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Hazardous Waste Ground-Water Task Force

Evaluation of Adams Center Sanitary Landfill Fort Wayne, Indiana

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

FINAL REPORT

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HAZARDOUS WASTE GROUND-WATER TASK FORCE
EVALUATION REPORT
ADAMS CENTER SANITARY LANDFILL
FORT WAYNE, INDIANA

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FEBRUARY 1989

UPDATE OF THE HAZARDOUS WASTE GROUND-WATER TASK FORCE

EVALUATION OF

ADAMS CENTER SANITARY LANDFILL, INC.

The United States Environmental Protection Agency's Hazardous Waste Ground-Water Task Force ("Task Force"), in conjunction with the Indiana Department of Environmental Management (IDEM), conducted an evaluation of the Adams Center Sanitary Landfill, Inc., facility (ACSL). 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) ground-water monitoring regulation, and whether the ground-water monitoring systems in place at the facilities are capable of detecting contaminant releases from waste management units. ACSL is located at 4636 Adams Center Road southwest of Fort Wayne, Indiana.

The onsite field inspection was conducted over a one-week period from May 11 through May 16, 1987.

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

The ground-water monitoring system which was in place during the Task Force evaluation has been modified to accommodate a new landfill area to comply with the terms of the September 23, 1986, Consent Agreement and Final Order (CAFO) entered between ACSL and the United States Environmental Protection Agency (U.S. EPA), and to comply with the conditions stipulated in the RCRA facility permit issued September 30, 1988.

In November 1986, ACSL submitted a Ground-Water Quality Assessment Plan, in accordance with the CAFO. Although portions of this plan were deficient, U.S. EPA determined that the portions pertaining to additional

monitoring well installations were acceptable and approved ACSL's request to proceed with this activity while revisions were being made to correct other plan deficiencies.

In June and July of 1987, ACSL installed seven additional ground-water monitoring wells screened in the Atherton 2B aquifer flow zone at the downgradient limit of the hazardous waste management area. The approximate location for these wells were specified in the CAFO.

The CAFO also specified three locations for installation of monitoring wells screened in the shallower Atherton 2C aquifer flow zone. The Atherton 2C aquifer flow zone was not encountered during drilling operation at the proposed R13 and R14 monitoring well locations (see Figure A), therefore, ACSL was unable to construct these wells. The Atherton 2C was present at the R15 location and a monitoring well was installed at this location as required.

The Ground-Water Quality Assessment Plan submitted by ACSL was approved by U.S. EPA on March 7, 1988. This approval had been delayed due to negotiations regarding data analysis techniques and procedures for the determination of rate and extent of any plume of contamination identified during the assessment monitoring program. U.S. EPA allowed installation of the new monitoring wells and sampling and analysis of ground-water samples obtained from the monitoring system while these negotiations were under way in order to provide timely completion of the assessment program.

On September 30, 1988, a RCRA Facility Permit was issued to ACSL. On October 17, 1988 ACSL appealed certain conditions of the permit. However, the permit conditions under appeal do not significantly impact the permit ground-water monitoring program. Therefore, ACSL's ground-water monitoring program pursuant to 329 IAC 3-45 (40 CFR 264) is in effect.

EXECUTIVE SUMARY

I. EXECUTIVE SUMMARY

A. INTRODUCTION

Concerns were recently raised as to whether the commercial hazardous waste treatment, storage, and disposal facilities have been in compliance with the ground-water monitoring requirements promulgated under the Resource Conservation and Recovery Act (RCRA)¹. Specifically, the concerns focus on the ability of ground-water monitoring systems to detect contaminant releases from waste management units at these facilities. In response to these concerns, the Administrator of the United States Environmental Protection Agency (U.S. EPA) established a Hazardous Waste Ground-water Task force (Task Force) to evaluate the level of compliance at these facilities and address the cause(s) of noncompliance. The Task Force was comprised of personnel from U.S. EPA Headquarters, U.S. EPA Regional Offices, and State regulatory agency personnel.

1. OBJECTIVES

To determine the status of facility compliance, the Task Force conducted in-depth facility investigations, including on-site inspections with the following objectives:

- Determine compliance with interim status ground-water monitoring requirements of 40 CFR Part 265 as promulgated under RCRA and Indiana Administrative Code, Section 329 IAC 3-20-1 et seq.
- Evaluate the ground-water monitoring program described in the facilities' RCRA Part B permit applications for compliance with 40 CFR Part 270.14(c) and potential compliance with 40 CFR 264 Subpart F, IAC 329 3-45.
- Determine if the ground water at the facility contains hazardous waste or hazardous waste constituents.

¹Regulations promulgated under RCRA address hazardous waste management facilities' operations, including ground-water monitoring, to ensure that hazardous waste constituents are not released to the environment.

- Verify the quality of the company's ground-water monitoring data and evaluate the sampling and analytical procedures.
- Provide information to assist the Agency in determining if the facility meets EPA ground-water monitoring requirements for waste management facilities receiving waste from response actions conducted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, Public Law 91-510)².

To address these objectives, each Task Force investigation determined if:

- The facility had developed and was following an adequate ground-water sampling and analysis plan;
- RCRA (and/or State-required) monitoring wells were properly located and constructed;
- Required analyses were conducted on samples from the designated RCRA monitoring wells; and
- The ground-water quality assessment program outline (or plan, as appropriate) was adequate.

2. BACKGROUND

The Task Force investigated the Adams Center Sanitary Landfill (ACSL) facility, located at 4636 Adams Center Road, in Fort Wayne, Indiana (see Figure 1). The facility handled hazardous wastes exclusively at the time of the investigation. The on-site inspection was conducted from May 11 through May 16, 1987, and was coordinated by personnel from U.S. EPA, Region V, Central District Office, the Indiana State Department of Environmental Management (IDEM), and Region V RCRA Enforcement and Permits personnel. The investigation included review of State, Federal, and facility records, a facility inspection, laboratory evaluation, and ground-water sampling and analysis.

²"Procedures for Planning and Implementing Off-Site Response Action"; Federal Register, Vol. 50, No. 214, Pages 459-463, November 5, 1985.

a) History of Site

The ACSL facility is located on a 151-acre tract in the northeast quarter of Section 21, Township 30 North, Range 13 East, in the city of Fort Wayne, Allen County, Indiana (see Figure 1). The site is bordered on the east by Adams Center Road, the northeast by the Penn Central Railroad tracks, and on the northwest corner by a stream known as Trier Ditch. The facility is owned and operated by Adams Center Sanitary Landfill, Inc., which is a wholly-owned subsidiary of Chemical Waste Management, Inc. The site was purchased from SCA Chemical Services, Inc. in September 1984. The city of Fort Wayne lies immediately to the northwest. Land elevation on the property ranges from 754 to 817 feet above mean sea level (MSL) (ACSL Part B application, 1986).

A section of land on the western half of the property was used as a sanitary landfill until October 1985. This portion of the landfill has been capped and closed. Wastes that would now be considered RCRA hazardous wastes were accepted from 1980 to present. These wastes were disposed of in areas on the eastern half of the site. Phases IA through IC of the hazardous waste disposal area have been filled and have an interim cap. Current activity is in Phase II. Phases III through V are planned for further expansion. Wastes disposed of include most wastes listed in 40 CFR Part 261 (ACSL Part B application, 1986).

b) Adjacent Land Use

Land surrounding the facility is used for light industrial, residential, and agricultural purposes. Much of the land immediately to the west, south, and east of the site is currently used as farmland. Directly to the north, across the Penn Central Railroad tracks, is an automobile "graveyard". Northwest of this is a mobile home park. To the northeast of the site, across Adams Center Road, is a warehouse/truck loading facility. Farther to the north and northwest of the site is a larger industrial/ commercial development (ACSL Part B application, 1986).

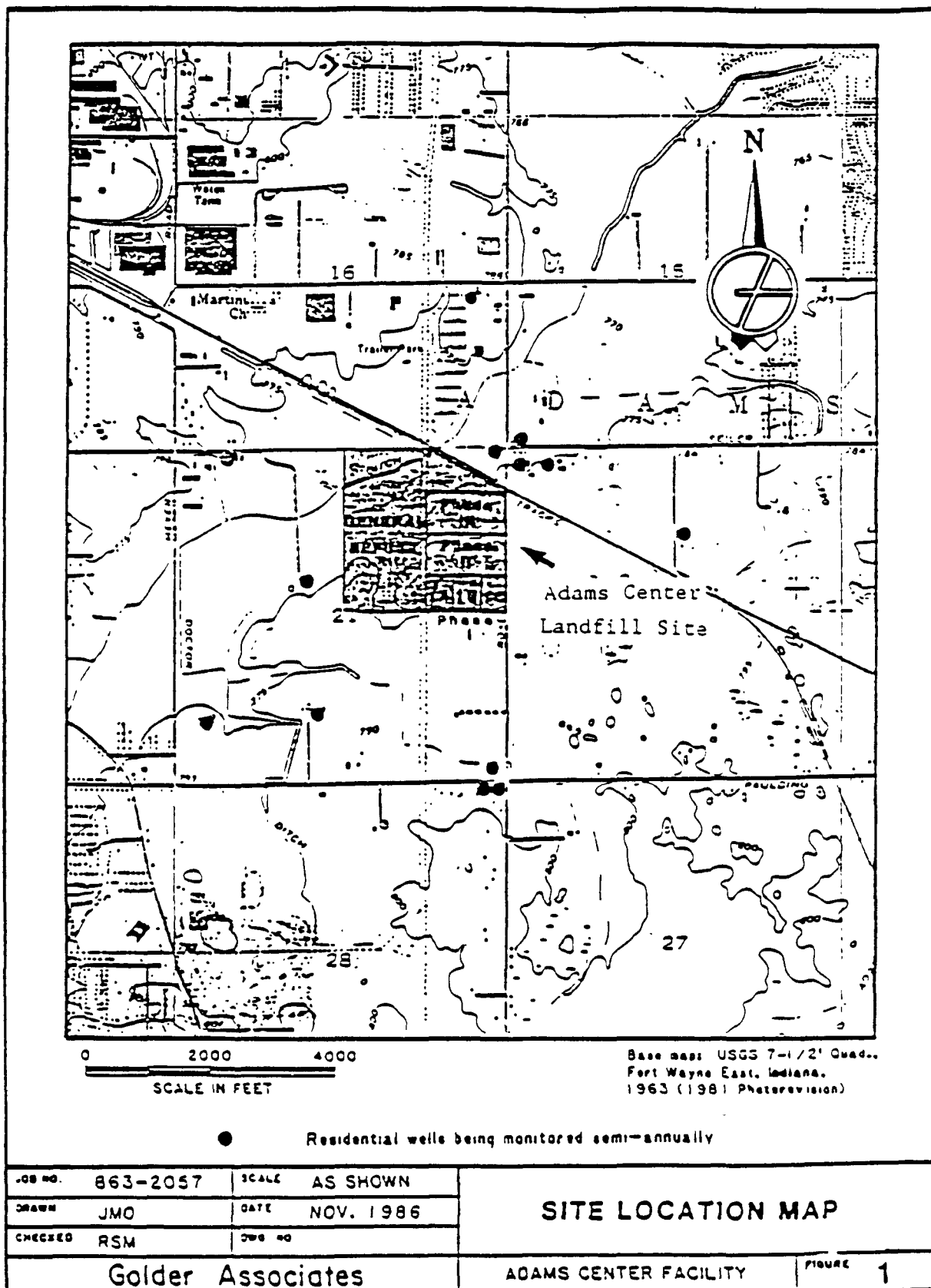


FIGURE 1
SITE LOCATION MAP, ADAMS CENTER SANITARY LANDFILL
FORT WAYNE, INDIANA
(Golder Associates, 1986)

c) State/Federal Requirements

The ACSL facility must meet the requirements for ground-water monitoring at hazardous waste landfills as promulgated in the Indiana Administrative Code provisions found in 329 IAC 3-20-1, et seq. (40 CFR Part 265). Indiana has been granted Phase I Interim Authorization by U.S. EPA and therefore facilities in Indiana qualifying for interim status under 40 CFR 270.70 are regulated under the Indiana provisions. In matters related to the issuance of the corrective action portions of final RCRA permits, the Federal regulations in 40 CFR Parts 124, 264 and 270 remain applicable.

Interim status ground-water monitoring was begun in 1982 at the site. ACSL has filed both a RCRA Part A permit application, and a RCRA Part B permit application as required in the RCRA permit process. The RCRA Part B permit application was revised and resubmitted in December 1986. The site began a ground-water assessment program in 1984, and filed a revised ground-water assessment plan with the revised RCRA Part B permit application in 1986 (Aware, 1984, ACSL, 1986).

On November 7, 1985, U.S. EPA issued a Complaint and Compliance Order specifying violations by the ACSL facility of the applicable State (RCRA) regulations. These violations included:

- a) Failure to install at least one monitoring well hydraulically upgradient of the waste management area in each of the two aquifers identified as the Atherton 2C and Atherton 2B aquifers, as required by 329 IAC 3-20-2(a)(1).
- b) Failure to install at least three monitoring wells hydraulically downgradient at the limit of the waste management area in each of the two aquifers identified as the Atherton 2C and Atherton 2B, as required by 329 IAC 3-20-2(a)(2).
- c) Failure to construct monitoring wells in a manner that allows sampling from the appropriate aquifer flow zones, maintains the integrity for the monitoring well borehole, and prevents contamination of samples and the ground water, as required by 329 IAC 3-20-2(c).

- d) Submission of a ground-water quality assessment program plan to the Indiana State Board of Health (ISBH) which is not capable of determining:
 - (i) if hazardous waste or hazardous waste constituents have entered the ground water;
 - (ii) rate and extent of migration of any hazardous waste or hazardous waste constituents in the ground water; and
 - (iii) the concentration of hazardous waste or hazardous waste constituents in the ground water, as required by 329 IAC 2-20- 4(a).
- e) Submission of ground-water quality assessment program plan to the ISBH which failed to specify:
 - (i) the depth of monitoring wells;
 - (ii) sampling and analytical methods for those hazardous wastes or hazardous waste constituents disposed of at the facility; and
 - (iii) a schedule of implementation, as required by 329 IAC 3-20-4(d)(3).
- f) Failure to implement a ground-water quality assessment plan which determines the rate and extent of migration and the concentrations of hazardous waste or hazardous waste constituents in the ground water, as required by 329 IAC 3-20-4(d)(4).
- g) Failure to make a determination regarding ground-water quality as soon as technically feasible following completion of the assessment plan, as required by 329 IAC 3-20-4(d)(5).

The Indiana State Board of Health also noted concentrations that exceed the interim primary and secondary drinking water levels of the Safe Drinking Water Act (SDWA). In 1985, there were 24 such events (Busch, 1985a, b). In 1986, there were 36 occurrences (Busch, 1986).

B. SUMMARY OF FINDINGS AND CONCLUSIONS

1. Compliance with Interim Status Ground-Water Monitoring - Indiana Administrative Code 329 IAC et. seq. (40 CFR Part 265 Subpart F)

On September 23, 1986, ACSL and the U.S. EPA entered into a Consent Agreement and Final Order (CAFO). This CAFO required ACSL to submit a ground-water quality assessment plan to U.S. EPA and the IDEM for

approval. The plan must include monitoring wells at the limit of the hazardous waste management area screened in the Atherton 2C water bearing flow zone and additional wells in the Atherton 2B water bearing flow zone. The plan must also be capable of determining if hazardous wastes or hazardous waste constituents have entered the ground water from the hazardous waste management area of the facility, and if so, the rate and extent of migration and the concentrations of hazardous wastes or hazardous waste constituents in the ground water. The CAFO required ACSL to install additional wells as necessary to provide a determination of the rate and extent of any plume of contamination.

Upon completion of the work specified in the approved assessment plan ACSL was required to submit a report containing the results of the groundwater quality assessment and a determination of whether hazardous waste or hazardous waste constituents have entered the ground water from the hazardous waste management area of the facility.

2.0 GROUND-WATER PROGRAM PROPOSED FOR RCRA PERMIT

A detection ground-water monitoring program is proposed for the RCRA permit. This program must meet the requirements of IAC 329 3-45-9.

3.0 TASK FORCE SAMPLING AND MONITORING DATA ANALYSIS

The sampling information and sample monitoring results are presented in Appendices II and III, respectively.

4.0 CONFORMANCE WITH SUPERFUND OFF-SITE POLICY

At the time of the Task Force evaluation, the ACSL facility was deemed acceptable by U.S. EPA for receiving wastes resulting from Superfund clean up actions.

I. T E C H N I C A L R E P O R T

II. TECHNICAL REPORT

A. INTRODUCTION

Operation at hazardous waste treatment, storage, and disposal (TSD) facilities are regulated by the Resource Conservation and Recovery Act (RCRA P.L. 95-589). Regulations issued pursuant to RCRA (40 CFR Parts 260 through 265, as modified) address waste site operations including monitoring of ground water to ensure that hazardous waste constituents are not being released to 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 Task Force) to evaluate the levels of compliance with ground-water monitoring requirements at on-site and commercial off-site TSD facilities and address the cause of noncompliance. In addition, the Task Force was to examine the suitability of the facility as a provider of treatment, storage, or disposal services for waste managed by the Agency's Superfund program. The Task Force was comprised of personnel from EPA Headquarters, Regional Offices, and the States. Fifty-eight TSD facilities were scheduled for ground-water evaluations. One of these was Adams Center Sanitary Landfill (ACSL), Fort Wayne, Indiana.

B. OBJECTIVES

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

- Determine compliance with requirements of Indiana Administrative Code Section 329 IAC 3-20 (40 CFR 265 Subpart F) - ground-water monitoring and the monitoring system's capability of providing the required monitoring data.
- Evaluate the facility's ground-water monitoring program as described in the RCRA Part B permit application for compliance with Indiana Administrative Code 329 IAC 3-34-5(c) (40 CFR Part 270.14)(c).
- Evaluate the facility's potential compliance with Indiana Administrative Code Chapter 329 IAC 3-45 (40 CFR Part 264 Subpart F).

- Verify the quality of the company's ground-water monitoring data and evaluate sampling and analytical procedures.
- Determine if any ground-water contamination existed from site operations.
- Provide information to assist the Agency in determining if the TSD facilities meet EPA ground-water monitoring requirements for waste management facilities receiving waste from actions conducted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

C. INSPECTION METHODS

The Task Force investigation at ACSL consisted of:

- Reviewing and evaluating records and documents from U.S. EPA, Region V, the Indiana Environmental Management Board (IDEM), and ACSL.
- Conducting an on-site inspection from May 11 through May 16, 1987.
- Evaluating off-site laboratories contracted by ACSL for analysis of past and present ground water samples.
- Sampling and analyzing ground water from monitoring wells and two surface water points.

To accomplish the objectives, a facility Evaluation Team was assembled, consisting of U.S. EPA, State, and Task Force contractor personnel. The Evaluation Team was comprised of a Technical (records) Review Team, a Laboratory Evaluation Team (to evaluate on-site laboratories and off-site contract laboratories), and a Sample Collection Team. Each Team had individual responsibilities to achieve the objectives of the Task Force.

