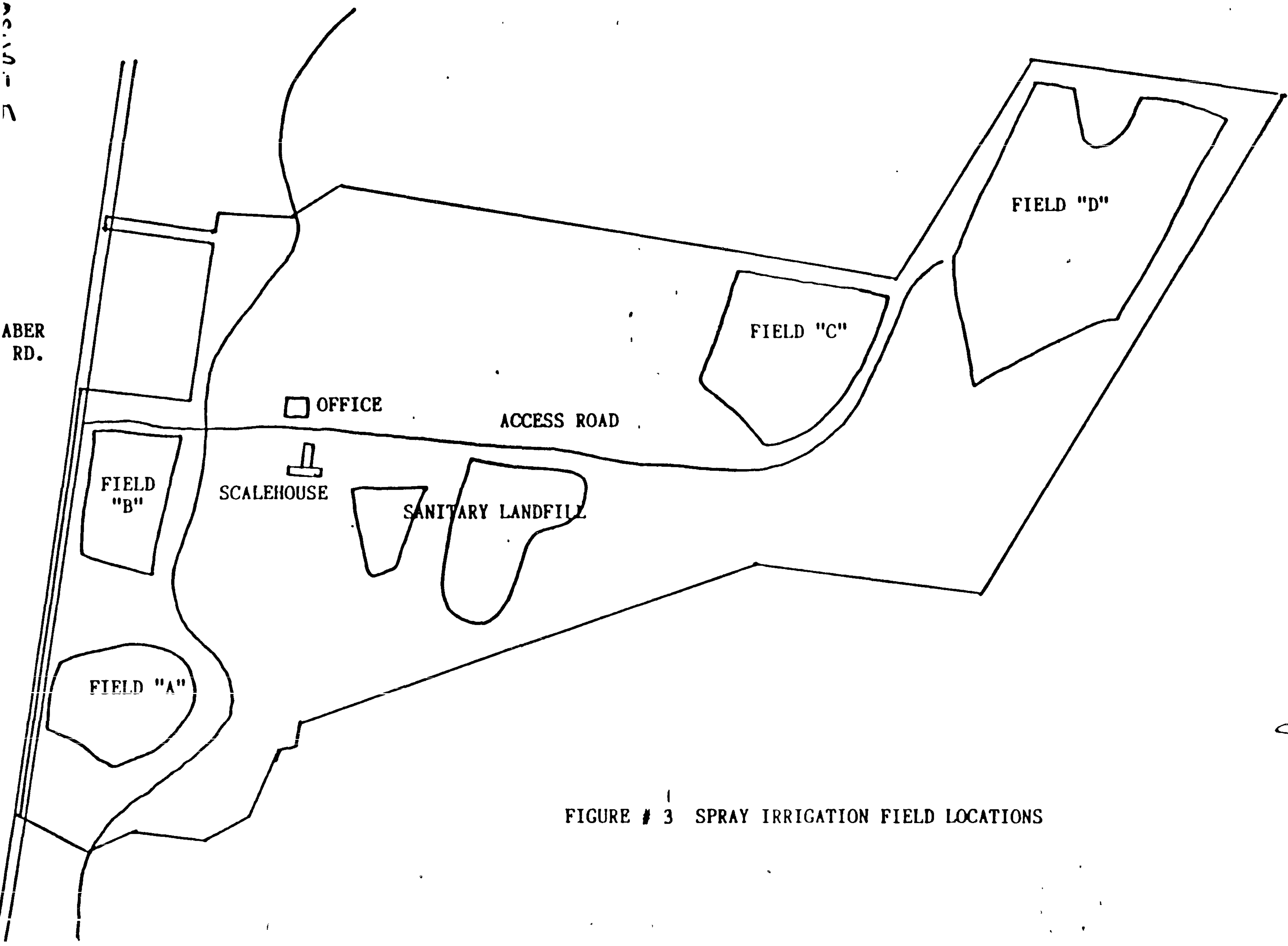


FIGURE # 3 SPRAY IRRIGATION FIELD LOCATIONS

7. Hydraulic Loading Rate

The zero discharge system will be flexible in operations in relying on maximum evaportranspiration. The maximum loading rate (in inches) is developed from the following Table 3.

TABLE 3

Hydrologic Budget for Soil Percolation Based on 0.06 inches per day average rate.

