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# Hazardous Waste Ground-Water Task Force

Evaluation of  
Uniform Tubes, Inc.  
Collegeville, Pennsylvania

U.S. Environmental Protection Agency  
Region 5, Library (PL-12J)  
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Chicago, IL 60604-3590



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

November 23, 1986

### UPDATE OF THE HAZARDOUS WASTE GROUND-WATER TASK FORCE

EVALUATION OF UNIFORM TUBES, INC.,

COLLEGEVILLE PENNSYLVANIA

The United States Environmental Protection Agency's Hazardous Waste Ground-Water Task Force (Task Force) conducted an evaluation of the ground-water monitoring program at the Uniform Tubes, Inc. (UTI), hazardous waste treatment and storage facility in Collegeville, Pennsylvania. The onsite field inspection was conducted during the period of April 8 to 11, 1986. UTI is one of 58 facilities that are to be evaluated by the Task Force. The purpose of the Task Force evaluations is to determine the adequacy of a facility's ground-water monitoring program in regard to the applicable State and Federal ground-water monitoring requirements. The Task Force effort came about in light of the recent concerns as to whether operators of hazardous waste treatment, storage and disposal facilities are complying with the State and Federal ground-water monitoring regulations.

The evaluation of the UTI facility focused on determining (1) if the facility was in compliance with applicable regulatory requirements and policy, and (2) if hazardous waste constituents were present in the ground water. The inspection revealed that UTI was not fully complying with applicable interim status ground-water monitoring requirements and that ground-water samples from onsite wells contained hazardous waste constituents. This update provides information on ground-water related activities by UTI, EPA Region III and the Pennsylvania Department of Environmental Resources (DER) since the Task Force inspection.

In May 1986, personnel from UTI, EPA Region III and DER met to discuss the revised work plan for a subsurface investigation at the facility. The work plan was initially submitted in February 1986 and was evaluated by the

Task Force. The plan was subsequently revised, approved by the State and implemented in June 1986. The investigation included sampling and analysis of soil and soil gas, and installing additional monitoring wells. The results of that investigation should be provided to EPA Region III and DER in January 1987.

EPA Region III is working with UTI to address noncompliance with interim status requirements for the ground-water monitoring program and ground water contamination.

UTI has decided to close the regulated units (surface impoundments) and has withdrawn its RCRA Part B permit application. A closure plan and several revisions have been submitted to the State for approval. A final plan was approved by the State in September 1986. UTI plans to close the impoundments during the spring of 1987. Construction of a separation unit to replace the impoundments is scheduled to be completed by January 1987.

This completes the Hazardous Waste Ground-Water Task Force evaluation of the Uniform Tubes, Inc., facility.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
HAZARDOUS WASTE GROUND-WATER TASK FORCE

EPA-330/2-87-001

GROUND-WATER MONITORING EVALUATION

UNIFORM TUBES, INC.  
Collegeville, Pennsylvania

November 1986

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## EXECUTIVE SUMMARY





## INTRODUCTION

Concerns have recently been raised about whether hazardous waste treatment, storage and disposal facilities (TSDFs) are complying with the ground-water monitoring requirements promulgated under the Resource Conservation and Recovery Act (RCRA)\*. In question is the ability of existing or proposed ground-water monitoring systems to detect contaminant releases from waste management units. To evaluate these systems and determine the current compliance status, the Administrator of the Environmental Protection Agency (EPA) established a Hazardous Waste Ground-Water Task Force (Task Force). The Task Force comprises personnel from the EPA Office of Solid Waste and Emergency Response, Office of Enforcement and Compliance Monitoring, National Enforcement Investigations Center (NEIC), Regional Offices and State regulatory agencies. The Task Force is conducting in-depth, onsite investigations of TSDFs with the following objectives:

- Determine compliance with interim status ground-water monitoring requirements of 40 CFR Part 265, as promulgated under RCRA or the State equivalent (where the State has received RCRA authorization)
- Evaluate the ground-water monitoring program described in the RCRA Part B permit application, submitted by the facility, for compliance with 40 CFR Section 270.14(c)
- Determine if the ground water at the facility contains hazardous waste or constituents