1) Technical Review Team

The Records Review Team was responsible for conducting the evaluation of the facility with respect to applicable ground-water monitoring requirements. The evaluation was divided into six areas as follows:

- site history and design
- site geology and hydrogeology
- ground-water monitoring system

- ground-water sampling analysis
- ground-water data quality and interpretation
- waste characterization and operations

Records and documents from U.S. EPA, Region V, and the IDEM offices, were compiled by the Planning Research Corporation (PRC) of Chicago, Illinois, under contract with the U.S. EPA. These documents were reviewed prior to and during the on-site inspection. On-site facility records were reviewed to verify and augment information currently in government files. These records were reviewed to obtain information on facility operations, construction details of waste management units, and the ground-water monitoring program. The facility was requested to supply the U.S. EPA with a copy of selected documents for an in-depth evaluation. Specific documents and records that were reviewed included the facility ground-water sampling and analysis plan; outline of the facility ground-water quality assessment program; analytical results from past ground-water sampling; monitoring well construction data and boring logs; site geologic reports; site operations plan; facility permits; waste management unit design and operation reports; and operating records specifying the general types of waste, the quantities of waste, and location where the waste was disposed of at the facility.

2) Laboratory Review Team

The off-site laboratories that have analyzed ACSL's samples are: Environmental Testing and Certification Laboratory, in Edison, New Jersey (organics); Gulf Coast Laboratory, University Park, Illinois (inorganics, TOC, indicator parameters); and Core Laboratories, Casper, Wyoming (radiochemical samples). These Laboratories were evaluated regarding their responsibilities under the ACSL ground-water sampling and analysis plan. Analytical equipment and methods, and quality assurance procedures and records were examined for adequacy. Laboratory records were inspected for completeness, accuracy, and compliance with State and Federal requirements. The ability of the laboratories to produce quality data for the required analyses was also evaluated. Later in this report, a detailed discussion of this evaluation is presented under "Sample Analysis and Data Quality Evaluation".

3) Sample Review Team

a) Methods

Samples for the Task Force evaluation were collected by Alliance Technologies Corporation, a U.S. EPA contractor, under the supervision of U.S. EPA personnel. Sample collection followed the procedures given in the Hazardous Waste Ground-Water Task Force-Protocol for Ground-Water Evaluations (U.S. EPA, 1986b). ACSL's existing dedicated PVC bailers or Well Wizard pumps were used to purge the wells and to collect ground-water samples. ACSL also supplied water level markers and performed water level measurements at each well. The Task Force contractor supplied all other necessary equipment and materials to manage, handle, field filter, document, and ship the samples collected. This included clean sample bottles and preservatives that were supplied to the Task Force contractor through the U.S. EPA contract laboratory program (CLP).

All samples were analyzed for the following parameters: volatile organic compounds, purgeable organic carbon (POC), purgeable organic halogens (POX), extractable organics, pesticides and herbicides, dioxin, total metals, dissolved metals, total organic carbon (TOC), total organic halogens (TOX), total phenols, cyanide, anions, nitrate, and sulfide (Note: sample MQB378 was not analyzed for sulfide). The order of sample collection, container types, and preservatives are provided in Table 1. A listing of sampling parameters is given in Table 2. Dedicated sampling equipment provided by ACSL was used to purge and remove samples from the wells. Personnel from one of the laboratories used by the facility, Gulf Coast Laboratory, operated this equipment. All other sampling tasks, including in situ measurements, were performed by the Task Force contractor.

Monitoring of airborne vapors was performed by the Task Force contractor at each wellhead prior to water level measurements and sampling. An HNu meter was used to monitor any volatile emissions from the well casing at or above background levels for health and safety

TABLE 1
ORDER OF SAMPLE COLLECTION
BOTTLE TYPE, AND PRESERVATIVE LIST
 (From U.S. EPA, 1987)

<u>Sampling Order</u>	<u>Parameter</u>	<u>Bottle Type</u>	<u>Preservatives</u>
1.	Field Measurements*	1 - 200 mL Plastic	None
2.	Volatile Organics	4 - 40 mL VOA vials	Cool 4°C No Headspace
3.	Purgeable Organic Carbon (POC)	1 - 40 mL VOA vial	Cool 4°C No Headspace
4.	Purgeable Organic Halogens (POX)	1 - 40 mL VOA vial	Cool 4°C No Headspace
5.	Extractable Organics	4 - 1L. amber glass	Cool 4°C
6.	Total metals	1 - 1L. plastic	HNO ₃ to PH<2 Cool 4°C
7.	Dissolved metals**	1 - 1L plastic	HNO ₃ PH<2
8.	Total Organic Carbon (TOC)	1 - 50 mL glass	H ₂ SO ₄ to PH<2 Cool 4°C
9.	Total Organic Halogens	1 - 1L. amber glass	Cool 4°C No Headspace
10.	Phenols	1 - 1L. amber glass	H ₂ SO ₄ to PH<2 Cool 4°C
11.	Cyanide	1 - 1L. plastic	NaOH to PH>10 Cool 4°C
12.	Sulfate and chloride	1 - 1L. plastic	Cool 4°C
13.	Nitrate and ammonia	1 - 1L. plastic	H ₂ SO ₄ to PH<2 Cool 4°C

*Field measurements included pH, specific conductance, temperature, and turbidity.

**Samples were filtered before preservation with HNO₃.

T A B L E 2

SAMPLING PARAMETERS LISTING, HWGWTF SITE VISIT

ADAMS CENTER SANITARY LANDFILL

FIELD PARAMETERS

pH

Specific conductance

Temperature

Turbidity

OTHER PARAMETERS

Volatile Organics (VOA)

Purgeable Organic Carbon (POC)

Extractable Organics

Pesticides/Herbicides

Dioxin

Total Metals

Dissolved Metals

Purgeable Organic Halogens (POX)

Total Organic Carbon (TOC)

Total Organic Halogens (TOX)

Total Phenol (4AAP)

Cyanide

Anions

Nitrate

Sulfide

purposes. HNu meters were calibrated daily using a benzene standard. Water levels were measured in all wells before purging or sampling of the monitoring wells. Each well was purged with either a dedicated bailer or Well Wizard pump^R. The volume of water removed was calculated to equal the volume of standing water in the well casing, plus the volume of water in the sand pack of the well. Alternately, slow recharge wells were purged to dryness when the above calculated volume could not be obtained. Samples were collected from slow-recharge wells either by waiting until sufficient volume had collected in the well casing for a complete sample set, or by filling sample bottles in stages as the water level rose in the well. At times, wells were allowed to recharge overnight.

All sample bottles were directly filled from the bailer using a top-emptying device or directly from the Well Wizard tubing. Volatile organic analyses (VOA) vials were filled as replicate samples while other sample bottles were filled proportionately between U.S. EPA and facility containers. Replicate volatile organic samples and splits of all other samples were offered to ACSL. In addition, one trip blank, two field blanks, and two field duplicate samples were shipped from the site. A total of 28 field samples were collected at the facility, including QA/QC samples. No samples for immiscible components were taken from any wells. Two surface water samples were taken from Trier Ditch, a stream located on the northwest boundary of the site. One was designated an upstream sample while the other was designated a downstream sample.

b) Sample Locations

Table 3 shows a listing of the sampling locations of wells and surface water samples. Wells used by ACSL for sampling points for RCRA compliance are listed. Well locations may be determined from Figure 2.

^RTrademark

T A B L E 3

SAMPLING LOCATION LISTING FOR ADAMS CENTER SANITARY LANDFILL

SAMPLE LOCATIONS FOR BOTH WATER LEVEL MEASUREMENTS AND SAMPLING DURING THE INSPECTION*

<u>RCRA MONITORING WELLS</u>	<u>STATE MONITORING WELLS</u>	<u>STATE MONITORING WELLS</u>
MW-R1 (up)**	MW-A	MW-3A
MW-R2 (up)**	MW-B	MW-3B
MW-R3 (up)**	MW-E	MW-4
MW-R4	MW-K	MW-7B
MW-R5	MW-N	MW-9
MW-R6	MW-7A	MW-MO
MW-R7		

SURFACE WATER

TR-UP
TR-DN

PIEZOMETERS MEASURED FOR WATER LEVEL

PZ-G-01A	PZ-G-06B	TM-1
PZ-G-01B	PZ-G-07A	TM-2
PZ-G-02A	PZ-G-07B	TM-3
PZ-G-02B	PZ-G-07C	
PZ-G-03A	PZ-N	
PZ-G-04A	PZ-O	
PZ-G-04B	PZ-P	
PZ-G-05A	PZ-Q	
PZ-G-05B	PZ-R	
PZ-G-06A	PZ-U	

* Samples were analyzed for parameters listed in Table 2.

**Identified by ACSL as upgradient wells.

c) Quality Control and Quality Assurance

Quality assurance and quality control (QA/QC) for EPA contractor sample collection, handling, and analysis was conducted in accordance with the Hazardous Waste Ground-Water Task Force - Protocol for Ground-Water Evaluation (U.S. EPA, 1986b).

The Task Force prepared and submitted to the contract laboratories two types of blanks during the inspection period. Two field blanks, produced for the full parameter set, were prepared by pouring high-purity, distilled, deionized (HPLC) water into the appropriate sample containers after the wells were sampled. One set of trip blank samples was brought to the site by the Task Force contractor and sent to the laboratory with the other sample sets. No equipment blank samples were taken at this site, since all sampling equipment used was provided by ACSL and was dedicated equipment. Two field duplicate samples were collected at the site. All of the blank and duplicate samples were submitted to the laboratories with no distinguishing labels or markings. Locations and EPA sample numbers of the blank and duplicate samples are as follows:

<u>Sampling blank/Duplicate</u>	<u>EPA Number</u>
Trip Blank	MQB360
Field Blank (taken at MW R05)	MQB365
Field Blank (taken at MW R07)	MQB379
Field Duplicate (MW R06)	MQB368
Field Duplicate (MW R06)	MQB377
Field Duplicate (MW-MO)	MQB353
Field Duplicate (MW-MO)	MQB373

All field measurement equipment, including turbidity meters, pH meters, and conductivity meters were calibrated daily during the sampling event.

d) Custody and Sample Handling

All samples collected by the Task Force were shipped to the following contractor laboratories: CE-EMSI, in Camarillo, California (organics); Centec Laboratories, Salem, Virginia (inorganic and indicator analyses); and CompuChem Laboratories, Inc., Research Triangle Park,

North Carolina (dioxin and furan analyses). Shipping was in accordance with applicable DOT regulations (40 CFR 171-177). All samples were characterized for the laboratories by the Task Force as low-level groundwater or low-level surface water. Each sample shipment was accompanied by a Chain-of-Custody record. This form identified the contents of the shipment by sample type, date, time, sample number, etc. The original custody form accompanied the shipment, and a copy was provided to the Field Team Leader. Samples taken from the site by EPA personnel were documented with a Receipt for Samples form. The facility was offered splits but declined to accept them.

D. WASTE MANAGEMENT UNITS AND OPERATIONS

1) Introduction

Adams Center Sanitary Landfill (ACSL) is located on a 151 acre tract in the northeast quarter of Section 21, Township 30 North, Range 13 East, in Fort Wayne, Allen County, Indiana (See Figure 1). The site is bordered on the east by Adams Center Road, the northeast by the Penn Central Railroad, and the northwest, west, and south by vacant land or farmland. In addition, a stream known as Trier Ditch borders the northwest corner of the property. The facility is owned and operated by Adams Center Sanitary Landfill, Inc., which is a wholly-owned subsidiary of Chemical Waste Management, Inc. The site was acquired when Chemical Waste Management purchased SCA, Inc., in September, 1984 (ACSL, 1986).

At the time of the Task Force investigation, ACSL was authorized to receive and manage virtually every type of hazardous waste identified and listed in 40 CFR Part 261. This included containerized or bulk solids and containerized liquids and slurries. Wastes accepted at the facility were sent directly to the landfill or temporarily stored to await treatment on-site or to be transferred to an off-site treatment facility. At the time of the Task Force investigation, ACSL did not accept municipal garbage. The facility operated two regulated units: a container handling unit, and a landfill (ACSL, 1986).

During the investigation, landfill operations were taking place in the Phase II section of the site (see Figure 2). Phase II, Phase III, and future expansion into Phases IV and V will use the "expanding area method", where succeeding cells are constructed while the previous cell is being filled. The cells are being developed to meet minimum technology requirements and will include double synthetic liners and leachate collection and removal systems. The Phase I section of the landfill is no longer active, and was constructed before minimum technology requirements were enacted.

At the time of the investigation, the facility handled both hazardous and non-hazardous wastes, primarily in solid form, although containerized liquids, sludges, and slurries were also received. Incoming wastes were sampled and analyzed to determine that they met waste manifest specifications and to assess the need for processing prior to landfill disposal. The facility did not accept radioactive wastes (as regulated by the NRC), infectious wastes, some explosive and shock-sensitive wastes, organic oxidizing agents, pressurized gases, air- or water-reactive wastes, dioxin-contaminated wastes, or PCB-contaminated wastes (ACSL, 1986). In the past, the landfill operated a sanitary (non-hazardous) disposal area. The sanitary disposal area is located on the western half of the site and has not received wastes since October 1985.

The Interim Status disposal areas included the hazardous waste areas on the eastern half of the site. The hazardous waste facilities are isolated from the closed sanitary waste landfill by a buffer zone which runs the length of the site. Each landfill has its own surface drainage system, and each portion is ringed by a slurry wall which is intended to isolate ground- water flow within the Atherton 2C.

ACSL has filed both RCRA Part A and Part B permit applications. The RCRA Part B permit application was revised in response to several Notices of Deficiency (NODs) from U.S. EPA and the Indiana State Board of Health and Department of Environmental Management (IDEM) and resubmitted on December 15, 1986.

2) Waste Management Units

a) RCRA Regulated Units Under Interim Status

At the time of the Task Force investigation, there were two operating RCRA-regulated units on-site: a container handling facility, and a landfill (ACSL Part B, 1986). The container handling facility was used to store incoming containers of wastes that were not immediately placed in the landfill (i.e., they contained free liquids or required further testing). This facility is shown in Figure 2. Bulk solid wastes, containerized solids, and stabilized wastes were disposed of directly in the landfill without on-site storage. Stored containerized wastes were accumulated in the drum storage unit for a maximum of 5 days. The unit is designed to hold a maximum of 450 drums in four segregated areas. This includes containers filled with liquids, solids, pumpable and non-pumpable sludges. The container handling facility structure is made of concrete and steel, with a canopy roof and concrete floor. It is walled on the north, south, and east sides. The containment system (floor and sumps) are designed to hold ten percent of the volume of the drums placed in each storage area (ACSL, Part B 1986).

Cells IA, IB, and IC are included in Phase I of the landfill. Landfill cell IA was constructed prior to 1980. It consists of a series of shallow, discontinuous pits. This cell is unlined and does not have a leachate collection system. Cell IB was constructed with a clay liner but does not include a synthetic liner. A leachate collection system, leading to two collection manholes, was installed in cell IB. Cell IC was constructed with a synthetic liner over a 2-foot-thick compacted clay liner and a leachate collection and removal system. Figure 2 shows the location of the Phase I cells. Phase I was inactive at the time of the inspection and had an interim cover. It has not yet received closure certification (ACSL, Part B, 1986).

Phase II was active at the time of the investigation, and was divided into cells IIA and IIB. Phase IIA was constructed in 1985, and was authorized for waste disposal in September 1985. Both of the Phase II cells have 3-foot-thick clay liners overlain by double

synthetic liners. Both also have leachate collection systems. Phases III through V are planned for future disposal activities. Plans incorporating minimum disposal technologies for these areas were being completed at the time of the Task Force inspection. All of the current phases are separated by buffer zones, and are surrounded by slurry walls which are intended to isolate ground water within the Atherton 2C (ACSL, Part B, 1986).

Interim status ground-water monitoring was begun in 1982 at the site. Appropriate parameters were analyzed to provide baseline data. In December 1984, a ground-water assessment was begun, as a result of statistically significant increases in specific conductance in a downgradient well. ACSL concluded that these increases were due to naturally occurring variances in the water in the monitored aquifer (Atherton 2B) and not to a release from the waste management units. It was also concluded by ACSL that the designated upgradient well was not always upgradient due to water level fluctuations (Aware, 1984). In 1985, the RCRA monitoring system was upgraded with additional monitoring wells. In November 1985, U.S. EPA issued an administrative complaint alleging ground-water monitoring violations. In September 1986, a consent agreement with U.S. EPA was signed, and a ground-water quality assessment plan was submitted which included plans for installation of additional monitoring wells and for sampling and analysis of hazardous constituents. In addition, a revised RCRA Part B permit application was submitted. No corrective actions had been undertaken at the site at the time of the Task Force inspection.

b) Pre-interim Status Units

A landfill operation has existed on this site since before 1974. Non-hazardous (domestic) wastes were accepted prior to the beginning of interim status and up until 1984. These sanitary wastes were disposed of on the western half of the site. This section of the property has been capped and closed, and a slurry wall placed around the perimeter. There is an area of vacant land (utility right-of-way) between the old landfill and the hazardous waste disposal areas (ACSL, 1986).

It is not known when Phase I of the hazardous waste landfill began accepting wastes, although it was prior to the beginning of interim status monitoring and possibly before 1974. Phase I landfilling methods and structure are discussed in Section D-2a. Two field studies were conducted at the site prior to the initiation of RCRA monitoring. One was performed in 1974 by Michigan Testing Engineers, Inc., and the other was performed from 1979 to 1981 by James D. Andrews, P.E.. The Michigan Testing Engineering Study included the installation of monitoring wells MW-A, MW-B, and MW-C. These wells were first sampled in June 1976, the beginning of ground-water monitoring at the site. The study performed by James D. Andrews, P.E. included the installation of wells MW-I (MW-R2), MW-H (MW-R3), MW-JO, MW-MO, and MW-K, as well as an investigation of subsurface conditions at the site. Quarterly interim status monitoring was begun in 1982 (Golder Assoc., 1986).

c) Waste Characterization

RCRA hazardous wastes have been disposed at the facility from 1980 until the present. Plans for the facility include an expansion of waste handling capability and the opening of additional hazardous waste disposal areas.

d) Site Operation

- Waste Disposal

Wastes are disposed of in the landfill cells. Each succeeding cell is constructed while the previous cell is being filled. Drummed wastes are disposed of directly in the cells. Wastes disposed of include containerized or drummed solid waste (approximately 25% by volume), stabilized waste, and bulk solid waste (both together approximately 75% by volume). The location of the wastes disposed of in the landfill is recorded daily, using the three-dimensional coordinates of the active work area. Incompatible wastes are segregated prior to landfiling, and are disposed of in different areas of the active landfill, separated by berms. Drummed wastes which contain free space may be crushed to reduce their volume, or will be filled with inert materials, such as absorbents or clean fill (ACSL, 1986).