Month	Average Precipitation	Evaportranspiration Potential	Percolation	Max. Waste Loading Inches/Month
January	3.34	.65	1.8	- .89
February	3.04	.90	1.8	- .34
March	4.09	1.63	1.8	- .66
April	3.64	2.86	1.8	1.02
May	3.74	4.37	1.8	2.43
June	3.81	5.06	1.8	3.05
July	4.12	5.39	1.8	3.07
August	2.62	4.60	1.8	3.78
September	2.55	3.17	1.8	2.42
October	2.15	2.01	1.8	1.66
November	3.08	.99	1.8	- .29
December	2.86	.56	1.8	- .50

Note: All values are expressed in inches of water

Table 3 dictates the operating period of April - October for normal average operations. The percolation rate of 0.06 inches per day is well below the 1 inch per day rate that would normally be accepted. This proposal relys primarily on evaportranspiration to accomplish zero discharge.

a. Annual Liquid Loading Rate

The proposed system will operate from April through October (184 days). This will allow a maximum waste loading in inches per acre per operating season of 17.43 inches. This equates to approximately 0.09 inches per day average, including evaportranspiration, rainfall and percolation. (See Table 3)

Enclosure 6

FIGURE 3

PERMIT LIMITS OF MATERIALS TO BE TREATED BY SPRAY IRRIGATION

PARAMETER	OHIO EPA PERMIT TO OPERATE PERMITTED RANGE (PPM)
COD	100 - 500
TOC	10 - 1000
PHENOL	1.0 - 2.0
BOD	100 - 400
TKN	10 - 100
AMMONIA	10 - 30
NITRATE	10 - 100
PHOSPHORUS	0.1 - 0.9
CHROMIUM	0.1 - 1.0
CADIUM	0.005 - 0.01
COPPER	0.1 - 1.0
NICKEL	0.1 - 0.9
LEAD	0.001 - 0.1
ZINC	0.1 - 1.0
MERCURY	0.001 - 0.02

Enclosure 7

Re: Clermont County
Clermont Environmental Reclamation

Mr. Harold Flannery
Clermont Environmental Reclamation
980 Cincinnati-Batavia Pike
Batavia, Ohio 45103

July 21, 1977

Dear Mr. Flannery:

Introduction. This letter will serve to summarize the activities leading up to the approval of the CER hazardous waste disposal site and to note for the record some of the verbal agreements between CER and OEPA. The letter will also summarize the discussions of the June 7 and July 13, 1977 meetings between CER and OEPA, and contains comments on the revised plans submitted to OEPA on May 27, 1977.

Chronology of the Approval of the Facility. The OEPA suggested to CER in January of 1976 that CER consider applying for a PTI for disposal of hazardous waste at their landfill. The need for such a landfill in southwestern Ohio was great and in the opinion of the OEPA staff the geology of the CER site was probably suitable for a secure landfill. From the initial discussions of January 1976 to the present time, the OEPA staff has been working closely with CER in the development of a sound operational plan and a more careful evaluation of the geology of the site. The Clermont County Health Department was also involved in this work from beginning. Detailed plans were received by OEPA on May 28, 1976, revised plans were received on August 3, 1976. Detailed soils information was received on September 3, 1976 and October 18, 1976. The plans were approved on November 4, 1976. A revised, operational plan was received on March 9, 1977 and a second draft of this operational plan was received on May 27, 1977, including revisions in the "regular" solid waste disposal area as well as in the hazardous waste area.

Leachate Monitoring. In addition to the discussion in Abduhl Rashidi's report of November 5, 1976, the following comments are made:

> The exact details of the monitoring system have not been determined at this time. Jim Pennino and this writer discussed this with Dave Santoro on January 26, 1977. At that time it was agreed that one lysimeter and one well would be developed in order to compare the effectiveness of these devices for obtaining water samples from the tight soils on the site. The remainder of the system will be developed after this initial evaluation. Jim Pennino's letter of February 9, 1977 to Dave Santoro discusses the agreements of the January 26, 1977 meeting. It should be noted at this time that some consideration should also be given to the use of resistivity probes.

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Enclosure 8

is imperative that the first well and lysimeter be developed as soon as ible so that the necessary information can be obtained for designing verall monitoring system. As discussed in our July 13, 1977 meeting he CER site, the plan for the overall monitoring system should be leted by early April, 1978, and submitted to OEPA as an operational . The OEPA ground water hydrology staff will assist CER in developing plan. The monitoring system should be installed by October, 1978.

l Control and Safety. The operation of CER without spills or personnel ry accidents must be of the highest priority. CER and OEPA have ussed this during our July 13, 1977 meeting. The following points of concern and should be addressed by emergency contingency plans.

A. There is a possibility that the small stream on the western side of the site could become contaminated as a result of an accident. The entrance road crosses the small stream and there is a possibility that a truck might runoff the narrow bridge or road into the stream. For this reason it was agreed that a stock pile of earth would be maintained along the stream which could be used to dam the stream if necessary during an emergency clean up of a spill. The OEPA staff considered this as a temporary measure. Ultimately, a control structure should be developed across the stream which could be closed at a moments notice.

The OEPA also requested that CER prepare a contingency plan for handling a clean up of a spill in the small streams. A first draft of such a plan was received May 27, 1977. After a careful review, it was concluded that considerably more work is required on this plan. It is the opinion of the OEPA staff that CER should consult with some experts in this area and prepare a revised draft. In particular, consideration should be given to handling various categories of waste spills. Also, it is not acceptable to depend on dilution of a spill during times of high flow as a solution to the spill clean up problem. Equipment and techniques are available for containing spills and CER should become more knowledgeable in this area.