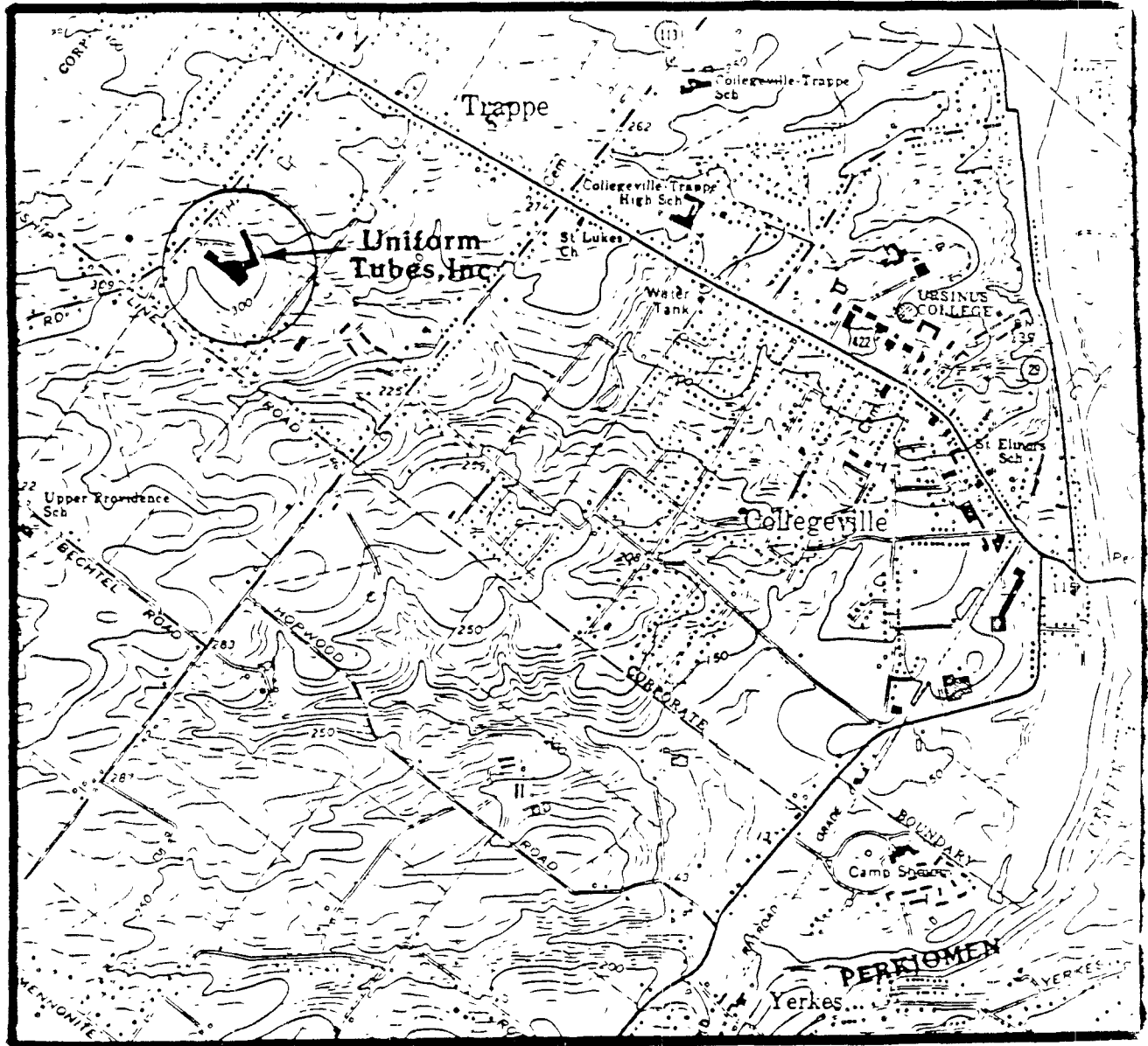
Uniform Tubes, Inc. (UTI) is located in Collegeville, Pennsylvania [Figure 1], which is about 20 miles northwest of Philadelphia. The onsite inspection was conducted from April 8 through 11, 1986 and was coordinated by NEIC personnel.

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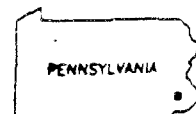
\* Regulations promulgated under RCRA address TSDF operations, including ground-water monitoring to ensure immediate detection of any hazardous waste or constituents released to the environment.

Figure 1

Site Location Map  
Uniform Tubes, Inc. Facility  
Collegeville, PA



SCALE



UTI pretreats process wastewater in two waste management units (surface impoundments), which are subject to RCRA ground-water monitoring requirements. The Company plans to close these units and withdraw its permit application for a RCRA permit. Consequently, the ground-water monitoring program proposed in the Part B application was not evaluated for compliance with 40 CFR Section 270.14(c).

During the inspection, Task Force personnel evaluated compliance with the interim status ground-water monitoring requirements of 40 CFR Part 265 and the Pennsylvania equivalent regulations [25 PA Code Section 75.265(n)]. The adequacy of the ground-water sampling and analysis plan, monitoring well construction and location, analysis of samples taken from the interim status monitoring wells and the ground-water quality assessment program outline and plan were evaluated. Information was also obtained on present and past solid waste management units to aid in evaluating the well network and interpreting ground-water monitoring data. The evaluation involved a review of State, Federal and facility records; facility and laboratory inspections; and collection and analysis of samples from ground-water monitoring wells, one of the surface impoundments and a stripping tower.

UTI manufactures high-precision, small-diameter metal tubing and tubular parts at the Collegeville plant. The plant property was purchased by the Company in 1964. At that time, the plant area and surrounding property were farmland. The plant area was subsequently developed into a 40-acre industrial complex and is now surrounded by a residential area.

The pretreatment system for process wastewater comprises a control building, three tanks, and two surface impoundments; the latter are used as settling basins. The pretreatment system effluent is discharged into the Collegeville-Trappe Municipal Authority sewer system. Solids from the settling basins are periodically removed and taken to the Waste Conversion facility in Hatfield, Pennsylvania.