- Leachate Handling

A leachate collection system has been or will be included in all landfill phases except for Phase IA and IB. The liquid levels in each leachate collection sump are monitored as described in the site Inspection Plan. Liquid is removed from all leachate risers or collection manholes by pump or vacuum truck. All liquids removed from the existing manholes are transported off-site for treatment. In the future, liquids will be temporarily stored on-site in an above-ground tank prior to being treated in a proposed leachate pretreatment facility. No free liquids or unstabilized drummed liquids are disposed of in the landfill, minimizing inputs of liquid materials. Rainfall infiltration is minimized during active landfilling by a combination of slopes and berms, or rainwater is pumped off ponded areas on the landfill to minimize the quantities of leachate generated (ACSL, 1986).

- Surface Water Control and Discharge

Surface runoff and runoff from various areas of the facility were controlled by the use of natural and artificial diversion structures, such as ditches and berms. In the future all developed areas of the facility will be channelled and runoff will be collected into runoff collection basins. Surface runoff from the active landfill operations area is collected as part of the leachate collection system and is treated as leachate. Runoff from other parts of the site is directed into stormwater retention basins. Retained stormwater is tested, then discharged to Trier ditch, according to NPDES permit (ACSL, 1986).

E. SITE GEOLOGY AND HYDROGEOLOGY

1) Introduction

The hydrogeological information presented in this report incorporates data and interpretations derived from ACSL's consultant's reports and does not imply Task Force concurrence. Areas of disagreement between the consultant and U.S. EPA and the IDEM staff members are noted in the following text. The ACSL facility is located in a glaciated area of gently undulating topography, approximately 4 miles southeast of the

center of Fort Wayne. The site comprises a total area of approximately 150 acres at an elevation ranging from 754 to 817 feet above MSL. The land surface at the site generally slopes to the northwest towards Trier Ditch.

2) Hydrogeologic Units

The following material is a summary of information provided in the Draft Report, Hydrogeologic Characterization, Adams Center Facility, Adams Center Sanitary Landfill, Inc. (1986) by Golder Associates.

The facility is underlain by thick glacial deposits of late Pleistocene age which overlie Devonian bedrock. The bedrock consists of dolomites and limestones, and are usually not considered to be of importance to the site hydrogeology due to their depth (60-80 feet) and due to the presence of confining layers above. In descending order (by depth) the generalized stratigraphic sequence for the overburden is as follows:

- New Holland Till - silt and clay with varying amounts of sand and gravel, present at or very near the surface across the entire site. Contains discontinuous sand and silt lenses, and jointing is common in the upper portions. The unit is of sufficiently low permeability to be considered an aquitard relative to the underlying Atherton 2C sand unit. Average undisturbed thickness of the unit is approximately 12 feet.
- Atherton 2C Sand - fine to coarse sand with a trace of silt and varying amounts of fine gravel. The unit ranges in thickness from 0 to 7.5 feet and averages 2.2 feet thick in the vicinity of the site. The unit, though consistently present beneath the southern half of the site, is absent in areas east and south of the site and in the vicinity of MW-R2, MW-MO, Pz-Q, PZ-R, PZ-G-02A. This sand unit has been partially excavated beneath portions of the hazardous waste disposal units, and is considered to be in hydraulic connection with those units.
- Upper Trafalgar Till - silt and clay with a trace to some fine to coarse sand and gravel. Discontinuous lenses of less dense, possibly reworked till (may be interpreted as a transition zone) have been observed at the top of this unit. The transition zone, which contains a basal sand bed is consistently present at the northern half of the site (see Figure 3). The average thickness of the upper Trafalgar Till below the site is 22 feet. This till

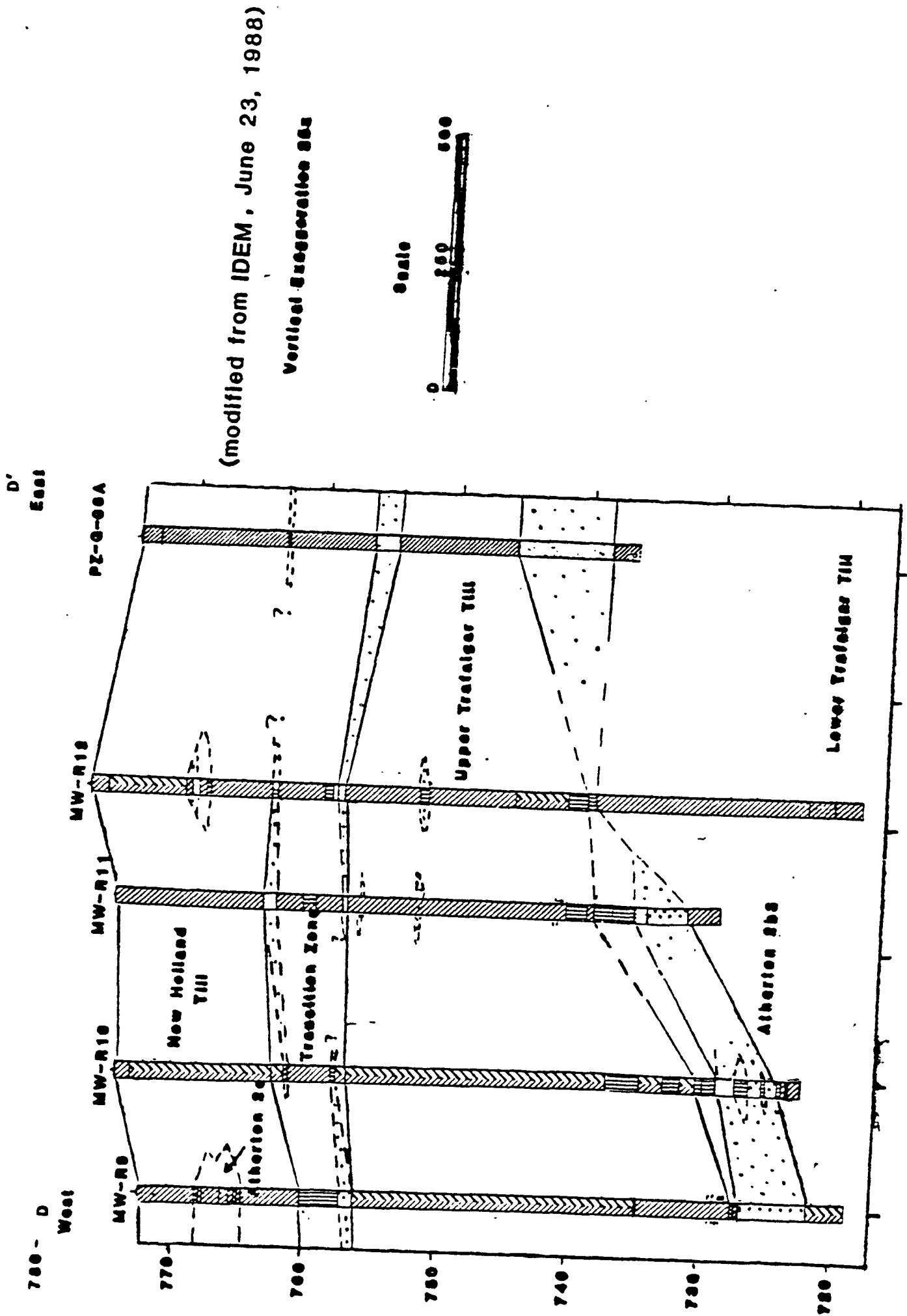


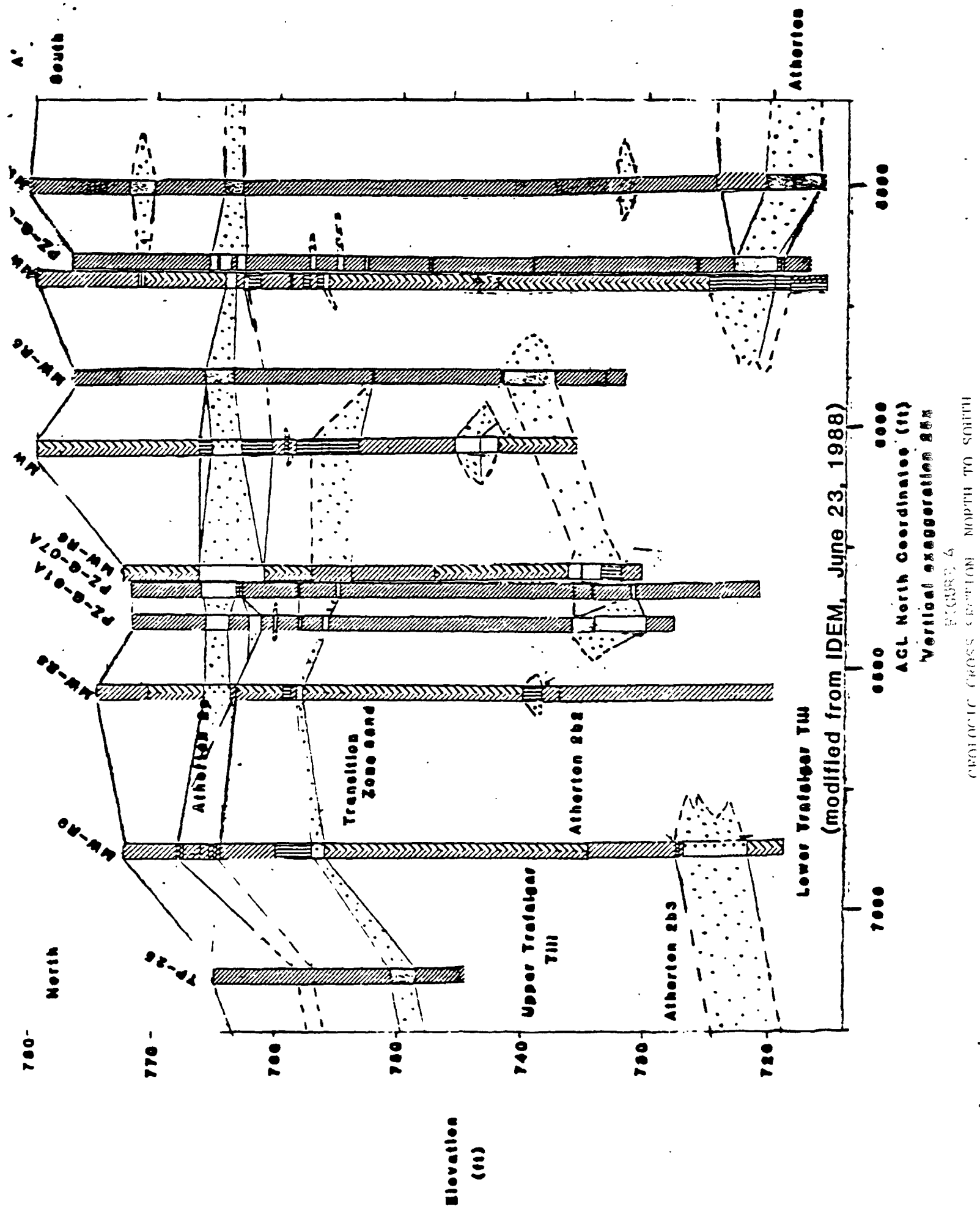
FIGURE 3
GEOLOGIC CROSS SECTION, WEST TO EAST

is highly overconsolidated and is extremely dense. It is considered to be an aquitard that confines the underlying Atherton 2B sand. However some vertical connections are thought to exist, allowing the Upper Trafalgar Till to recharge the Atherton 2B.

- Atherton 2B Sand - fine to medium sand with a trace of silt and varying amounts of gravel. The silt and clay content increases in the vicinity of MW-R7. The unit is predominantly silt near PZ-G-07A and CB1-2B. The unit is thicker and better sorted towards the southern and eastern portions of the site, and generally thinner and finer-grained at the northern part of the Phase III Landfill. At the western boundary of the Phase I, II and III landfill areas, this unit does not form a continuous sand layer but consists instead of lenticular sands at different elevations, which may be interpreted as sub units of the Atherton 2B (see Figures 3 and 4). The Atherton 2B sand is an artesian aquifer confined within the Trafalgar Till, and it ranges in thickness from approximately 3 feet in the Phase III area, to over 19 feet near the southern site boundary. Both the surface and base of the unit generally slope north and west at 0.007 to 0.011 ft/ft.
- Lower Trafalgar Till - similar to the Upper Trafalgar Till, this unit is approximately 25 feet thick. The underlying Atherton 2A sand is 12 feet thick where penetrated in the region. The Task Force evaluation of available hydrogeological data did not result in absolute concurrence with the stratigraphic interpretations but forth by ACSL consultants.

3) Hydraulic Conductivities and Ground-Water Flow

ACSL's consultants contended that the Atherton 2B sand was the principal water-bearing unit to be monitored by the facility at the time of the Task Force evaluation. Ground-water recharge to the Atherton 2B sand is primarily by infiltration of precipitation through the overlying till. Because of differences in the hydraulic conductivity between the various till and sand units, ground-water flow in the Atherton 2B is predominantly horizontal from areas of higher to lower elevation and vertically downward through the tills to the Atherton 2B. On a regional scale, the flow gradient of the unit is to the north. From data collected since October, 1985, flow in the vicinity of the site is generally to the north-northwest. A steeper gradient north of the Phase II area is probably due to the higher head loss resulting from flow



(modified from IDEM, June 23, 1988)

AGL North Coordinates (ft)
Vertical exaggeration 25x

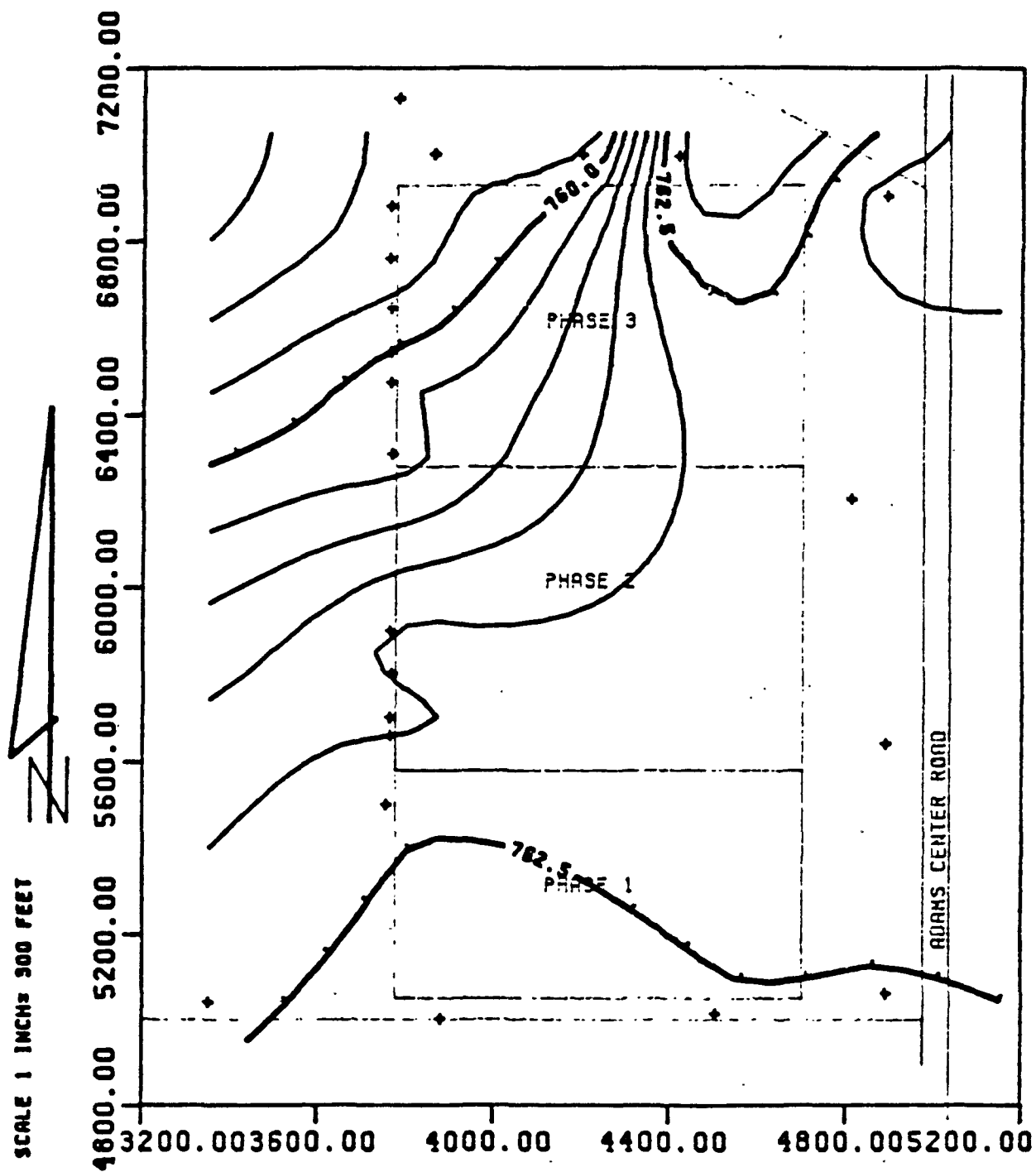
FIGURE 4
GEOLOGIC CROSS SECTION NORTH TO SOUTH

through the finer-grained and thinner materials present in the aquifer in this area. The hydraulic gradient ranges from 0.0009 to 0.0011 ft/ft in the Phase I and II portions of the site, and is an order of magnitude greater in the vicinity of Phase III.

Figures 5 and 6 show the potentiometric surface of the Atherton 2B. These figures indicate a predominantly northwest ground-water flow direction at the site. However, Figure 6, which incorporates a more detailed interpretation as presented by IDEM (a smaller contour interval is employed), suggests that a ground-water divide exists at the eastern part of the site creating eastwardly ground-water flow at this part of the site. The Figure 6 interpretation includes MW-12 water level data which is believed to be representative of the Atherton 2B potentiometric head at this location. Figure 3 shows a strong correlation for the Atherton 2B at MW-12 and adjacent wells. Water level elevations of the Atherton 2C are shown in Figure 7.

Hydraulic conductivity values obtained from 1985 and 1986 data (Golder Assoc., 1986) yielded a set of values ranging from 5.0×10^{-3} cm/sec to 2.0×10^{-2} cm/sec (average value, 1.0×10^{-2} cm/sec, horizontal values) for the Atherton 2B sand. A minimum flow velocity of about 25 ft/yr in the northwestern portion of the site, and a maximum velocity of 150 ft/yr is calculated for the southeastern part of the site. The vertical hydraulic conductivity of the Upper Trafalgar Till was estimated to be 8.0×10^{-7} cm/sec, with a vertical transport velocity of 2 to 3 ft/yr.