B. Fire control was discussed during our July 13, 1977 meeting. Again, the OEPA requests that a contingency plan be developed to indicate how a fire will be contained if it were to occur in the storage area, during the operation of placing drums in the pit, on loaded trucks, or any other activity which might result in a chemical fire.

C. Another concern is the safety of personnel during any activity where the wastes are handled or stored. A contingency plan is requested on what would be done if a drum were accidentally ruptured during unloading operations, operation in the pit, etc. Also, what would be done if someone were overcome by fumes. Who would rescue such a person and how would it be done.

Revised Plans. The revision of the plans for the CER facility has been under consideration since March 9, 1977. This was to be handled as a revised operational plan which would not require a new PTI. The following points are under consideration:

A. The depth of cells on the hazardous waste disposal area was to be increased from 15 to 25 feet. This was considered by the OEPA staff and was found to be an acceptable modification.

B. The design of the storage area has been modified from the original plans. In our meeting of June 7, the following agreements were reached:

1. The gated valve from the sump must be removed and the storm water overflow must be plugged. Revised plans must clearly show proper construction detail.

2. Storm water will be permitted to collect in the sump area. It will be tested for contamination with hazardous materials. If no contamination is detected, the water will be applied to the nearby fields as an irrigation application. If the water is contaminated, it will have to be handled as a hazardous material and containerized for disposal in the hazardous waste facility. In no event will storm water be discharged directly from the sump into the small streams on the primeters of the property. Notes on plans must explain this item clearly.

3. The drainage pipe under the dike on the west side will be plugged. (It should be removed.)

4. Discussion regarding the storage area dikes and entrance ramps to place during our July 13 on-site meeting. The ramps were observed to be about 18" high, or somewhat lower than the remaining dike walls. An accurate measurement of the dike, entrance ramps, and storage floor elevations, plus dimensions is needed to calculate exact volume of storage area. The volume must be equal to intended material to be stored, plus a reserve for fire control material, plus freeboard. Detail plans must clearly show that retention volume is provided.

5. Based upon our observations of July 13, an area may be required for "temporary" parking of hazardous waste laden trucks prior to unloading to pits or storage area. Although this type of occurrence is somewhat out of your control, it is a serious problem needing a contingency plan. The observed truck was not parked within a diked area and runoff of waste would be a certainty if the truck were to leak, explode, or catch on fire. Even though you claimed to not have "officially" received the waste, the fact that it is parked on your property would probably require you to share in the legal responsibility for any accident which might occur. You should discuss this with your attorney. It would be our recommendation that in the future you check the manifest as soon as the truck enters your facility. If the waste on the truck does not correspond to waste categories already approved by OEPA send the load back to the generator. There should be a containment dike around any trucks parked at the site waiting to be unloaded. This portion of your operation requires further consideration.

C. The sequence of operation in the revised plans still requires clarification. The cell drawings and the narrative statements (especially #4) do not clearly describe how cells will be developed or managed. Clarification is needed on how the ramp into cell will be developed; the dimensions of the ramp; how will the sump in the corner of the cell will be constructed, moved, drained, etc.; how much intermediate cover will there be; will this be compacted; what machinery will run over the drums and intermediate cover; etc. The drawing of a typical completed cell suggests that each cell will be covered with a mount of earth rather than one mound over the entire site as shown in the final contours. A statement is required to clarify this point. Finally, the plans should clearly state procedures used to seed and establish vegetation on the final cover. A narrative statement will suffice.

D. The narrow bridge on the entrance road to the property is a very weak link in the overall facility design. Serious consideration must be given to increasing the bridge width and structural integrity.

E. The plans should show a distance of at least 50 feet of undisturbed earth between the hazardous waste cells and the conventional waste disposal area.

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F. The need for clarification of design concepts and exact operational steps in the hazardous waste disposal area cannot be over-emphasized. Your plans must be readily understood by all your personnel, not only a select few.

Miscellaneous comments, hazardous waste and sanitary landfill areas.

1. Hazardous waste storage area "floor" should eventually be concrete to allow for easier observation of leaking drums, easier cleanup, etc.

2. The request to raise elevation in the sanitary landfill area should be reflected on detail plans, i.e., new plan and profile drawings, new topo contours of proposed grades, cell detail, step-by-step procedures, etc. Maximum side slope ratios above normal grade is to be 1 v to 10 H, as discussed July 13.

You should make necessary revisions to plans and resubmit to this office as soon as possible. We would like to finalize this project!

Yours truly,

Dan T. Redman

Dan T. Redman, P.E.
Chief, Division of Solid Waste
Management Operations
Office of Land Pollution Control

Robert E. Brown, P.E.
Public Health Engineer
Office of Land Pollution Control

DTR/REB/pam

cc: Clermont County Health Department
cc: Southwest District Office, OEPA

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