Interim authorization was delegated to the Pennsylvania Department of Environmental Resources (DER) in May 1981. Final authorization was delegated in January 1986. Consequently, the surface impoundments have been

operated under State interim status requirements (State and EPA ID No. PAD002344463) since May 1981.

Between July 1981 and November 1983, no ground-water monitoring, pursuant to DER interim status requirements, was conducted by UTI. During this period, the Company was seeking an administrative waiver from DER and EPA for the treatment system from the RCRA program and the associated ground-water monitoring requirements. Waiver requests and government responses are not completely documented in DER and EPA files; however, a waiver was apparently sought, at various times, on the grounds that (1) the treatment units composed a totally enclosed treatment system, (2) the State deleted the waste sludge (but not the liquid) in the impoundments from the list of hazardous wastes\* and (3) the wastes in the impoundments were not hazardous.

The 1983 monitoring network comprised four wells designated by a "UTM" prefix. These wells were part of an eight-well network installed in 1977 because of a solvent release attributed to underground solvent storage tanks on the northwestern part of the plant property. The solvents identified in the ground water were trichloroethylene (TCE) and 1,1,1-trichloroethane (TCEA), which were used by UTI for degreasing metal parts. Following installation, the well closest to the solvent tanks, UTM 1, was used to extract contaminated ground water for treatment. The other seven wells installed primarily on the western and southern parts of the UTI property, were used by the Company to identify the extent of contamination and monitor the cleanup. Only one of the UTM wells (UTM 3) was near the surface impoundments and it was not close enough to satisfy State regulations. The extraction well continues to be used for removing contaminated ground water. The extracted water is passed through a stripping tower. When air temperatures are above freezing, usually from March to November, stripping tower effluent is pumped to an onsite area, near the surface impoundments, where it is

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\* Sludge from lime treatment of pickling liquor (hazardous waste number K063) was deleted in September 1982. The supernatant, however, is spent pickling liquor (technically) and is still subject to the State interim status requirements.

sprayed into the air for further stripping of the volatile solvents. During cold weather, the effluent is discharged into a small unnamed tributary to Perkiomen Creek.

In 1984, DER personnel concluded that the four UTM wells were not adequate for monitoring the impoundments, pursuant to the interim status requirements, and they issued a Notice of Violation on December 11. After a series of meetings between DER and UTI personnel in early 1985, the Company agreed to install four monitoring wells adjacent to the impoundments. The new wells, designated as RCRA 1 through 4, were installed in June 1985.

In July 1985, UTI initiated interim status monitoring on the four new wells. These wells were sampled in July and September 1985 for organic and inorganic constituents. Very high concentrations of TCEA (up to 96 mg/L) and TCE (up to 38 mg/L) were identified. These concentrations are similar to those associated with the solvent release from the underground storage tanks (described above); however, the source(s) of the solvents in the RCRA wells has not been determined. In November 1985, DER directed UTI to discontinue routine interim status monitoring and initiate an investigation to determine if the impoundments were leaking. As a result, only two quarters of monitoring have been conducted for the interim status program.

A work plan for a subsurface investigation in the vicinity of the impoundments was submitted to DER in February 1986 and was under review during the Task Force inspection. The work plan is now considered to be a ground-water quality assesement program plan by DER and UTI, and was evaluated as such by the Task Force.

UTI submitted a RCRA Part B application to EPA in April 1983 for the pretreatment system. Although the effluent goes to a publicly-owned treatment works (POTW), the surface impoundments precluded an exemption from the State interim status requirements. Following the Part B submittal, the Company decided to close the impoundments and withdraw the Part B. A closure plan and several revisions were submitted to DER and EPA. A revision dated December 1985 was being reviewed during the Task Force inspection.

## SUMMARY OF FINDINGS AND CONCLUSIONS

The findings and conclusions presented reflect conditions existing at the facility in April 1986. Actions taken by the State, EPA Region III and UTI subsequent to April are summarized in the accompanying update.

### GROUND-WATER MONITORING DURING INTERIM STATUS

Task Force personnel investigated the interim status ground-water monitoring program at UTI for the period between November 1981, when applicable provisions of the Pennsylvania regulation became effective, and April 1986. The investigation revealed that no interim status monitoring program was implemented until November 1983. Further, no concurrent sampling and analysis plan, specifically for interim status requirements, was submitted for the required DER approval. After two quarters of monitoring, DER required that new wells be installed to replace the existing monitoring well network. Following installation of these wells in 1985, interim status monitoring was initiated on them.

A sampling and analysis plan for interim status monitoring was submitted to DER in February 1985. In response to DER comments, the plan was revised and resubmitted in May 1985. Although the plan did not receive the required written approval, it was implemented on new wells installed in June 1985. The Task Force evaluated the program implemented during the summer of 1985 and determined it to be inadequate. Program components, including the ground-water sampling and analysis plan and procedures, monitoring well network and the assessment program outline and plan, did not comply with DER requirements.