There has been disagreement between U.S. EPA and ACSL regarding the significance of the Atherton 2C as the uppermost aquifer beneath the site. Since portions of the Atherton 2C have been excavated beneath the landfilled areas, and since ACSL contends that the slurry wall cuts off the Atherton 2C from the landfilled areas, ACSL has maintained that the Atherton 2B is the uppermost aquifer, which would be the first to indicate potential ground-water contamination from the site. EPA has contended that the Atherton 2C unit should be monitored in addition to the Atherton 2B. This issue was addressed in the Consent Agreement and



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

DATE: 05/20/88

DRAWN BY: HRT

SITE= POTENTIOMETRIC SURFACE 01/05/88 ACSL

FIGURE 6
POTENTIOMETRIC SURFACE OF THE ATHERTON 2B
JANUARY 5, 1988

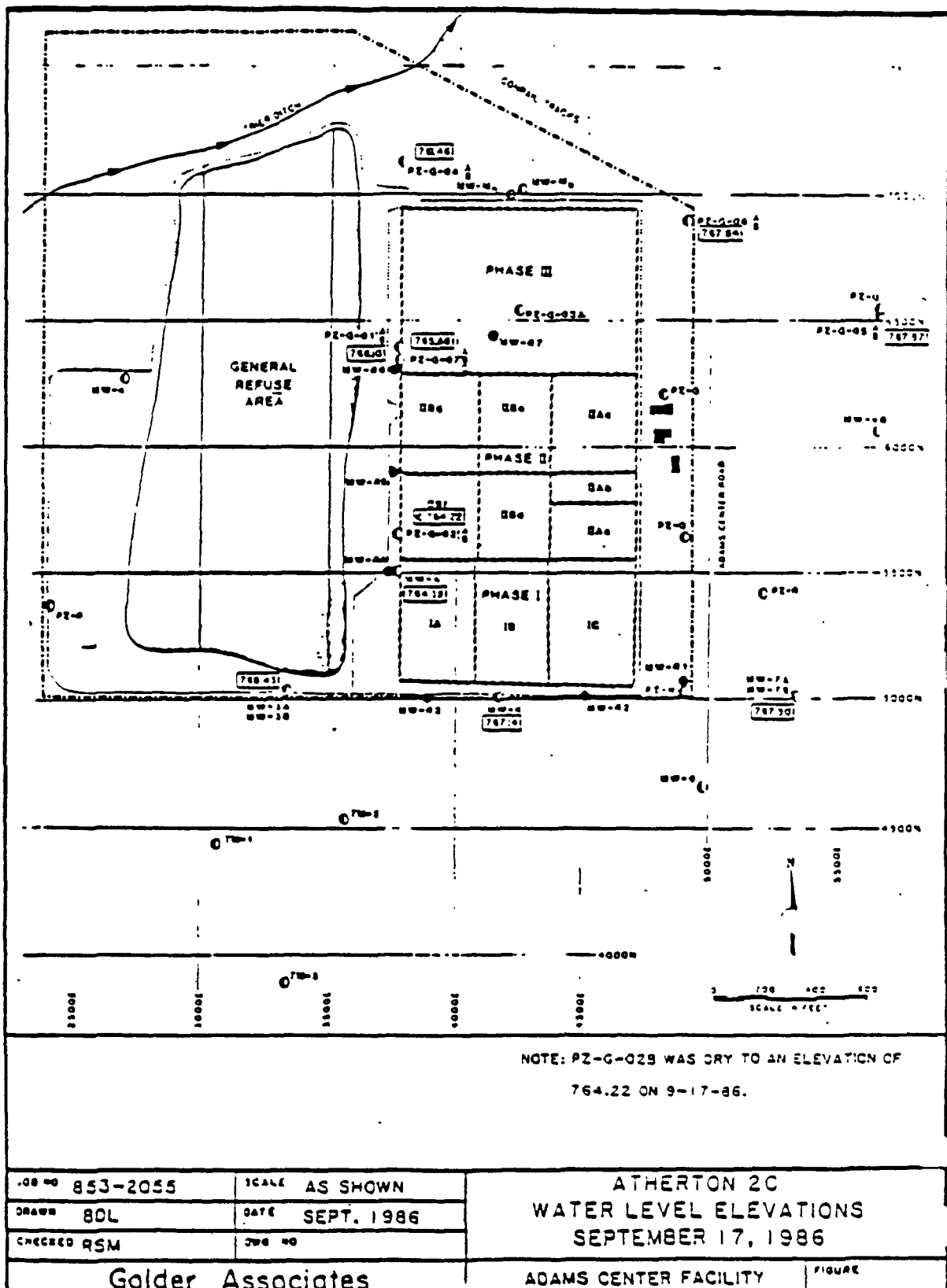


FIGURE 7
 ATHERTON 2C WATER LEVEL ELEVATIONS
 SEPTEMBER 17, 1986
 (GOLDER ASSOCIATES, 1986)

Final Order, dated September 23, 1986 (U.S. EPA, 1986a): As a result of this order, ACSL was required to perform a ground-water quality assessment that was to include monitoring of the Atherton 2C.

F. GROUND-WATER MONITORING PROGRAM DURING INTERIM STATUS

1) Regulatory Requirements

ACSL is required to monitor groundwater under the requirements of 320 IAC 4.1-20 (Indiana State Code), and 40 CFR Part 265, Subpart F, for interim status facilities. In addition, ACSL is required to comply with 40 CFR Part 270.14(c), regarding their Part B permit application.

2) Ground-Water Monitoring System

a) Monitoring Well History

Ground-water monitoring at ACSL was initiated in June, 1976, with the sampling of wells MW-A, MW-B, and MW-C, installed under the supervision of Michigan Testing Engineers (MTE). Additional monitoring wells, including MW-I (MW-R2), MW-H (MW-R3), MW-JO, MW-MO, and MW-K, were installed in 1981 in connection with a hydrogeologic investigation performed by James D. Andrews, P.E., (Golder Assoc., 1986). Since ACSL concluded that the Atherton 2B sand comprised the "uppermost aquifer" at the site, wells MW-I, MW-JO, MW-MO, and MW-C, which are completed in the Atherton 2B, were designated as the RCRA monitoring wells for the site.

In 1982, Wehran Engineering performed a detailed site hydrogeologic investigation, including the installation of 12 additional wells including MW-JN (MW-R5), and W-1 (MW-R4) through W-7B (ACSL, 1986). The above information provided the basis for the ground-water monitoring section of the RCRA Part B permit application submitted in August 1983 by SCA Chemical Services, Inc. Based on the results of the Wehran Investigation, a slurry trench was constructed through the Atherton 2C to attempt to hydraulically restrict flow within the unit (Golder Assoc., 1986). The trench was completed in November 1983, and its location is shown in Figure 2.

In February, 1984, a statistical comparison between measurements in MW-MO (downgradient RCRA well) and MW-I (upgradient RCRA well) showed a statistically significant increase in specific conductance. This was re-evaluated in March 1984, and in response, SCA hired Pollution Control Systems Inc. to develop a ground-water assessment plan. This plan was carried out by AWARE Corp. in 1984, and included a review of the statistical evaluations, more frequent ground-water sampling, and installation of an additional monitoring well and piezometers (PZ-N, PZ-O, PZ-Q, PZ-R, PZ-N) (Golder Assoc., 1986).

Golder Associates, Inc. (Golder) was subsequently asked to provide recommendations for modifications to the existing ground-water monitoring program for the Atherton 2B aquifer. In 1985, Golder installed four new Atherton 2B wells (intended to be RCRA wells), resurveyed all of the wells, measured water levels in all of the wells, and conducted pump tests to obtain values for hydraulic conductivity. In 1986, Golder installed 14 piezometers in the Atherton 2B, the Atherton 2C, and the Upper Trafalgar Till, conducted aquifer tests for hydraulic conductivity in the Upper Trafalgar Till, and monitored head levels in all of the piezometers (Golder Assoc., 1986).

Ground-water monitoring wells present at the time of the Task Force evaluation are illustrated on Figure 8. Four of the wells (MW-R2 through MW-R5) were included in the original monitoring program for the site. The other wells were added to upgrade the system. The upgradient wells are MW-R1 through MW-R3, and are located along the southern compliance boundary of the site. The rest are downgradient wells, located along the westerly compliance area boundary and north of the Phase II development area.

The September 23, 1986, CAFO requires the installation of additional monitoring wells to increase the number of downgradient monitoring wells necessary to ensure immediate detection of statistically significant amounts of hazardous waste or hazardous waste constituents that may migrate from the hazardous waste management area to the uppermost aquifer. A summary table of monitoring wells and piezometers installed during 1976 to 1985 is given in Table 4.

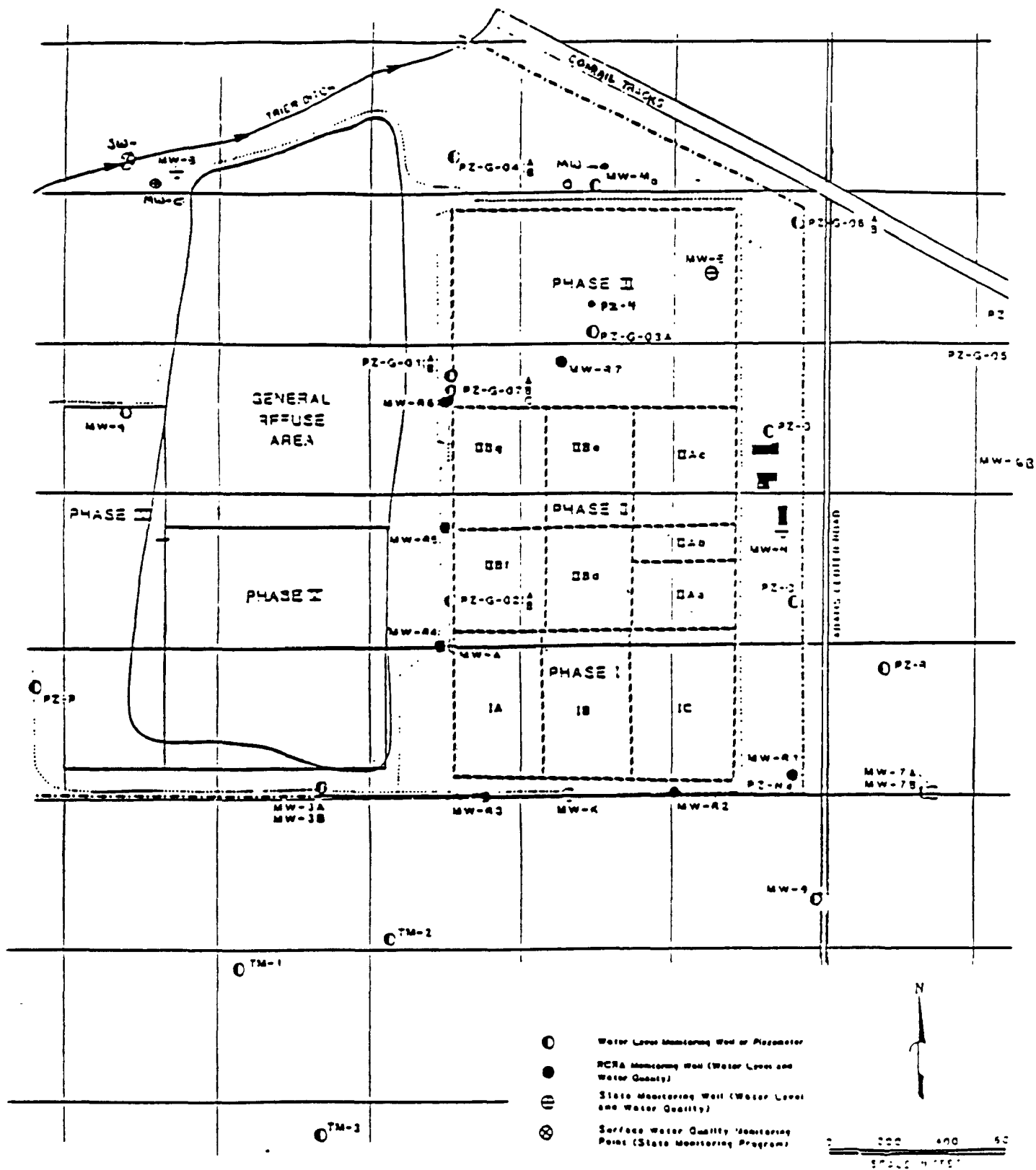


FIGURE 8
PIEZOMETER AND MONITORING WELL LOCATIONS
(ACSL PART B APPLICATION, 1986)

TABLE 4

WELL AND PIEZOMETER INSTALLATION AND WATER LEVEL DATA,
ADAMS CENTER SANITARY LANDFILL
(ACSL, 1986)

WELL/ PIEZOMETER	INSTALLATION DATE	PRIMARY FUNCTION MONITORING(1)	WELL CONSTRUCTION(2)	MEASURING POINT ELEVATION (101.1)	MEASURING POINT ELEVATION (101.1)	DEPTH FROM LAND SURFACE (101.1)	EFFECTIVE SCHEDULE INTERVAL					
							WATER LEVEL ELEVATION ON 9-6-85 (101.1)	WATER LEVEL ELEVATION ON 10-30-85 (101.1)	WATER LEVEL ELEVATION ON 11-12-85 (101.1)	WATER LEVEL ELEVATION ON 12-6-85 (101.1)		
WM - R1	11-3-85	ALH-20	4	PVC	100.31	14.5 - 50.0	101.4 - 101.7	-	-	101.13	101.60	101.29
WM - R2	3-81	ALH-20	4	STEEL	100.60	32.0 - 55.0	101.0 - 101.3	100.46	100.35	100.15	101.07	101.39
WM - R3	3-81	ALH-20	4	STEEL	101.01	34.0 - 57.0	101.6 - 101.9	100.47	100.40	100.28	100.98	101.22
WM - R4	9-82	ALH-20	4	STEEL	102.02	34.0 - 63.0	101.6 - 101.9	100.4	100.4	100.49	100.48	100.82
WM - R5	1-82	ALH-20	4	STEEL	101.23	32.5 - 63.5	101.3 - 101.6	100.10	100.08	100.07	100.15	100.12
WM - R6	11-3-85	ALH-20	4	PVC	101.35	30.5 - 42.5	100.3 - 101.6	-	-	100.91	100.52	100.63
WM - R7	11-4-85	ALH-20	4	PVC	101.43	28.3 - 48.9	101.3 - 101.7	-	-	102.08	101.60	101.63
WM - A	1976	ADH-20	4	STEEL	101.55	-	-	-	-	-	101.91	101.80
WM - E	11-10-81	ADH-20	4	STEEL	101.10	18.0 - 26.0	100.2 - 101.2	-	-	-	101.07	101.05
WM - M2	9-81	ADH-20	4	STEEL	101.59	28.0 - 41.0	100.3 - 101.3	100.11	100.64	100.48	100.03	100.43
WM - M4	6-23-84	ADH-20	2	PVC	101.99	20.0 - 34.0	101.0 - 102.0	100.26	-	-	-	-
WM - 3A	9-82	ADH-20	4	STEEL	100.01	20.5 - 27.5	100.0 - 101.0	-	-	-	101.28	101.80
WM - 3B	9-82	ADH-20	4	STEEL	101.03	18.0 - 26.0	100.3 - 101.1	-	100.95	101	100.62	100.88
WM - 4	9-82	ADH-20	4	STEEL	100.00	18.0 - 26.0	100.3 - 101.1	101.13	100.07	100.95	101.34	101.80
WM - 6B	1-83	ADH-20	4	STEEL	101.10	34.0 - 47.0	101.6 - 102.6	-	100.02	100.88	100.34	100.34
WM - 7A	1-83	ADH-20	4	STEEL	101.50	21.0 - 28.0	102.6 - 103.6	-	-	-	102.05	101.05
WM - 7B	1-83	ADH-20	4	STEEL	101.10	20.5 - 27.5	100.3 - 100.9	-	100.51	100.15	101.03	101.21
WM - 8	11-8-85	ADH-20	4	PVC	101.01	21.0 - 28.0	101.4 - 102.0	-	-	100.34	101.25	102.46
PE - M	9-84	ADH-20	3	STEEL	100.21	21.0 - 28.0	102.3 - 103.3	100.95	100.10	100.15	100.44	101.11
PE - O	9-84	ADH-20	3	STEEL	101.21	21.0 - 28.0	102.3 - 103.2	100.16	100.99	100.90	100.79	100.99
PE - P	9-84	ADH-20	1.5	STEEL	101.21	21.0 - 28.0	102.3 - 103.6	102.26	101.51	101.43	101.49	101.37
PE - Q	9-84	ADH-20	1.5	STEEL	100.09	21.0 - 28.0	102.3 - 103.9	100.32	100.16	100.03	100.90	101.16
PE - R	9-84	ADH-20	1.5	STEEL	101.20	21.0 - 28.0	102.3 - 103.2	-	100.19	100.07	-	-
PE - U	6-84	ADH-20	1.5	STEEL	101.11	21.0 - 28.0	102.3 - 103.2	-	101.10	101.12	101.13	101.90
IM - 1	6-84	ADH-20	2	PVC	100.02	21.0 - 28.0	102.3 - 103.3	-	100.10	100.19	100.95	101.13
IM - 2	6-84	ADH-20	1	PVC	100.52	21.0 - 28.0	102.3 - 103.4	-	100.10	100.44	101.34	101.57
IM - 3	6-84	ADH-20	1	PVC	101.06	21.0 - 28.0	102.3 - 103.3	-	100.11	100.65	101.39	101.57

NOTES:

1. ALH-20 = ALUMINUM 20, ADH-20 = ALUMINUM 20, U-100 = UPPER IMAGINATION 100.
2. 1 = 1.25 INCH PVC, 1.5 = 1.5 INCH PVC, 2 = 2.0 INCH PVC, 3 = 3.0 INCH PVC, 4 = 4.0 INCH PVC (MINIMUM INSIDE DIAMETER).
3. PVC = UP OR PVC CASTING, STEEL = 100% STEEL CASTING.
4. WATER LEVEL MEASUREMENTS IN WM - R1 WAS MADE ON WHEELER 3, 1".
5. WATER LEVEL MEASUREMENTS IN WM - R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100, R101, R102, R103, R104, R105, R106, R107, R108, R109, R110, R111, R112, R113, R114, R115, R116, R117, R118, R119, R120, R121, R122, R123, R124, R125, R126, R127, R128, R129, R130, R131, R132, R133, R134, R135, R136, R137, R138, R139, R140, R141, R142, R143, R144, R145, R146, R147, R148, R149, R150, R151, R152, R153, R154, R155, R156, R157, R158, R159, R160, R161, R162, R163, R164, R165, R166, R167, R168, R169, R170, R171, R172, R173, R174, R175, R176, R177, R178, R179, R180, 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b) Background Ground-Water Quality

ACSL has used data collected since interim status monitoring began (1982) as the statistical base for background water quality. This information was used in calculations that indicated a statistically significant increase in specific conductance (1984), and initiated ground-water assessment. As a result of the ground-water assessment, ACSL concluded that ground-water quality at the site had not been affected. It was also concluded by ACSL that natural variances in the ground-water quality produced the increase in conductivity that preceded the assessment (Aware, 1984). In the revised RCRA Part B permit application, ACSL proposed new indicator parameters. The proposed indicator parameters are the volatile organic compounds (VOCs). These additional indicator parameters were proposed based upon analysis of landfill leachate and materials accepted for disposal.

c) Monitoring Well Construction

The ground-water monitoring wells and piezometers at ACSL have been installed at four different times between 1976 and 1986. Figure 5 has the locations of existing piezometers and monitoring wells on-site. Varying methods of construction have been documented for these wells. Well logs are available for all of the wells installed at the site, and well construction diagrams are provided in the RCRA Part B permit application for all but the James D. Andrews, P.E. wells (ACSL, 1986). Little information is available for the installation of the earliest wells (MW-A, MW-B, and MW-C, installed by MTE). Figures 9 through 12 have the details of typical monitoring well and piezometer construction.