### Ground-Water Sampling and Analysis Plan

The ground-water sampling and analysis plan submitted in May 1985 is inadequate and does not comply with State regulations [75.265(n)(7)]. The plan does not adequately detail the procedures followed for sample collection, sample preservation and shipment, analytical procedures or chain-of-custody control.

For example, the plan did not specify methods and equipment used for making water-level measurements; calculating purge volumes; purging and sampling the wells; and making field measurements for temperature, pH and specific conductance. Neither does the plan address calibration of the field meters. The plan indicates that some sample aliquots will be preserved by adding acid until a specified pH is achieved, but does not explain how the pH will be determined. Regarding chain-of-custody procedures, the plan states only that U.S. EPA procedures will be followed.

The plan does not contain a sampling schedule, which is necessary because monitoring frequencies and parameter requirements change after the first year. Without a guide (schedule) for sampling in the plan, it is deficient.

#### Sampling and Analysis Procedures

The contractor personnel conducting the interim status sampling for UTI did not follow the sampling and analysis procedures submitted in the 1985 plan and, therefore, did not comply with State regulations [75.265-(n)(7)]. For example, the plan states that at least five well volumes will be purged from each well before sampling. Sampling records indicate that no more than three casing volumes were ever evacuated. Measurements for pH, specific conductance and temperature were to be made in the field, but they were made in the laboratory instead. Consequently, the holding time for pH was exceeded. The plan indicates that equipment blanks, trip blanks and duplicate samples will be taken; however, field data sheets do not indicate that the blanks were collected. Laboratory records indicate that a duplicate sample was taken during one of the two quarterly sampling events.

Discrepancies and errors were also found between the specified and actual sample preservative and analytical methods. The plan states that nitrate samples are to be preserved with hydrochloric acid and analyzed by EPA Method 352.2. Another EPA method was actually used and the sample should only have been cooled to 4° Celsius (C) rather than preserved with acid.

For phenol analysis, the plan specified EPA Method 420.1 and preservation by cooling to 4° C. According to the referenced method, the samples should be preserved with phosphoric acid and copper sulfate, but they were not. Likewise, samples for radium analysis were not preserved; nitric acid should have been added. Improper preservation can result in sample degradation and biased results.

Task Force personnel inspected the laboratory contracted by UTI, which conducts the interim status analyses on ground-water samples. The inspection revealed that many of the analyses were not performed as required by State regulations [75.265(n)(8)]. Further, most of the reported analytical data are biased and inaccurate. Biases due to sample handling, analytical procedures and quality control methods were found for most of the parameters.

#### Monitoring Well Network

Construction procedures for the four monitoring wells installed in June 1985 were adequate; however, several deficiencies were found in the completed wells. The length of the surface casing (5 feet) was only half of that required by State regulations [75.265(n)(6)] and the casing was not marked with the well designation [75.265(n)(5)]. Construction records do not clearly indicate whether sufficient grout was placed in the annular space to prevent surface water from entering the well bore. Concrete aprons, installed around the wellhead to drain surface water away from the well, were broken at all four wells. Two of the wells (RCRA 2 and 4) produced turbid water when sampled by Task Force personnel, thereby suggesting deficiencies in the sand pack installed around the screen or well development.

The adequacy of the well locations (vertical and areal) can not be completely evaluated because the ground-water flow zones and direction have not been adequately defined. Consequently, the uppermost aquifer and the hydrogeologic units that need to be monitored at the facility have not been identified. Ground-water flow directions have been interpreted, by a UTI consultant, from two different well networks constructed at the site with conflicting results. Water level measurements made in the original monitoring network wells suggested a southeasterly flow direction. Water levels



measured in the second (current) monitoring network wells, which were between 50 and 150 feet shallower than the wells in the original network, suggest a northwesterly flow direction. Data on the site hydrogeology indicate that the hydraulic continuity between the zones monitored by the various wells is probably limited, thereby rendering comparisons of water level data inconclusive.

#### Assessment Program Outline and Plan

An outline for a ground-water quality assessment program was required [75.265(n)(13)] by November 19, 1981. UTI first submitted an outline in April 1983 as part of the Part B application. A second outline, prepared to satisfy the interim status requirements, was submitted to DER in February 1986. Neither outline received the required written approval from DER.

State regulations require that the outline describe a more comprehensive ground-water monitoring program capable of determining:

- Which hazardous waste or hazardous waste constituents have entered the ground water
- The rate and extent of migration of hazardous waste or hazardous waste constituents in the ground water
- The concentration of hazardous waste or hazardous waste constituents in the ground water
- Abatement alternatives for any ground-water contamination attributable to the hazardous waste management facility

The outline does not comply with State regulations [75.265(n)(13)] because:

- It does not address how the rate and extent of migration of hazardous waste or constituents will be determined

- It does not address abatement of ground-water contamination
- It was not submitted to DER for approval until February 1986

Samples collected from the UTI monitoring wells in July and September 1985 contained elevated levels of volatile organics, chromium and dissolved solids. In November 1985, DER recommended that the source of the contaminants be identified through subsurface investigations. UTI subsequently submitted a "Work Plan for Subsurface Investigation" in February 1986. This plan, which was under review during the Task Force inspection, is considered to be a ground-water quality assessment program plan by both DER and UTI.

The work plan was reviewed by Task Force personnel and found to be inadequate. It did not contain either abatement procedures or an implementation schedule as required by State regulations [75.265(n)(15)]. Further, the design for proposed monitoring wells was deficient. If constructed as proposed, the open well bores would intersect several water-bearing zones and provide avenues for cross-zone migration of contaminants. Collapse of another similarly constructed well at the site suggests that a casing and screen (which were not included in the proposed design) are necessary to maintain the integrity of the borehole in the monitored zone. Further, the proposed depths were intermediate between the deeper wells for the remediation system and the shallower RCRA wells. Water level data from these wells may not aid in defining the ground-water flow direction because of vertical hydraulic discontinuities at the site.

#### TASK FORCE SAMPLING AND MONITORING DATA EVALUATION

During the inspection, Task Force personnel collected samples from eight ground-water monitoring wells, a surface impoundment and the effluent from a stripping tower constructed as part of a ground-water remediation system [Figure 2]. The well samples were collected to determine if the ground water contained hazardous waste or constituents. The surface

Spray Field

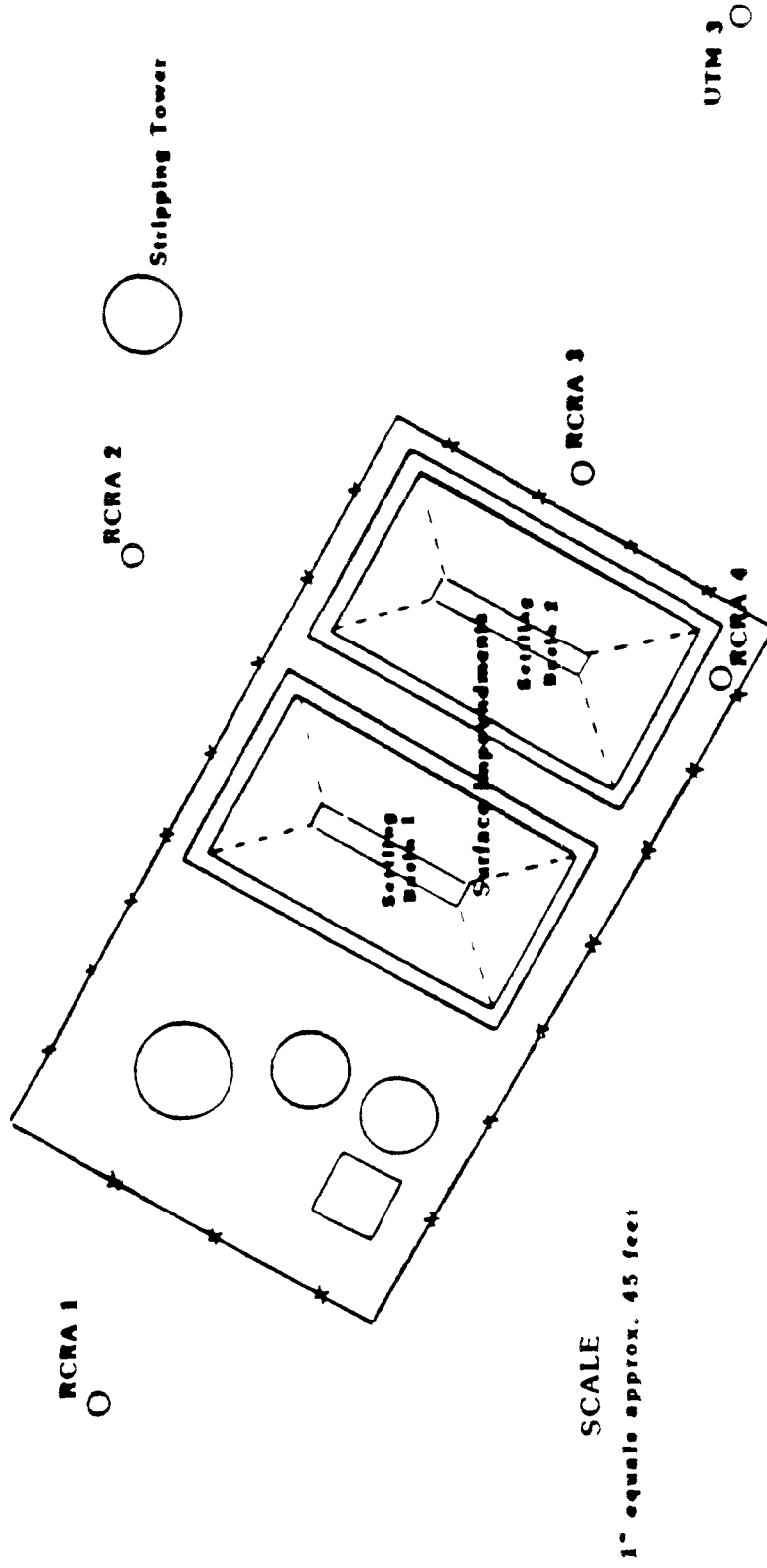


Figure 2

# Location Map Waste Management Area and Adjacent Wells

impoundment and stripping tower were sampled because they are potential contaminant sources. Monitoring data from Task Force samples were evaluated together with previous UTI data.