All of the wells are constructed from threaded, flush joint Schedule 40 or Schedule 80 PVC pipe. Inner diameters vary between two and four inches. Screens are of the same material, machine slotted. Wells installed by Wehran have five-foot screens, and filter packs of pea gravel to two feet above the screen. A 2-foot bentonite pellet seal and cement-bentonite grout were used to seal the annular space above the gravel pack. All of these wells are equipped with a steel protective casing and locking cap.

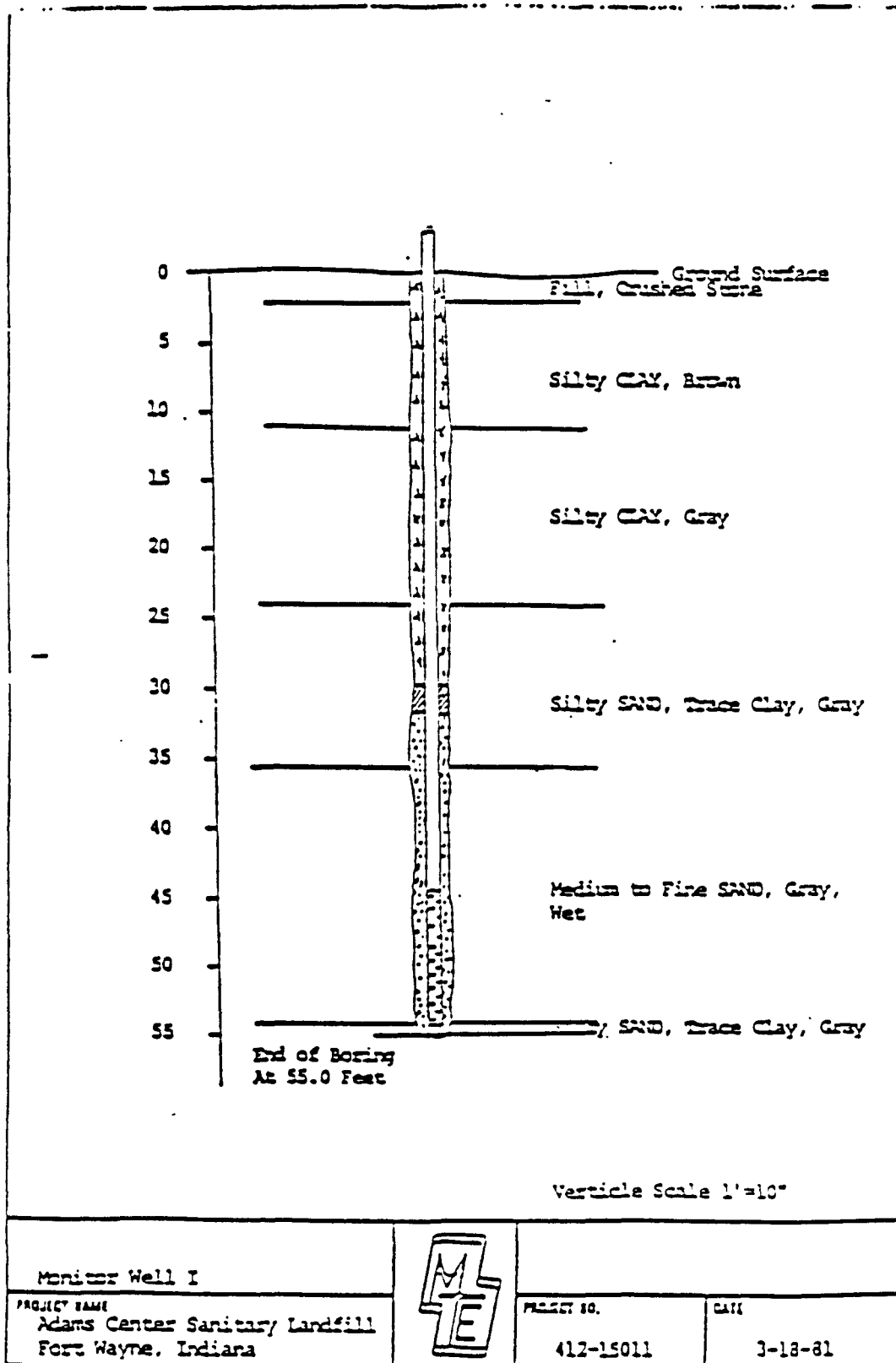


FIGURE 9
 TYPICAL MONITORING WELL CONSTRUCTION FOR WELLS INSTALLED
 BY MICHIGAN TESTING ENGINEERS (MTE), 1976
 (ACSL PART B APPLICATION, 1986)

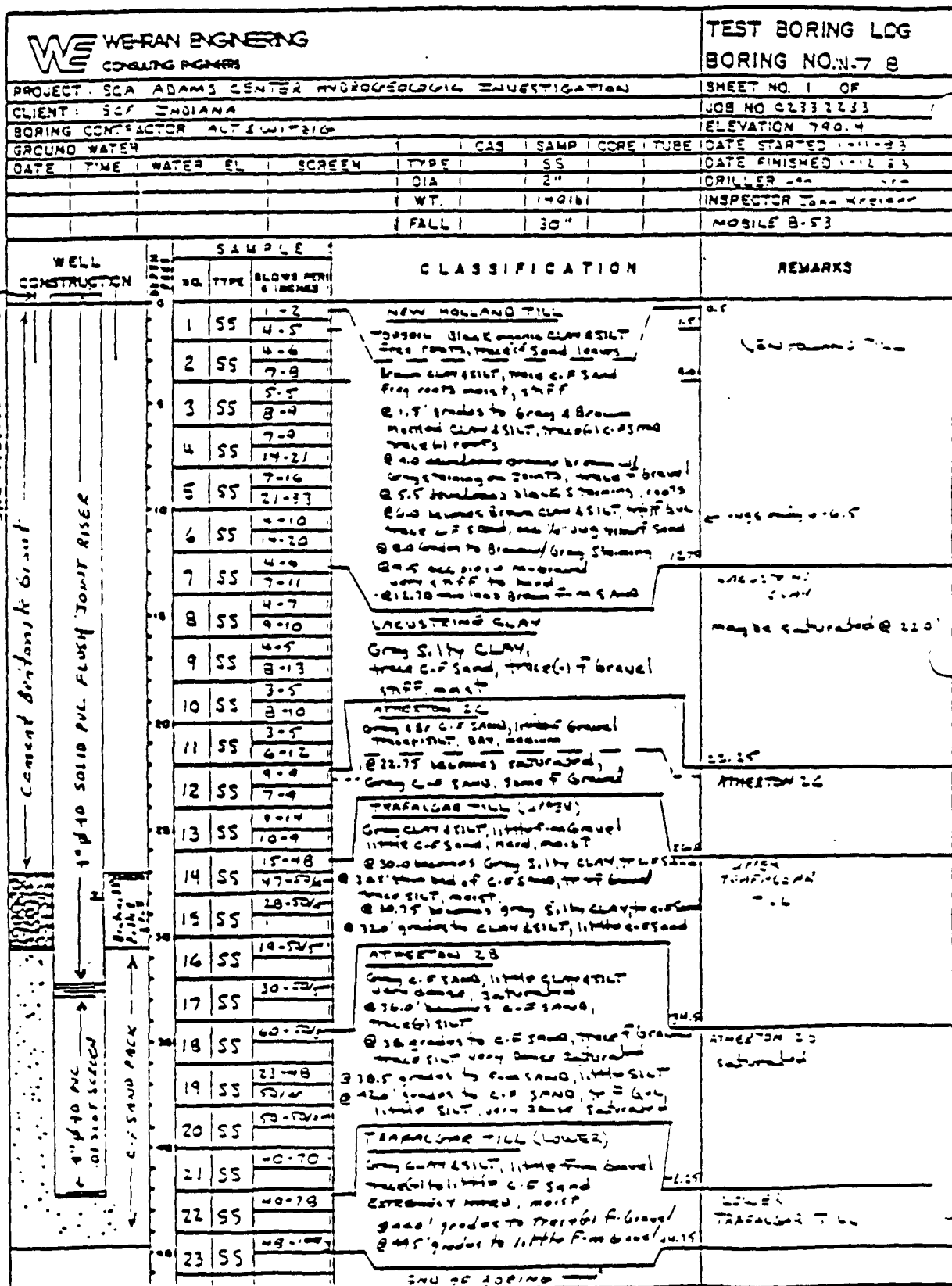
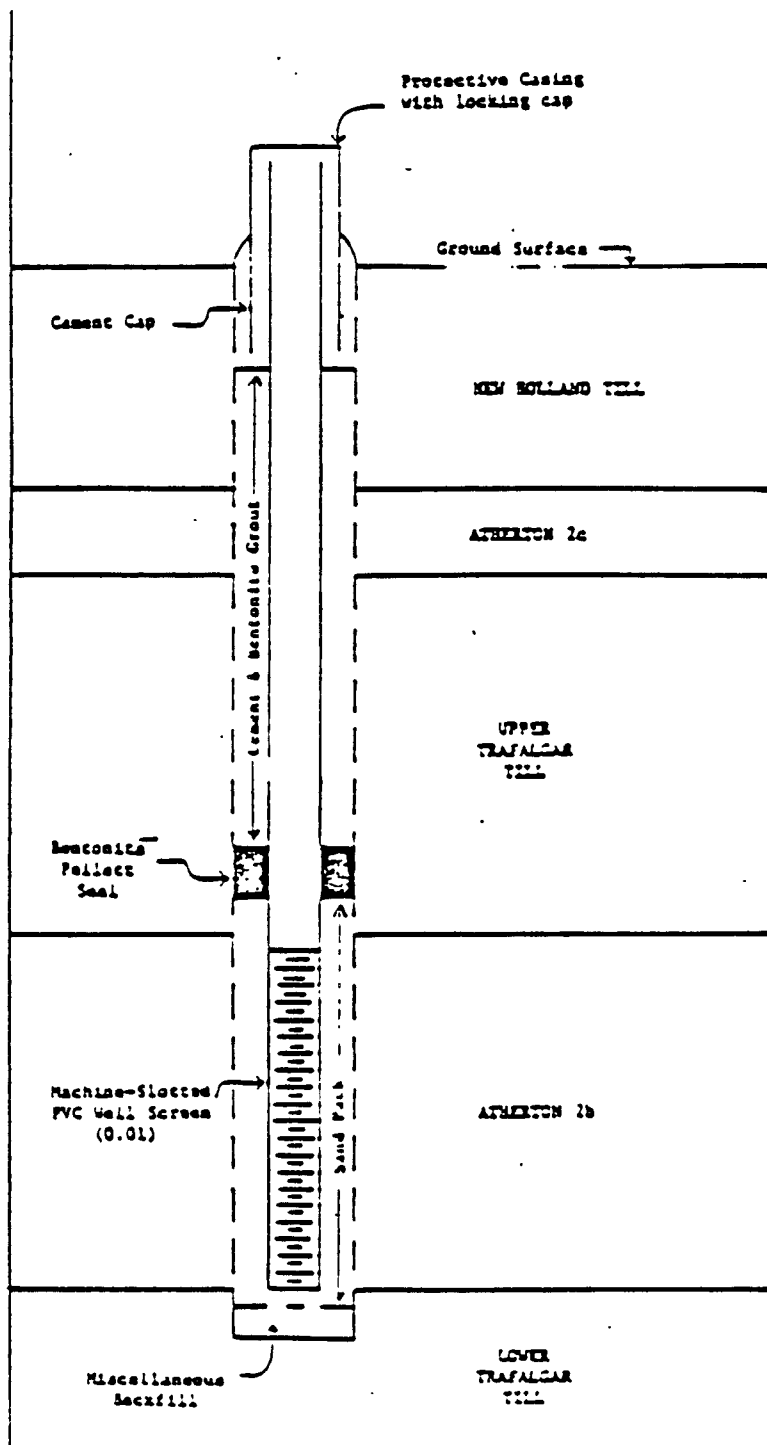


FIGURE 10
TYPICAL MONITORING WELL
CONSTRUCTION DIAGRAM AND BORING LOG
(WEHRAN ENGINEERING)



ADAMS CENTER LANDFILL INC. ,
GROUNDWATER ASSESSMENT

TYPICAL PIEZOMETER DETAIL

ADAMS TOWNSHIP

ADAMS COUNTY

INDIANA

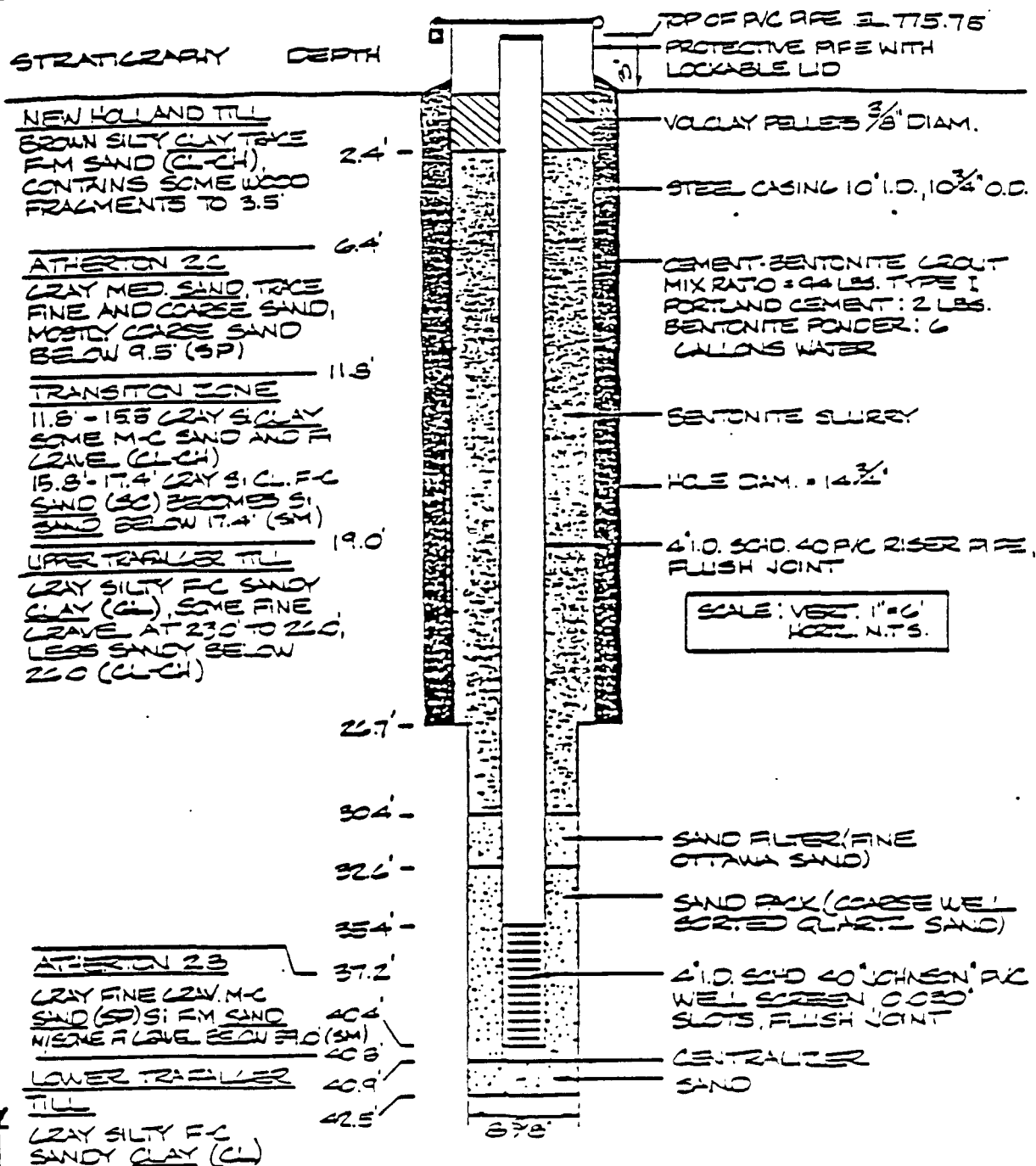
FIGURE

THE
AWARE
CORPORATION

FIGURE 11
TYPICAL PIEZOMETER DETAIL
(AWARE CORPORATION, 1984)

ADAMS CENTER FACILITY
FORT WAYNE, INDIANA

MONITORING WELL
MW-R6



Golder Associates

FIGURE 12
TYPICAL MONITORING WELL CONSTRUCTION
(GOLDER ASSOCIATES, 1985)

Due to the wide variety of compounds disposed of at the site, the Task Force recommends that wells installed at the site be composed of materials which have been proven to be chemically and physically stable under conditions similar to the environment within the saturated zone at the facility.

Piezometers installed by AWARE were either 3-inch or 1.5-inch diameter PVC, (Schedule 40, threaded flush joint) equipped with 10-foot slotted screens. The piezometers were sand packed and sealed in the same manner as described previously.

Golder installed wells in accordance with what ACSL describes as the standard Waste Management, Inc. specifications for monitoring well construction. Ten-inch I.D. steel casing was set and grouted into the Upper Trafalgar Till, the Atherton 2C unit prior to drilling into the Atherton 2B aquifer. Temporary flush-joint steel casing was driven into the Lower Trafalgar Till in borings MW-R1, MW-R6, AND MW-9, to prevent caving. The steel casing was withdrawn as the wells were installed. All of these wells are also constructed of 4-inch I.D. Schedule 40 PVC, with 5-foot slotted screens. The sand pack consists of coarse, well sorted quartz sand placed to two feet above the screen, above which lies a 1-foot thick sand filter of fine Ottawa sand. Above this the annular space is sealed with bentonite slurry to a depth 2 feet below surface. The remaining two feet is sealed with Volclay bentonite pellets and cement. All of the wells have a protective steel casing with locking cap (Golder Assoc., 1986).

3) Sampling and Analysis

a) ACSL's Sample Collection and Handling Procedures

The ACSL uses two sampling and analysis plans. One site-specific and the other a generalized corporate plan. A number of deficiencies were noted in both of these plans:

- Neither plan includes procedures for checking wells for immiscible layers such as low density (floaters) or high density (sinkers) contaminants.

- Neither plan contains documentation of the cleaning procedures used to decontaminate the cable of the water level indicator equipment after each use.
- Neither plan contains procedures for use and cleaning of the in-line filtering equipment used in wells that have pumps installed.
- The general plan requires that total organic carbon (TOC) should be filtered. This is incorrect and may result in a sample biased low.