Task Force and UTI data indicate the presence of trichloroethene (TCE) and 1,1,1-trichloroethane (TCEA) with high concentrations (i.e., greater than 1,000 µg/L) in six of the eight wells sampled by the Task Force (RCRA 1, 2, 3, 4 and UTM 1 and 3). The other two wells (UTM 5 and 8) also had detectable TCE and TCEA, but at much lower concentrations. All but one of the concentrations in these two wells (TCE at 77 µg/L in UTM 5) were at or near the limit of quantitation. The source of these compounds is probably a solvent release, which was discovered in mid-1977. In late 1977, UTI installed a remediation system to clean up the affected ground water.

Inorganic data from the Task Force samples suggest leakage from the surface impoundments. Data for selected parameters present in high concentrations in the impoundment samples during the inspection are compared [Table 1] to data for wells having elevated concentrations (relative to concentrations in the other wells) of these chemicals. Data from the stripping tower discharge are also included for comparison because they are probably indicative of parameter concentrations in recharge to ground water from the nearby spray field.

In Table 1, the parameter concentrations for the respective wells are listed in decreasing order from left to right. The pattern of elevated concentrations suggests a southeasterly migration of chemicals from the impoundments.

Table 1  
SELECTED INORGANIC DATA FROM TASK FORCE SAMPLES\*

Parameter	Settling Basin 2	Stripping Tower	RCRA 2	RCRA 3	UTM 3	RCRA 4
Chromium**	2,840	58	1,280	246	395	8
Cyanide**	53	<10	20	<10	<10	<10
Sulfate***	1,250	28.5	500	500	250	44
Sodium***	268	11.5	37.4	45.0	28.4	17.4
Magnesium***	263	7.6	44.7	46.1	25.3	16.9

\* Data are from wells adjacent to the surface impoundments

\*\* Concentrations are in micrograms per liter ( $\mu\text{g/L}$ )

\*\*\* Concentrations are in milligrams per liter ( $\text{mg/L}$ )

## TECHNICAL REPORT

## INVESTIGATION METHODS

The Task Force investigation of the Uniform Tubes, Inc., facility comprised:

- Reviewing and evaluating records and documents from EPA Region III, DER and UTI
- Conducting an onsite facility inspection April 8 through 11, 1986
- Evaluating the offsite contract analytical laboratory
- Sampling and analyzing data from ground-water monitoring wells, a surface impoundment and the stripping tower effluent

### RECORDS/DOCUMENTS REVIEW

Records and documents from EPA Region III and the DER offices were reviewed prior to and during the onsite inspection to obtain information on facility operations, construction details of waste management units and the ground-water monitoring program. Additional DER and EPA records were copied and reviewed by Task Force personnel before the onsite inspection. Onsite facility records were reviewed to verify information where necessary. Selected Company documents requiring further evaluation were copied by the Task Force during the inspection.

Specific documents and records that were reviewed included the ground-water sampling and analysis plan; outline and plan for the ground-water quality assessment program; analytical results from past ground-water sampling; monitoring well construction data and logs; site geologic reports; site operations plans; facility permits; waste management unit design and operation reports; and operating records showing the general types, quantities and locations of process waste sources at the facility.





### FACILITY INSPECTION

An onsite facility inspection was conducted to identify waste sources, waste transport, waste management units (past and present), pollution control practices, surface drainage routes, and to verify the location of ground-water monitoring wells. Company representatives and contractors provided information on and explained: (1) facility operations (past and present), (2) site hydrogeology, (3) the ground-water monitoring system and (4) the ground-water sampling and analysis plan.

### LABORATORY EVALUATION

Weston Laboratory in West Chester, Pennsylvania, analyzes all ground-water samples for UTI and was evaluated regarding its ability to produce quality data for the required analyses. Analytical equipment and methods, quality assurance procedures and records were examined for adequacy. Laboratory records were inspected for completeness, accuracy and compliance with State and Federal requirements. The sample handling, analysis and document control procedures followed were discussed with laboratory personnel.

### SAMPLE COLLECTION AND ANALYSIS

The sampling portion of the investigation involved two activities: (1) measuring water levels in all wells onsite and (2) sampling eight wells, one active surface impoundment and effluent from a stripping tower [Figure 3]. Water level measurements were taken in an attempt to determine the direction of ground-water flow. Those wells, designated by the "UTM" prefix, are deep wells (ranging from 65 to 150 feet) constructed in 1977 for monitoring/recovery of contaminated ground water following a solvent release discovered that year. The remaining wells are designated by UTI as "RCRA" monitoring wells. These were installed in 1985 adjacent to the surface impoundments. The stripping tower is associated with the cleanup of the solvent release and discharges water to a drainage channel in the vicinity of the RCRA wells. The wells were sampled to determine if and to what extent the ground water contains hazardous waste or constituents. The surface impoundments and the

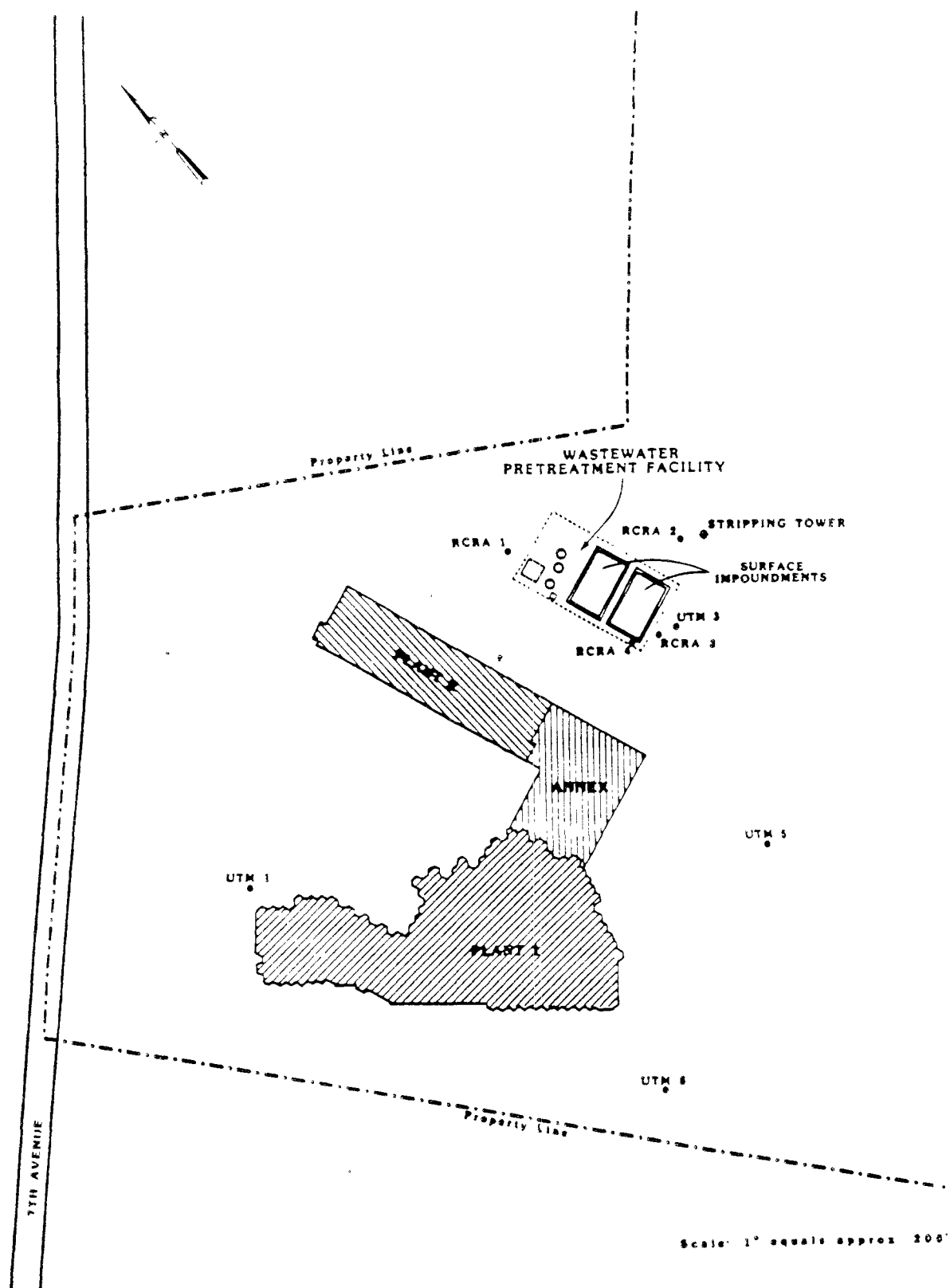


FIGURE 3  
TASK FORCE SAMPLING STATIONS

stripping tower effluent were sampled because of the potential to release hazardous waste or constituents to the ground water.

Duplicate volatile organic samples and splits of total metals, dissolved metals and specific conductance samples were provided to UTI. EPA Region III was provided the same duplicate and split samples with the exception of the aliquot for specific conductance, which was not requested.

Only one of the facility wells (UTM 1) was equipped with a pump. UTM 1 is equipped with a submersible pump, which continuously discharges 75 gallons per minute (gpm) to the stripping tower, pursuant to a State cleanup directive related to the solvent spill. Samples were collected by an EPA contractor for the Task Force, UTI and EPA Region III using the following procedures.