During the measurement of water level two problems were noted by the Task Force. First, the personnel from ACSL sampling contractor were not using consistent procedures for measuring the water level. There was a discrepancy in which point should be used as the reference elevation of the well. When the ACSL site manager was informed he had all of the reference levels resurveyed. This survey was completed before the Task Force completed its inspection. The second problem found was that some of the wells no longer can be easily identified. The number painted on the well casing has either worn off or has been buried.

Both of these problems can be avoided by including procedures in the site- specific sampling plan documenting where water level measurements should be taken and for periodically checking well casings labels.

b) ACSL's Sample Analysis and Data Quality Evaluation

In May 1987, the Task Force Laboratory Evaluation Team performed an on- site evaluation of two of the three laboratories performing analyses for ACSL, pursuant to RCRA ground-water monitoring activities for ACSL. The laboratories evaluated included Gulf Coast Laboratory, University Park, Illinois (inorganics, TOC, and indicator parameters), and Environmental Testing and Certification Laboratory, Edison, New Jersey (organics analyses). Core Laboratories of Casper, Wyoming, performed the radiochemical analyses for the site. Core Laboratories has been certified by Region VIII for gross alpha, gross beta, radium-226, radium-228, and uranium in drinking water. Data for Core Laboratories was provided courtesy of Region VIII. The purpose of the evaluation was

to establish whether the standard operating procedures of these laboratories produce data of acceptable quality. See Appendix IV for the full evaluation report for these laboratories.

4) Ground-Water Quality Assessment

ACSL initiated a ground-water quality assessment in 1984, following the determination of a statistically significant increase in specific conductivity in ground water monitored by RCRA wells (Atherton 2B aquifer), in accordance with 40 CFR Part 265.93. The assessment was performed by Aware, Inc., and submitted in December 1984 (Aware, 1984). This report concluded that:

- The statistically significant difference in specific conductance at monitoring well MW-MO was due to naturally-occurring concentrations of sodium, sulfate, calcium, and magnesium, and not due to the presence of hazardous waste constituents.
- A ground-water divide exists in the Atherton 2B beneath the southeast quadrant of the site.
- Additional monitoring wells, both upgradient and downgradient, would be required to provide improved monitoring of the system.

Golder Associates was subsequently asked to provide recommendations to increase the responsiveness of the ground-water monitoring program. As a result, the monitoring network in the Atherton 2B was expanded, an inventory of water levels in the Atherton 2B and 2C was taken, and aquifer tests were performed to better define aquifer properties in the Atherton 2B. The findings of this report did not substantiate the conclusion of Aware, that there was a ground-water divide beneath the site. Rather, Golder found that gradient reversals due to variable recharge conditions had occurred in the Atherton 2B. They also concluded that portions of the Atherton 2C had been dewatered as a result of Phase II cell construction (Golder Assoc., 1986).

Interim status monitoring was continued through the assessment period. The sampling and analysis plan originally used during interim status monitoring was revised by 1987 and was included in a revision of the RCRA Part B permit application.

G. GROUND-WATER MONITORING PROGRAM PROPOSED FOR FINAL PERMIT

Permit conditions stipulated by IDEM will include, in addition to the well system approved for interim status, the addition of four wells at the eastern boundary of the site, and a well at the western boundary. ACSL shall implement a detection ground-water monitoring program in accordance with 329 IAC 3-45-9.

H. MONITORING DATA ANALYSIS FOR INDICATIONS OF WASTE RELEASE

During the inspection, samples were collected by U.S. EPA's contractor to determine if the ground-water contained hazardous waste constituents or other indicators of contamination. Samples were collected from 21 field locations, including 19 monitoring wells and two stream locations. Water levels were also measured in the piezometers onsite. Field measurements were made at the time of sampling by U.S. EPA's contractor for pH, specific conductance, and turbidity. Laboratory analysis results were obtained from three U.S. Contract Laboratories participating in the Contract Laboratory Program. Specific organic compounds were analyzed at CE-EMSI, dioxin and furan analyses at CompuChem Laboratories, Inc., and metals and other parameters at Centec Laboratories. Appendix II gives a summary of analytical techniques and reference methods, by parameter, for sample analyses. Also, in Appendix II is a summary of results of field measurements. Appendix III includes a summary of all other analytical results.

Several wells contained organic constituents at levels greater than the method detection limit. Trichloroethene was detected in well MW-Mo (4 ug/l, 3 ug/l (duplicate)); cyclohexanol was found in well MW-R06 (50 ug/l), Trier Ditch upstream (20 ug/l), and Trier Ditch downstream (10 ug/l); 1,2- dichlorobenzene was detected in well MW-A (3 ug/l); nitrobenzene was found in well MW-A (3 ug/l); and vinyl chloride was found in well MW-C (1 ug/l).

Total lead levels were detected in 6 wells, MW-B (20 ug/l), MW-07B (6.2 ug/l), MW-07A (17 ug/l) MW-K (31 ug/l), MW-C (128 ug/l) and MW-E (104 ug/l). The level in the last two wells is greater than the 50 ug/l lead limit given in Appendix III-EPA Interim Drinking Water Standards, 40 CFR Part 265.

Arsenic was detected in 5 wells; MW-R04 (8.3 ug/l), MW-K 17 (ug/l), MW-Mo (18 ug/l), MW-Mo (10 ug/l)(duplicate), MW-06B (6.2 ug/l) and MW-C (46 ug/l). Chromium was found in four wells; MW-B (15 ug/l), MW-07A (10 ug/l), MW-K (36 ug/l) and MW-C (37 ug/l). High levels of metals commonly found in ground water were also found. These include iron, calcium, sodium, manganese, aluminum, and magnesium.

Samples from six wells and the down stream sample point on Trier Ditch contained Total Phenol. These were wells MW-Mo (60 ug/l), MW-R06 (65 ug/l), MW-B (60 ug/l), MW-R04 (113 ug/l), MW-3B (173 ug/l), MW-06B (105 ug/l) and Trier Ditch (downstream) (113 ug/l).

Chloride levels in two downgradient wells, MW-B and MW-A were six and four times higher respectively than upgradient wells. Sulfates were three to six times higher in three downgradient wells (MW-Mo, MW-4 and MW-K). Two downgradient wells (MW-B and MW-3A) had 7 to 18 times as much purgable organic carbon as upgradient wells.

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APPENDIX I

EVALUATION OF QUALITY CONTROL ATTENDANT TO THE
ANALYSIS OF SAMPLES FROM THE ADAMS CENTER LANDFILL, INDIANA

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prc

Planning Research Corporation

SEP 23 1987

September 18, 1987

Mr. Rich Steimle
Hazardous Waste Ground-Water Task Force (WH-562A)
U.S. EPA
401 M Street, S.W., Room S-6301
Washington, D.C. 20460

Re: Final Memorandum, Adams Center Landfill, Indiana (015-05491903)

Dear Mr. Steimle:

PRC Environmental Management, Inc., is pleased to submit for your review the final memorandum for QA/QC support of Work Assignment No. 549, under TES II entitled "Evaluation of Quality Control Attendant to the Analysis of Samples from the Adams Center Landfill, Indiana.

If you have any questions regarding this submittal, please feel free to contact us.

Sincerely,



Daniel T. Chow

Enclosure

cc: Nancy Deck (letter only)
John McGuire (w/l copy of report)
Gareth Pearson (w/l copy of report)
Maxine Long (w/l copy of report)
Sujith Kumar (w/l copy of report)
Ken Partymiller (w/l copy of report)



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**EVALUATION OF QUALITY CONTROL ATTENDANT
TO THE ANALYSIS OF SAMPLES FROM THE
ADAMS CENTER LANDFILL, INDIANA**

FINAL MEMORANDUM

Prepared for

**U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, D.C. 20460**

Work Assignment No.	:	549
EPA Region	:	Headquarters
Site No.	:	IND078911146
Date Prepared	:	September 18, 1987
Contract No.	:	68-01-7331
PRC No.	:	15-05491903
Prepared By	:	PRC Environmental Management, Inc. (Ken Partymiller)
Telephone No.	:	(713) 292-7568
EPA Primary Contact	:	Rich Steimle
Telephone No.	:	(202) 382-7912

FINAL MEMORANDUM

DATE: September 14, 1987

SUBJECT: Evaluation of Quality Control Attendant to the Analysis of Samples
from the Adams Center Landfill, Indiana Facility

FROM: Ken Partymiller, Chemist
PRC Environmental Management, Inc.

TO: HWGWTF: Richard Steimle, HWGWTF*
Paul H. Friedman, Chemist*
Gareth Pearson, EMSL/Las Vegas*
John McGuire, Region V
Maxine Long, Region V

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 Adams Center Landfill, Indiana 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 (2-5) which contain raw data, statistically transformed data, and graphically transformed data.

The evaluation process consisted of three steps. Step one consisted of generation of a package which presented 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 referenced reports (2-5). 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.

* HWGWTF Data Evaluation Committee Member

I. Site Overview

Twenty-eight field samples were collected at this facility. The samples included two field blanks (MQB365 and 379), a trip blank (MQB360), and two sets of field duplicate samples (well MW-RO6, samples MQB368/MQB377 and well MW-Mo, samples MQB353/MQB373). All samples were designated as low concentration ground-water samples except for samples MQB357 and 366 which were designated as low concentration surface water samples and sample MQB356 which was designated as a low concentration tap water sample. All samples were analyzed for all HWGWTF Phase 3 analytes with the following exception. Sample MQB378 was not analyzed for sulfide.

II. Evaluation of Quality Control Data and Analytical Data

1.0 Metals

1.1 Metals QC Evaluation

Total and dissolved spike recoveries were calculated for twenty-four metals which were spiked into samples MQB376 and 377.

All of the total metal average spike recoveries from these samples were within the data quality objectives (DQOs) for this Program. One individual total metal spike recovery was outside DQO and will be discussed in Section 1.3. The total metal spike recovery for iron from sample MQB377 was not calculated because the amount of this metals in this sample was greater than four times the amount of the spike. This information is listed in Tables 3-1a and 3-2a of Reference 2 as well as in the following Sections.

Twenty-three of the dissolved metal average spike recoveries were within the DQOs for this Program. The average matrix spike recovery for dissolved thallium (73 percent) was outside DQO. Three individual dissolved metal spike recoveries were outside DQO and will be discussed in Section 1.2. This information is listed in Tables 3-1b and 3-2b of Reference 2 as well as in the following Sections.

The calculable average relative percent differences (RPDs) for all metallic analytes were within Program DQOs. RPDs were not calculated for approximately 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 contract required detection limit (CRDL) and thus were not required, or in some cases, not possible to be calculated.

Required metal analyte determinations were performed on all samples submitted to the laboratory.

No contamination involving the metallic analytes was reported in the laboratory blanks. Sampling blank contamination involving total zinc was reported in field blank MQB379 and will be discussed in Section 1.3.

1.2 Furnace Metals

The quality control results for the metals analyzed by graphite furnace atomic absorption analyses (antimony, arsenic, cadmium, lead, selenium, and thallium) were generally acceptable.

The matrix spike recovery for dissolved lead for spiked sample MQB377 (130 percent) was above DQO. As the dissolved lead spike recovery was high and no dissolved lead was detected in any field samples, there was no impact on the dissolved lead results.

A continuing calibration verification (CCV) for total cadmium was above DQO. Total cadmium results for samples MQB357, 366, 368, 371, and 377 were affected and should be considered semi-quantitative, unless otherwise qualified.

Several total arsenic and cadmium samples were rerun but either a CCV was not run with the samples or the results of the CCV were not included with the raw data. Total arsenic results for samples MQB357, 366, 368, 371, and 377 and total cadmium results for samples MQB356, 378, 380, and 382 should be considered semi-quantitative.

A group of dissolved cadmium samples were rerun but either the CCB was not run with the samples or the results of the CCB were not included with the raw data. Dissolved cadmium results for samples MQB353, 355, 366, 373, and 379 should be considered semi-quantitative.

The correlation coefficients for the method of standard addition (MSA) determination of total arsenic in sample MQB380 (46 ug/L reported), total lead in sample MQB374 (17 ug/L), cadmium in laboratory control standard #1, and selenium in laboratory control standard #2 were below DQO. The results for these analytes in the indicated matrices and samples should be considered qualitative. The correlation coefficients for the method of standard addition (MSA) determination of total arsenic in samples MQB355 (32 ug/L reported) and 374 (22 ug/L), total lead in sample MQB378 (16 ug/L), dissolved cadmium in samples MQB357 (58 ug/L) and 366 (33 ug/L), and cadmium in laboratory control standard #2 were also below DQO. The results for these analytes in the indicated matrices and samples should not be used.

The analytical spike recoveries of total selenium in sample MQB363 (no recovery) and dissolved thallium in samples MQB357, 366, and 373 (30 to 36 percent) were below DQO. The negative results reported for all of these samples should not be used as they are possible false negatives.

The double burn precision for dissolved antimony in sample MQB375 and for dissolved selenium in sample MQB355 was above DQO. Results for these analytes in these samples should be considered semi-quantitative.

The dissolved cadmium results for samples MQB357, 358, 364, 366, 370, 371, and 374 were greater than the total cadmium results for those samples. The HWGWTF does not normally require dissolved metals analyses because EPA does not have a standardized field procedure for separating dissolved from total metals. All total cadmium results were reported to be less than the CRDL. The total and dissolved cadmium results for samples MQB358, 370, 371, and 374 should be considered semi-quantitative as dissolved cadmium results near the CRDL were reported. The total and dissolved cadmium results for samples MQB357, 364, and 366 should not be used as larger dissolved cadmium results were reported.

The usability of all graphite furnace analytes is summarized in Sections 5.0 and 5.1 at the end of this Report.

1.3 ICP Metals

The matrix spike recovery for total aluminum in spiked sample MQB377 (70 percent) was below DQO. All total aluminum results should be considered semi-quantitative with raised detection limits and thus an increased probability of false negatives.

The low level (twice CRDL) linear range checks for all total and dissolved tin (45 to 50 percent low recovery), for all dissolved cobalt (20 to 25 percent), and for dissolved silver (30 percent) exhibited low recoveries. The data user should refer to Comment B4 of Reference 3 for a detailed listing of analysis dates, samples affected, and biases. 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 which can be expected by the method for results near the detection limits. The accuracy reported for these metals at low concentrations is not unexpected. Low concentration results for metals with low recoveries would be expected to be biased low.

Total zinc contamination was reported in field blank MQB379 at a concentration of 60 ug/L. The zinc CRDL is 20 ug/L. As a result of this contamination, total zinc results for samples MQB359, 360, 361, 364, 365, 366, 367, 371, 372, 376, 379, 381, and 382 should be considered quantitative and all other total zinc results should not be used.

The dissolved calcium, copper, and magnesium results for sample MQB353, the calcium result for sample MQB363, and the nickel result for sample MQB366 were greater than the total results for those metals in the same samples. The HWGWTF does not normally require a dissolved metals analysis because EPA does not have a standardized field procedure for separating dissolved from total metals. All total and dissolved results for these metals in these samples should be considered semi-quantitative.

The usability of all total and dissolved ICP metal analytes is summarized in Sections 5.2 and 5.3 at the end of this Report.

1.4 Mercury

All mercury results should be considered quantitative with an acceptable probability of false negatives and false positives.

2.0 Inorganic and Indicator Analytes

2.1 Inorganic and Indicator Analyte QC Evaluation

The average spike recoveries of all of the inorganic and indicator analytes were within the accuracy DQOs. Accuracy DQOs have not been established for the bromide, fluoride, nitrite nitrogen, and sulfide matrix spikes.

The calculable average RPDs for all inorganic and indicator analytes were within Program DQOs. 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, fluoride, nitrite nitrogen, and sulfide.

Requested analyses were performed on all samples for the inorganic and indicator analytes with one exception. Sample MQB378 was not analyzed for sulfide.

No laboratory blank contamination was reported for any inorganic or indicator analyte. Sulfide contamination was found in both of the field blanks and the trip blank. This contamination will be discussed below.

2.2 Inorganic and Indicator Analyte Data

All results for cyanide, bromide, fluoride, chloride, sulfate, total phenols, TOC, TOX, and POX should be considered quantitative with an acceptable probability of false negatives and false positives.

The holding times for the nitrate and nitrite nitrogen determinations ranged from 19 to 23 days from receipt of the samples which is longer than the recommended 48 hour holding time for unpreserved samples. All nitrate and nitrite nitrogen results should be considered semi-quantitative.

Sample MQB378 was not analyzed for sulfide. Sulfide contamination was present in field blanks MQB365 (152,000 ug/L) and 379 (339,000 ug/L) and the trip blank MQB360 (666,000 ug/L). The sulfide CRDL is 1000 ug/L. As a result of this contamination, all positive sulfide results, except those for the three blank samples MQB360, 365, and 379, should not be used. Sulfide results for samples MQB360, 365, and 379 should be considered quantitative. The matrix spike recovery (69 percent) of sulfide from sample MQB377 was low. This was not judged to affect data usability as there are no sulfide spike recovery DQOs and because of the problems with the presence of sulfide contamination in the blanks. Duplicate field sample precision for sulfide results for field duplicate pair MQB368 and 377 was poor with 162,000 ug/L detected in one sample and 105,000 ug/L detected in the other. The comparative precision of field duplicate results is not used in the preparation of the usability evaluation of the sample results. It is not possible to determine the source of this imprecision. The poor precision may be reflective of sample to sample variation rather than actual analytical variations. In this case the poor precision may be due to sample contamination.

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. All POC results should be considered qualitative.

3.0 Organics and Pesticides

3.1 Organic QC Evaluation

All matrix spike average recoveries were within established Program DQOs for accuracy. Individual matrix spike recoveries which were outside DQO limits will be discussed in the appropriate Sections below.

All required surrogate spike average recoveries were within DQOs for accuracy. Individual surrogate spike recoveries which were outside the accuracy DQO will be discussed in the appropriate Sections below.

All reported matrix spike/matrix spike duplicate average RPDs were within Program DQOs for precision. Individual matrix spike RPDs which were outside the precision DQO will be discussed in the appropriate Sections below.

All average surrogate spike RPDs were within DQOs for precision. Surrogate standard were neither required nor used for the organo-phosphorous herbicide analysis.

Requested organic analyses were performed, with one exception, on all samples submitted to the laboratory.

Laboratory (method) and sampling blank contamination was reported in organic samples and is discussed in Reference 4 as well as the appropriate Sections below.

Detection limits for the organic fractions are summarized in the appropriate Sections below.

3.2 Volatiles

Acetone contamination was found in laboratory (method) blanks MB-1 and MB-5 at concentrations of 3 and 2 ug/L. The acetone CRDL is 10 ug/L. Laboratory contamination is the probable source of these results. All positive acetone results (samples MQB356, 364, 372, 378, 380, and 382) were judged to be unusable due to this blank contamination.

Laboratory (method) blanks MB-2, MB-3, and MB-4 contained methylene chloride contamination at concentrations ranging from 1 to 8 ug/L. Methylene chloride contamination was also found in field blank MQB365 at a concentration of 4 ug/L. The methylene chloride CRDL is 5 ug/L. Laboratory contamination is the probable source of these results. All positive methylene chloride results (samples MQB354, 356, 357, 358, 359, 365, 368, 371, 374, 377, 378, 380, and 382) should not be used due to this blank contamination.

The analytical laboratory confused the cis- and trans-1,3-dichloropropene isomers and the 4-methyl-2-pentanone and 2-hexanone isomers in their calibration standards. As none of these compounds were found in the samples, the data quality for these isomers was not affected.

Estimated method detection limits were CRDL for all volatile samples. The volatile results should be considered quantitative with the exceptions of any positive acetone or methylene chloride results. No positive acetone or methylene chloride results should be used due to laboratory (method) blank contamination. The probabilities of false negative and positive results are acceptable for all volatile samples with the exceptions of the positive acetone and methylene chloride results.

3.3 Semivolatiles

The matrix spike (MS) recovery of 4-nitrophenol (81 percent) was above the DQO range of 10 to 80 percent. The surrogate spike recovery of 2-fluorophenol (13 percent) was below the DQO range of 21 to 80 percent. All other acid fraction recoveries were within DQO.

Semivolatile laboratory (method) blanks, MB-1 through MB-3 contained contamination including several unknown compounds, one or more of which was a nitrogen containing compound, at estimated concentrations ranging from 10 to 200 ug/L as well as bis(2-ethylhexyl)phthalate at concentrations of 2 to 6 ug/L and di-n-butylphthalate at a concentration of 2 ug/L. The trip blank (MQB360) and one field blank (MQB379) also contained bis(2-ethylhexyl)phthalate at concentrations of 17 and 4 ug/L. The CRDL for both bis(2-ethylhexyl)phthalate and di-n-butylphthalate is 10 ug/L. No positive bis(2-ethylhexyl)phthalate results (samples

MQB353, 354, 355, 356, 358, 359, 360, 361, 363, 367, 370, 373, 374, 375, 378, 379, 380, 381, and 382) or di-n-butylphthalate results (samples MQB359, 363, 375, and 378) should be used due to this contamination. Positive sample results for semivolatile unknowns whose standards are found at approximate scan numbers 452, 478, 639, and 1580, as well as an unspecified nitrogen containing compound, should also not be used due to laboratory blank contamination.

Standards for all Appendix IX semivolatile compounds have not been obtained by the analytical laboratory. All results for these compounds, which were analyzed by using extracted ion current profiles for major ion quantitation, should be considered qualitative. The laboratory must obtain standards for these compounds. Additionally, the laboratory is using the incorrect quantitation ions for four of the Appendix IX semivolatile compounds.

Many of the semivolatile samples contained significant peaks that were not confirmed by mass spectra and which were not identified as tentatively identified compounds. These samples, the scan numbers of the peaks, and the peak areas are listed in Comment B8 of Reference 4. These peaks represent possible semivolatile compounds which were not identified and thus, false negative results are possible. The largest peaks occurred at scan number 212-215 and affected samples MQB355, 370, and 381. According to the laboratory this was probably a volatile compound. However, no volatile compounds were reported for these samples.

All semivolatile samples had dilution factors of two. As a result, the estimated detection limits for the semivolatiles were approximately twice the CRDL.

The semivolatile data are acceptable and the results should be considered semi-quantitative with the exceptions of the results for the Appendix IX semivolatile compounds for which there were no analytical standard, the Appendix IX compounds corresponding to peaks which were not confirmed, and the compounds which were present in the blanks. The results for the Appendix IX compounds with no analytical standards should be considered qualitative. The Appendix IX compounds which have scan numbers corresponding to the above mentioned numbers (also see Comment B8 of Reference 4) should be considered possible false negatives. All positive bis(2-ethylhexyl)phthalate and di-n-butylphthalate results, as well as all results for unknown contaminants at the scan numbers listed above, should not be used due to blank contamination. Probabilities of false negatives and positives are acceptable with the following exceptions. False negative results for the unidentified compounds and false negative and positive results for the compounds for which there were no analytical standards are possible.

3.4 Pesticides

No laboratory (method) blank contamination was detected for the pesticides. Chromatographic contamination was present in both samples and blanks in the region of the BHCs and Aroclors. A unidentified chromatographic peak was present at a retention time of approximately 3.7 minutes in all samples and blanks run on the OV-101 column.

The retention time percent difference for dibutylchlorodate in one standard was greater than DQO.

The estimated method detection limits for all pesticides analyses are the CRDLs. The pesticides results should be considered qualitative with the exceptions of results for the early eluting pesticides (BHCs) and Aroclors. False negative

results are possible for the BHCs and Aroclors. Results for these pesticides should not be used.

3.5 Herbicides

The herbicides for which the laboratory analyzed include only 2,4-D, 2,4,5-T, 2,4,5-TP, chlorobenzilate, phorate, disulfoton, parathion, and famphur. The data packet was missing the chloroherbicide chromatograms for sample MQB382.

2,4-DB was used as a surrogate for the chloroherbicide fraction. No surrogates were included for the organo-phosphorous herbicides.

The maximum allowed holding time between sample receipt and extraction of 7 days was exceeded for all the chloroherbicide samples by 13 to 19 days.

Numerous artifact peaks or interferences were observed in the chloroherbicide method blank and sample chromatograms. Such peaks were present in the retention time window of 2,4,5-TP on the DB-210 column. The peaks were present at heights corresponding to concentrations near the CRDL. 2,4,5-TP results should be considered qualitative with a higher than normal probability of false negatives.

2,4-D was reported in sample MQB357 (2 ug/L) but this result should be considered to have a high probability of being a possible false positive due to matrix interferences and should not be used.

The laboratory misidentified chlorobenzilate on the DB-210 column for sample MQB380MS (matrix spike). The peak identified as chlorobenzilate was present outside the established chlorobenzilate retention time window. Peaks with this same retention time were present in the method (laboratory) blank and most of the samples analyzed on the DB-210 column.

The herbicide samples were analyzed at a standard dilution of one to one. The estimated method detection limits were the CRDL for the herbicides.

The organo-phosphorous herbicide results should be considered qualitative due to the lack of a surrogate. The chloroherbicide results for 2,4-D and 2,4,5-T should be considered semi-quantitative. The chloroherbicide results for 2,4,5-TP should be considered qualitative. All results for chlorobenzilate and the results for 2,4-D for sample MQB357 should not be used.

4.0 Dioxins and Furans

4.1 Dioxin and Furan OC Evaluation

The recoveries of the dioxin native spikes from two blank samples and two field samples ranged from 83 to 141 percent which is within the DQO range.

No target analytes were detected in the duplicate analyses of two field samples (MQB370 and 380). Therefore, method precision could not be evaluated.

Dioxin and furan determinations were performed on all samples which were submitted to the laboratory. No dioxins or furans were detected in the field samples.

Dioxin and furan contamination was neither detected in the laboratory (method) blanks nor the field blanks. Non-analyte ions were detected at a number of mass to charge ratios.

4.2 Dioxin and Furan Data

The samples were received by the laboratory on May 12 through 14, 1987 but were not extracted until May 17, 19, July 10, 13, and 15, 1987. Sample holding times are not specified for dioxins and furans but 60 day holding times are excessive and may result in false negative results.

Due to a method modification supplied to the laboratory by the EPA Sample Management Office, the column performance check solution was not analyzed by the laboratory.

Contamination was present at several mass to charge ratios characteristic of TCDF ions. The analyst noted that some of these were laboratory artifacts from carbon-13 labeled 1,2,3,4-TCDD or 2,3,7,8-TCDD.

The recovery of the carbon-13 labeled OCDD internal standard from sample MQB378 (146 percent) was above the contract specified range of 40 to 120 percent. The sample could not be re-extracted due to loss of the second volume of sample.

Background noise on some of the selected ion current profiles (SICPs) for both the initial and continuing calibrations was high. This reduces detection sensitivity and results in raised detection limits. It is estimated that detection limits were raised by two or three.

The dioxin and dibenzofuran results should be considered to be semi-quantitative. Dioxin and dibenzofuran detection limits should be considered to be about three times the normal method detection limits. The probability of false negative results at concentrations above three times the normal detection limits is acceptable.

III. Data Usability Summary

5.0 Graphite Furnace Metals, Total (See Section 1.2)

Quantitative:	all antimony and thallium results; arsenic, cadmium, lead, and selenium results with exceptions
Semi-quantitative:	arsenic results for samples MQB357, 366, 368, 371, and 377; cadmium results for samples MQB356, 358, 368, 370, 371, 374, 377, 378, 380, and 382
Qualitative:	the arsenic result for sample MQB380; the lead result for sample MQB374
Unusable:	arsenic results for samples MQB355 and 374; the cadmium results for samples MQB357, 364, and 366; the lead result for sample 378; the selenium result for sample MQB363

5.1 Graphite Furnace Metals, Dissolved (See Section 1.2)

Quantitative:	all arsenic and lead results; antimony, cadmium, selenium, and thallium results with exceptions
Semi-quantitative:	the antimony result for sample MQB375; cadmium results for samples MQB353, 355, 358, 370, 371, 373, 374, and 379; the selenium result for sample MQB355

Unusable: cadmium results for samples MQB357, 364, and 366;
thallium results for samples MQB357, 366, and 373

5.2 ICP Metals, Total (See Section 1.3)

Quantitative: all barium, beryllium, chromium, cobalt, iron, manganese, potassium, silver, sodium, tin, and vanadium results; calcium, copper, magnesium, and nickel results with exceptions; zinc results for samples MQB359, 360, 361, 364, 365, 366, 367, 371, 372, 376, 379, 381, and 382

Semi-quantitative: all aluminum results; calcium results for samples MQB353 and 363; the copper and magnesium results for sample MQB353; the nickel result for sample MQB366

Unusable: zinc results with exceptions

5.3 ICP Metals, Dissolved (See Section 1.3)

Quantitative: all aluminum, barium, beryllium, chromium, cobalt, iron, manganese, potassium, silver, sodium, tin, vanadium, and zinc results

Semi-quantitative: calcium results for samples MQB353 and 363; the copper and magnesium results for sample MQB353; the nickel result for sample MQB366

5.4 Mercury (See Section 1.4)

Quantitative: all mercury results

5.5 Inorganic and Indicator Analytes (See Section 2.2)

Quantitative: all cyanide, bromide, chloride, fluoride, sulfate, total phenols, TOC, TOX, and POX results; sulfide results for samples MQB360, 365, and 369

Semi-quantitative: all nitrate and nitrite nitrogen results

Qualitative: all POC results

Unusable: sulfide results with exceptions

5.6 Organics (See Sections 3.2 through 3.5)

Quantitative: volatile results with the exception of positive acetone and methylene results; pesticides results with exceptions

Semi-quantitative: semivolatile results with exceptions; chloroherbicides 2,4- (with an exception) and 2,4,5-T results

Qualitative: results for Appendix IX semivolatile compounds for which there were no analytical standards; organo-phosphorous herbicide results; chloroherbicide 2,4,5-TP results

Unusable: all positive acetone and methylene chloride (both are volatiles) results; all positive bis(2-ethylhexyl)phthalate and di-n-butylphthalate (both are semivolatiles) results; all positive semivolatile unknown compound results at scans 452, 478, 639, and 1580; pesticide results for BHCs and Aroclors; all chlorobenzilate (a chloroherbicide) results; the 2,4-D (a chloroherbicide) result for sample MQB357

5.7 Dioxins and Furans (See Section 4.2)

Semi-quantitative: all dioxin and furan results

IV. References

1. Organic Analyses: CE-EMSI
4765 Calle Quetzal
Camarillo, CA 93010

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

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

2. Draft Quality Control Data Evaluation Report (Assessment of the Usability of the Data Generated) for Case R-2363HQ, Site 52, Adams Landfill, IN, Prepared by Lockheed Engineering and Management Services Company, Inc., for the US EPA Hazardous Waste Ground-Water Task Force, 8/25/1987.
3. Draft Inorganic Data Usability Audit Report, for Case R-2363HQ, Adams Landfill, IN, Prepared by Laboratory Performance Monitoring Group, Lockheed Engineering and Management Services Co., Las Vegas, Nevada, for US EPA, EMSL/Las Vegas, 8/25/1987.
4. Draft Organic Data Usability Audit Report, for Case R-2363HQ, Adams Landfill, IN, Prepared by Laboratory Performance Monitoring Group, Lockheed Engineering and Management Services Co., Las Vegas, Nevada, for US EPA, EMSL/Las Vegas, 8/25/1987.
5. Draft Dioxin/Furan Usability Audit Report, for Case R-2363HQ, Adams Landfill, IN, Prepared by Laboratory Performance Monitoring Group, Lockheed Engineering and Management Services Co., Las Vegas, Nevada, for US EPA, EMSL/Las Vegas, 8/25/1987.

V. Addressees

Gareth Pearson
Quality Assurance Division
US EPA Environmental Monitoring Systems Laboratory - Las Vegas
P.O. Box 1198
Las Vegas, Nevada 89114

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Hazardous Waste Ground-Water Task Force, OSWER (WH-562A)
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The Woodlands, TX 77380

APPENDIX II

ANALYTICAL TECHNIQUES AND TABULATED SUMMARY
OF TASK FORCE OBSERVATIONS DURING
THE INSPECTION OF ADAMS CENTER LANDFILL, INDIANA

TABLE AII-1
SAMPLE PREPARATION AND ANALYSIS TECHNIQUES AND METHODS

Parameter	Preparation technique	Analysis technique	Method Reference
Conductance	None	Electrometric, Wheatstone Bridge	Method 120.1 (a)
pH	None	Potentiometry	Method 150.1 (a)
Turbidity	None	Nephelometry	No reference
PO ₄	None	Purgeable combust, Microcoulometry	EPA 600/4-84-008
TOC	Carbon absorption	Carbon combust, Microcoulometry	Method 9020 (b)
DOC	None	Purgeable combust, Non-dispersive Infrared	No reference
Ammonia	Acidify and purge	Liquid combust, Non-dispersive Infrared	Method 415.1 (a)
Chloride	Particulates settled	Phenolate Colorimetry of supernatant	Method 350.1 (a)
Nitrate	Particulates settled	Mercuric Precipitation filtration of supernatant	Method 9252 (b)
Sulfate	Particulates settled	Barium Sulfate Colorimetry of supernatant	Method 9200 (b)
Cyanide	Manual distillation	Pyridine Sulfate Turbidimetry of supernatant	Method 9018 (b)
Phenol	Manual distillation	Ferricyanide 4-Aminoantipyrine Colorimetry	CLP Method (c)
Mercury	Wet digestion for dissolved and total	Cold Vapor Atomic Absorption Spectroscopy	Method 420.1 (a)
As, Pb, Se and H	Acid digestion for total	Furnace Atomic Absorption Spectroscopy	CLP Method
Other elements	Acid digestion for total	Inductively Coupled Plasma Emission Spectroscopy	CLP Method
Volatiles	Purge and trap	Gas Chromatography with Electron Capture Detection	CLP Method
	Direct Injection	Gas Chromatography - Mass Spectroscopy or	CLP Method
		Gas Chromatography with Flame Ionization Detection	CLP Method
Semi-volatiles	Methylene chloride extraction	Gas Chromatography - Mass Spectroscopy	CLP Method
Pesticides/PCB	Methylene chloride/hexane extraction	Gas Chromatography with Electron Capture Detection	CLP Method
Herbicides	Diethylether extraction/methylation	Gas Chromatography with Electron Capture Detection	CLP Method
		Gas Chromatography with Electron Capture Detection	Method 8150 (b)

a) Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020.

b) Test Methods for Evaluating Solid Wastes, SW-846.

c) Contract Laboratory Program, IFA methods.

TABLE AII-2

Basic/Neutral Compounds

• Acid Compounds

Post: 15:50:10

- RECORDED AS ASSASSINATIONS
- RECORDED AS DISSENT/REBELLION
- NOT ANALYZED

SECRET

• **NOT ANALYZED**

TABLE A11-3
MONITORING WELL SAMPLING AND PURGE DATA

SAMPLE ID/ WELL #	MQB #	SAMPLING DATE(S)	VOLUME PURGED (GALLONS)	TURBIDITY (NTU)	COMMENTS
MW-A	363	5/12-5/13	1.5	2.9/3.5	
MW-B	355	5/12	4.5	1.6/0.1	
MW-C	380	5/11	70		
W-3a	361	5/12	36	2/53	
W-3b	367	5/12-5/13	6	>100/15	
W-4	354	5/12	22	8.8/>100	
W-9	382	5/11	36	64	
W-06b	378	5/11	40	>100/>100	Shipped minus Sulfides
MW-N	356	5/11	10 Minutes	2.3	TAP
MW-R07	359	5/12	11.5	13/10	
FB at R07	379	5/12	-	-	Field Blank
MW-Mo	353	5/12	48	22	
MW-Mo1	371	5/12	-	-	Duplicate
TB	360	5/8	-	-	Trip Blank
MW-K	375	5/12	10.2	>100	

(Continued)

TABLE A11-3
MONITORING WELL SAMPLING AND PURGE DATA
(Continued)

SAMPLE ID/ WELL #	MQB #	SAMPLING DATE(S)	VOLUME PURGED (GALLONS)	TURBIDITY (NTU)	COMMENTS
MW-E	381	5/12	116	75	
MW-R06	368	5/13	60	98	
MW-R06d	377	5/13	-	-	Matrix Spike & Duplicate
MW-R05	376	5/13	56	56	Matrix Spike
FB at R05	365	5/13	-	-	Field Blank
TR-UP	357	5/13	-	10	Upstream
TR-DN	366	5/13	-	>100	Downstream
MW-R04	358	5/13	86	14	
MW-07A	374	5/13	11	>100	
MW-07B	370	5/13	28	>100	
MW-R01	364	5/13	46	62	
MW-R02	371	5/13	61	15	1 Broken P&T VOA Vial
MW-R03	372	5/13	50	44	

TABLE A11-4
MONITORING WELL PURGE AND IN-SITU DATA

WELL DATE	IN SITU #	TIME	GALLONS PURGED	TEMP (°C)	pH	CONDUCTIVITY (mmhos/cm)
MWB						
5/11/87	1	09:35	0	10.5	6.8	2300
5/12/87	2	09:38	4.5	10.3	6.8	2350
	3	10:15	AS	10.0	6.6	2500
MW-C						
5/11/87	1	09:50	0	12.3	7.7	1120
	2	10:07	20	12.7	7.6	1150
	3	10:15	25	13.2	7.4	1200
	4	10:27	45	12.7	7.5	1180
	5	10:54	70	13.0	7.5	1200
	6	11:15	AS	13.2	7.6	1180
MW-A						
5/11/87	1	11:23	0	12.5	7.1	3000
5/12/87	2	11:25	1.5	12.6	7.1	2900
	3	11:25	AS	12.0	8.4	970
W-3a						
	1	12:42	0	12.8	7.5	910
	2	12:59	30	12.5		940
5/11/87	3	13:06	36	12.8	8.3	850
5/12/87	4	11:25	AS	12.0	8.4	970
W-3b						
5/11/87	1	13:13	0	12.1		1750
5/12/87	2	13:16	6	12.0	11.2	1630
	3	08:50	AS	12.2	10.9	1550
W-4						
	1	13:34	0	12.0	8.3	740
	2	13:42	14	12.6	7.9	730
5/11/87	3	13:52	22	12.8	7.9	790
5/12/87	4	12:05	AS	15.3	8.0	950

(Continued)

MONITORING WELL PURGE AND IN SITU DATA
(Continued)

WELL DATE	IN SITU #	TIME	GALLONS PURGED	TEMP (°C)	pH	CONDUCTIVITY (umhos/cm)
W-9 5/11/87	1	14:48	0	13.4	7.0	1440
	2	14:34	10	13.0	7.0	1480
	3	14:46	30	12.9	6.8	1540
	4	14:52	36	13.2	6.9	1500
	5	15:12	AS	13.6	7.0	1530
W-06B 5/11/87	1	15:42	1	13.2	7.3	1240
	2	15:50	20	13.3	7.3	1400
	3	16:04	40	12.7	7.2	1400
	4	16:25	AS	13.2	7.2	1380
MW-R07 5/12/87	1	08:46	0	11.8	7.3	100
	2	08:49	5.5	11.7	7.7	1110
	3	09:03	10	11.9	7.2	1150
	4	09:15	11.5	12.3	7.2	1150
	5	14:07	AS	13.5	7.1	1020
MW-R06 5/13/87	1	09:07	0	11.8	7.6	970
	2	09:26	20	12.0	7.7	1010
	3	10:06	40	12.2	7.3	1040
	4	10:37	59	12.2	7.5	1060
	5	11:20	AS	12.5	7.2	1150
MW-R05 5/13/87	1	11:40	0	12.9	7.3	1220
	2	11:47	25	12.6	7.1	1200
	3	12:01	56	12.7	7.2	1210
	4	12:22	AS	13.1	7.5	1230
TR-DN	1	14:00	NA	23.5	7.4	900
TR-UP	1	14:29	NA	27.2	7.8	880

(Continued)

TABLE A11-4
MONITORING WELL PURGE AND IN-SITU DATA
(Continued)

WELL DATE	IN SITU #	TIME	GALLONS PURGED	TEMP (°C)	pH	CONDUCTIVITY (umhos/cm)
MW-R04 5/13/87	1	14:54	0	13.0	7.4	1300
	2	15:04	20	12.5	7.5	1350
	3	15:15	55	12.3	7.4	1320
	4	15:30	86	12.4	7.4	1290
	5	15:56	AS	12.4	7.2	1310
MW-N 11/15/87	1	15:40		19.1	6.9	1225
	2	15:43		13.2	7.0	1225
	3	15:58		13.2	7.0	1240
MWE 5/12/87	1	08:37	0	11.7	7.4	1230
	2	09:34	58	11.6	7.1	1200
	3	10:27	115		7.1	2000
	4	10:51	AS		7.0	1250
MWK 5/12/87	1	11:20	1	11.5	6.9	1800
	2		5.5	11.3	6.9	1970
	3		10	11.5	6.7	1980
	4	12:00	AS	11.9	6.8	1990
MWN0 5/12/87	1	13:12	0	11.6	7.4	2000
	2	13:46	25	12.8	7.2	2000
	3	14:36	48	12.1	7.4	2400
	4	15:15	AS	12.1	7.1	2400
MWO7A 5/13/87	1	08:24	0	11.6	6.8	1440
	2	08:28	5	11.3	6.8	1460
	3	08:35	11	11.4	6.8	1460
	4	08:59	AS	12.5	6.7	1460

(Continued)

TABLE AII-4
MONITORING WELL PURGE AND IN-SITU DATA
(Continued)

1

WELL DATE	IN SITU #	TIME	GALLONS PURGED	TEMP (°C)	pH	CONDUCTIVITY (umhos/cm)
MW07B 5/13/87	1	09:02	0	12.2	6.8	1310
	2	09:16	14	11.9	6.8	1440
	3	09:30	28	12.0	6.8	1430
	4	09:52	AS	12.1	6.7	1420
MW01 5/13/87	1	10:23	0	11.7	7.2	1280
	2	10:32	23	12.4	7.5	1240
	3	10:40	46	12.1	7.3	1250
	4	11:01	AS	12.7	6.9	1360
MW02 5/13/87	1	11:19	0	12.0	6.9	1210
	2	11:32	30	11.8	6.9	1220
	3	11:45	61	11.8	7.0	1220
	4	12:07	AS	12.1	7.1	1240
MW03 5/13/87	1	12:25	0	11.5	7.4	1300
	2	12:36	25	12.3	7.2	1290
	3	12:47	50	12.3	7.2	1300
	4	13:05	AS	12.8	7.2	1360

AS = After Sampling

APPENDIX III

SUMMARY OF CONCENTRATIONS FOR COMPOUNDS FOUND IN
GROUND-WATER AND SAMPLING BLANK SAMPLES AT SITE NO. 52,
ADAMS LANDFILL, IN.

SUMMARY OF CONCENTRATIONS FOR COMPOUNDS FOUND
IN GROUND-WATER AND SAMPLING
BLANK SAMPLES AT SITE NO. 52, ADAMS LANDFILL, IN

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.

All concentration are in $\mu\text{g/L}$.

CONTRACT REQUIRED DETECTION LIMITS AND INSTRUMENT
DETECTION LIMITS FOR METALS, INORGANIC, AND INDICATOR PARAMETERS

Parameter	CRDL	IDL
<u>Metals</u>		
Aluminum	200	94
Antimony	60	5
Arsenic	10	6
Barium	200	3
Beryllium	5	2
Cadmium	5	0.5
Calcium	5000	67
Chromium	10	6
Cobalt	50	7
Copper	25	18
Iron	100	23
Lead	5	2
Magnesium	5000	84
Manganese	15	4
Mercury	0.2	0.2
Nickel	40	23
Potassium	5000	486
Selenium	5	4
Silver	10	5
Sodium	5000	163
Tin	50	72
Thallium	10	6
Vanadium	50	8
Zinc	20	20
<u>Inorganic and Indicators</u>		
Bromide	1000	50
Chloride	1000	1000
Cyanide	10	
Fluoride	1000	1000
Nitrate-nitrogen	300	300
Nitrite-nitrogen	300	50
POC	100	20
POX	5	5
Sulfate	1000	500
Sulfide	1000	1000
TOC	1000	1000
TOX	5	5
Total Phenols	50	10

concentrations are in µg/l

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.

FILE - ADAM CHENIC LANDILL, JR.
CASE NO SAS 23632

[illegible]

[illegible]

[illegible]

SIIC: ADAM CENTER LABORILL, IN.
CASE NO: 5AS/2343/B

[illegible]

[illegible]

[illegible][illegible]

FILE: ADAM CANTERLAND, JR.
CASE NO: SAS/22670

[illegible]

SITE: ADAM CLINTON LANDFILL, IN.
CASE NO: 855/216378

SAMPLE NO:	NO: 375	NO: 376	NO: 378	NO: 380	NO: 381	NO: 382
SAMPLE LOCATION:	WELL # 1	WELL # 2	WELL # 3	WELL # 4	WELL # 5	WELL # 6
SAMPLE TYPE:	GR LUG	GR LUG	GR LUG	GR LUG	GR LUG	GR LUG
BARITE	1	177	1	165	1	31
BENTONITE						
CEMENT						
CALCIUM	376000	91000	131000	577000	122000	165000
CHROMIUM	36			37		
COAL	22			42		
COPPER	37		16	83	11	
IRON	346000	21700	167000	277000	138000	55600
LEAD	31		16	170	104	
MAGNESIUM	2150000	675000	1310000	1030000	908000	1200000
MANGANESE	774	190	358	2100	67	228
MERCURY						
NICKEL	47			82		
POTASSIUM	116000	30400	54000	73400	20100	39300
SILICON						
SILICA	591000	201000	576000	209000	310000	361000
TANTALUM						
TIN						
Vanadium	49			40		
ZINC	177		60	270	6100	
ALUMINUM						
ANTHRACITE						
ARSENIC						
BARIUM	26	50	37	33	20	31
BENTONITE						
CADMIUM						
CALCIUM	3100000	905000	1060000	935000	1460000	1700000
CARBONIUM						
COBALT						
COPPER						
IRON	310	10000	310	50	2550	3910
LEAD						
MAGNESIUM	3700000	740000	1310000	615000	900000	1270000
MANGANESE	196	185	72	30	36	230
MERCURY						
NICKEL						
POTASSIUM	6130	36700	37000	26700	37600	61000
SILICON						
SILICA	7		5	6	5	6
SODIUM	611000	303000	555000	831000	374000	391000

[illegible]

APPENDIX IV

EVALUATIONS OF LABORATORIES PERFORMING ANALYSES
FOR ADAMS CENTER SANITARY LANDFILL, INC.
FORT WAYNE, INDIANA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

DATE: October 20, 1987

SUBJECT: On-Site Evaluations of Laboratories Performing Analyses
for Adams Center Sanitary Landfill, Inc., Fort Wayne, Indiana

FROM: *Maxine C. Long*
Maxine C. Long, Microbiologist
Quality Assurance Office

TO: John McGuire, Environmental Engineer
Central District Office

THROUGH: *James H. Adams, Jr.*
James H. Adams, Jr., Chief
Quality Assurance Office

The results of the evaluations of laboratories performing analyses for Adams Center Sanitary Landfill, Inc., are attached. Inorganics, TOC, and indicator parameter sample analyses are performed by Gulf Coast Laboratory, University Park, Illinois. Organics analyses are performed by the Environmental Testing and Certification Laboratory, Edison, New Jersey. These two laboratories were visited by the evaluation team. Core Laboratories, Casper, Wyoming analyzes the radiochemical samples. Core Laboratories has been certified by Region VIII for gross alpha, gross beta, radium-226, radium-228 and uranium in drinking water. Data for Core Laboratories was provided courtesy of Region VIII.

INORGANIC CHEMISTRY

COMMENTS ON
GULF COAST LABORATORIES, INC.
UNIVERSITY PARK, ILLINOIS

METALS ANALYSES

Comment: The laboratory analyzed most metals (Ba, Cd, Cr, Fe, Na, Ag, Mn, etc.) by inductively coupled plasma - atomic emission spectrometry; arsenic, lead, and selenium by graphite furnace atomic absorption; and mercury by cold vapor atomic absorption.

Comment: The laboratory should be commended for the excellent documentation of graphite furnace atomic absorption problems and corrective action report forms. The analytical corrective action report addressed the following problems:

1. Duplicate analysis not within control limits.
2. Low spike recovery.
3. Correlation coefficient does not meet the acceptance criteria.
4. Severe matrix interference present.
5. Laboratory control sample/blank does not fall within control limits.

Comment: An interference check sample is analyzed to verify interelement and background correction factors at the beginning and end of the sample run. Also the acceptance criteria is consistent with EPA Method 200.7.

Observation: A high standard and internal quality control samples are analyzed at a frequency of 10% to determine instrument drift. The acceptance criteria of $\pm 5\%$ of the expected values or within the established control limits, whichever is lower, is not observed as mandatory by EPA Method 200.7 (ICP procedure).

Recommendation: The acceptance criteria of $\pm 5\%$ of the expected values or within the established control limits, whichever is lower, should be observed.

Observation: An external quality control sample is used for the initial verification of the calibration standards. The acceptance criteria of $\pm 5\%$ of the true value listed for the control sample is not observed as mandatory by EPA Method 200.7.

Recommendation: The acceptance criteria of $\pm 5\%$ of the true value should be observed.

Observation: The laboratory put a lot of emphasis on the objective to provide a measure of the accuracy and precision of analytical methods, but failed to emphasize continuing assessment of the accuracy and precision of data generated over time.

Recommendation: The laboratory should maintain a continuing assessment of the accuracy and precision of data generated over time.

TOC, CYANIDE AND PHENOLS

Deficiency - The laboratory does not field screen the groundwater/surface water samples for the presence of sulfide before analyzing for cyanide.

Recommendation - Since the sample holding time for cyanide test procedure is only 24 hours when sulfide is present, the laboratory should screen all cyanide samples in field with lead acetate paper for sulfide and analyze the samples that are positive within 24 hours. Please refer to 40 CFR Part 136, dated October 26, 1984, for further instructions.

Deficiency - The laboratory does not have a well documented test procedure for the analysis of cyanide in water samples.

Recommendation - The laboratory should, as soon as possible, document the cyanide test procedure. The test procedure should describe exactly how the laboratory is performing the cyanide analysis.

Observation: The laboratory data on Total Organic Carbon (TOC) are hard to evaluate since the instrument outputs (data) are not legible. This is not a good recordkeeping practice.

Recommendation - The laboratory should look into the possibilities of acquiring a printer that would print the sample data legibly so that the TOC data can be evaluated, if necessary.

ORGANICS

During July, 1987, Babu Paruchuri, Chemist, Quality Assurance Office (QAO), conducted an on-site evaluation of Environmental Testing and Certification (ETC) laboratory pursuant to Hazardous Waste Ground Water Task Force program. The purpose of the audit was to determine the laboratory's capabilities to analyze organic pollutants listed in Appendix IX. The overall performance of the laboratory is acceptable. Listed below are the deficiencies observed at ETC during the Quality Assurance/Quality Control audit:

Deficiency - The laboratory did not extract pesticides and PCBs samples at the pH range specified in the EPA manual, SW-846, Second Edition (1984). The audit team was told that the laboratory staff did not determine the pH of the water samples since the Sample Field Parameter forms (CC2) have the pH data on them.

Recommendation - If the laboratory can not extract (i.e., sample extraction by liquid-liquid or continuous extraction technique and concentration of the extract to 5.0 ml) pesticides and PCBs sample within 48 hours of collection, the sample should be adjusted to a pH range of 6.0 - 8.0 with sodium hydroxide or sulfuric acid, if α -BHC, γ -BHC, endosulfan I and II, and endrin are of interest. All samples must be extracted within 7 days and completely analyzed within 30 days of sample collection.

Deficiency - The laboratory did not extract the semivolatile (acid, base and neutrals) samples within 14 days of sample collection.

Recommendation - The semivolatile sample extraction step must be completed (i.e., sample extraction and concentration of the extract) within 14 days of sample collection. (Note: The EPA new RCRA methods manual, SW-846/Third Edition/1986, requires the semivolatile organic samples be extracted within 7 days of sample collection.)

GENERAL COMMENT

1. Since the second edition of SW-846 did not properly address the sample preservation and holding time requirements for aromatics in EPA Methods 5030 and 8240, it is advised that the laboratory follow the sample preservation and holding time requirements specified in EPA Method 8020 of the RCRA manual.
2. The laboratory has analyzed Appendix IX dioxins and furans once during 1987. None of the site samples were analyzed for dioxins and furans during 1986.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
ONE DENVER PLACE — 999 18TH STREET — SUITE 1300
DENVER, COLORADO 80202-2413

Ref: 8HWM-RP

Ms. Maxine Long
QA Office
U.S. EPA, Region V
536 So. Clark St.
Chicago, IL 60605

CLIMATE ASSURANCE BRANCH

1+66

NOV 10 1985

ENVIRONMENT SERVICE DIVISION

Dear Maxine:

Attached is the information that you requested concerning Core Laboratories, Inc., Casper, Wyoming. Core Laboratories has been certified for the analysis of radionuclides in drinking waters from within Region VIII since 1980. The present certification is extended until November 1987. The accuracy for the results from the Las Vegas cross check samples has been average, compared to other certified laboratories in Region VIII.

If you have any further questions, please contact me at
FTS - 776-5083.

Sincerely yours,

Robert C. Tauer, Chemist
Radiation Programs Branch

Attachments

CROSS CHECK SAMPLE DATA

<u>Date</u>	<u>GROSS ALPHA, pCi/l</u>		<u>GROSS BETA, pCi/l</u>	
	<u>True Value</u>	<u>Reported Value</u>	<u>True Value</u>	<u>Reported Value</u>
1/18/85	5 \pm 5	4	15 \pm 5	16
3/22/85	5 \pm 5	7	15 \pm 5	11
9/20/86	8 \pm 5	9	8 \pm 5	7
1/24/86	3 \pm 5	4	7 \pm 5	7
5/23/86	8 \pm 5	9	15 \pm 5	12
7/18/86	6 \pm 5	7	18 \pm 5	16

<u>RADIUM 226, pCi/l</u>			<u>RADIUM 228, pCi/l</u>	
3/15/85	5.0 \pm .75	5.6	9.0 \pm 1.35	8.4
9/13/85	8.9 \pm 1.3	8.5	4.6 \pm .69	3.7
12/13/85	7.1 \pm 1.07	7.1	7.3 \pm 1.1	7.4
3/14/86	4.1 \pm .62	5.1	12.4 \pm 1.85	10.4
6/20/86	8.6 \pm 1.3	13.0* (Out)	16.7 \pm 2.5	17.4

<u>URANIUM, pCi/l</u>		
7/22/85	12 \pm 6	11
8/23/85	4 \pm 6	4
2/21/86	9 \pm 6	9
8/22/86	4 \pm 6	No response

BLIND SAMPLE DATA

Date	4/19/85		10/21/85		4/20/86	
	<u>TV</u>	<u>RV</u>	<u>TV</u>	<u>RV</u>	<u>TV</u>	<u>RV</u>
Gross Alpha, pCi/l	32 ± 5	31	52 ± 13	51	17 ± 5	9.3
Gross Beta, pCi/l	72 ± 5	63	75 ± 5	75	35 ± 5	10
Radium 226, pCi/l	$4.1 \pm .6$	3.7	$6.3 \pm .95$	4.6	$2.9 \pm .44$	3.2
Radium 228, pCi/l	$6.2 \pm .9$	2.9	10.1 ± 1.5	5.4	$2.0 \pm .3$	2.6
Uranium, pCi/l	7 ± 6	No Data	8.0 ± 6.0	9.0	5 ± 6	11

REF: 853-AS

Mr. David Demarest
Core Laboratories, Inc.
Casper, Wyoming 82402

Dear Mr. Demarest:

Attached is a copy of Robert Taver's report on the on-site evaluation of your laboratory. The purpose for the visit was to determine if your laboratory should receive continued certification under the Safe Drinking Water Act.

Based on the recommendations in the report, I am granting "Certification" to Core Laboratories, Inc., Casper, Wyoming, for the analysis of:

gross alpha,
gross beta,
Radium-226,
Radium-228, and Uranium in drinking water.

This certification will remain in effect for three years. Your laboratory must continue to participate in the Las Vegas cross check sample program with acceptable results. In addition, you are required to participate in the performance or blind sample program.

If you have further questions concerning the certification or the report please contact Robert C. Taver at 303-236-5063.

Sincerely Yours,

Irwin L. Dickstein, Director
Environmental Services Division

cc: Juanita Hillner

Agency
12th Floor
1230