1. UTI contractor (Weston) unlocked the wellhead.
2. EPA contractor monitored open wellhead for chemical vapor (Photovac TIP<sup>®</sup>) and radiation.
3. EPA contractor measured depth to ground water using an oil/water sonic Interface Probe<sup>®</sup> (Moisture Control Co., Inc., Model No B2220-3).
4. EPA contractor lowered the Interface Probe through the water column until total depth was reached.
5. EPA contractor retrieved the Interface Probe from the well bore and decontaminated the cable and probe using procedures outlined in Table 2.

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Table 2  
DECONTAMINATION PROCEDURES

Equipment*	Decontamination Method
Submersible pump, tubing, ropes and wire	Cleaned after each use with a non-phosphate soap and rinsed with tap water
Interface probe	Cleaned after each use with a pesticide grade hexane wipe, followed by a rinse with distilled water and wiped dry
Filtering apparatus	Cleaned with 1:1 nitric acid diluted with distilled water and rinsed with distilled water

\* Bladder pumps and Teflon bailers were pre-cleaned before the inspection; none were reused during the inspection, therefore, none had to be decontaminated.

6. EPA contractor sealed the well with a custody seal. (The water levels were taken at each well on the first day of sampling and then sealed until sampled later in the inspection.)
7. Task Force personnel calculated water-column volumes using height of water column and well casing radius.
8. When the Task Force was ready to sample the well, the EPA contractor broke the custody seal.
9. EPA contractor purged three water-column volumes using a 4-gallon plastic bucket (marked in quarts). Table 3 indicates the method of purging each well. Purge water from the UTM wells was discharged directly into the municipal sewer\* and water from the RCRA wells was discharged into the surface impoundment.

\* Permission was granted by the Municipal Water and Sewer Authorities, UTI and the PA-DER Bureau of Solid Waste for the disposal of purge water in this manner.

10. EPA contractor collected a sample aliquot and made field measurements for temperature, turbidity, specific conductance and pH.
11. EPA contractor filled sample containers using both the methods and order specified in Tables 3 and 4. Split samples were collected by filling one-third of each bottle for the Task Force, facility and Region III bottles, respectively. This process was repeated until each bottle was filled. If the bailer could not fill a third of each bottle, one-third of the bailer was used per bottle.
12. Samples were placed on ice in an insulated cooler.
13. EPA contract personnel took the samples to a staging area where the dissolved metals aliquot was filtered. In addition, total metals, TOC, phenols, cyanide and nitrate/ammonia samples were preserved [Table 4].

When additional samples were collected for quality control purposes (NEIC duplicate and contract laboratory triplicate), step number 11 above was modified. NEIC sample containers were filled following collection of Task Force, UTI and Region III aliquots; the laboratory triplicates were filled in series followed by the UTI and Region III samples. In each case, procedures were followed for collection of split samples.

When the active surface impoundment (settling basin 2) and stripping tower were sampled, steps 2, 10, 11, 12 and 13 were followed in their respective order. The impoundment sample was taken by the EPA contractor at the northeastern corner of the impoundment near the discharge manifold. Sample bottles were filled just below the water surface. The stripping tower sample was collected from the collection tank overflow pipe.

Table 3  
PURGING AND SAMPLING DATA

Well Number	Date	Time <sup>1</sup>	Volume Purging		Method/Remarks	Date	Time <sup>1</sup>	Sampling Method/Remarks
			Increments <sup>2</sup> (gal)	Total <sup>3</sup> (gal)				
RCRA 1	04/11/86	0815-1125		64	Teflon bailer; purge water to surface impoundment	04/11/86	1330-1540	Teflon bailer, triplicate sample
RCRA 2	04/09/86 04/09/86	0915-1015	2.8		Bladder pump, <sup>2</sup>	04/11/86	1030-1115	Teflon bailer; partial samples for SO <sub>4</sub> /Cl well bailed to dryness for samples
		1045-1350	15.3	17.8	Teflon bailer; purge water to surface impoundment			
RCRA 3	04/09/86 04/10/86 04/11/86	1105-1550			Bladder pump,	04/11/86	1030-1115	Teflon bailer; last bailer some turbidity
		0805-1300	16		Bladder pump,			
		0805-0940	14		Teflon bailer; purge water to surface impoundment			
RCRA 4	04/10/86	0940-1350		30	Bladder pump; purge water to surface impoundment	04/10/86	1450-1635	Bladder pump, NEIC sample collected
UTM 1					No purge; well continuously purged at 75 gpm	04/09/86	0900-0935	Discharge point; sample taken from elbow in manhole. Photovac tip reading 3-10
UTM 3	04/10/86	0855-0905	20 <sup>4</sup>		Submersible electric pump; purge water to municipal sewer	04/11/86	1645-1805	Teflon bailer
		1210-1212	17					
		1425-1427	11					
		1510-1511	3	51				
UTM 5	04/09/86	1240-1345		494	Submersible electric pump; purge water to municipal sewer	04/09/86	1625-1730	Teflon bailer
UTM 8		1220-1410		490	Submersible electric pump; purge water to municipal sewer	04/10/86	1700-1805	Teflon bailer

<sup>1</sup> Rounded to nearest 5 minutes

<sup>2</sup> Bladder pump was not functioning properly and was replaced with the Teflon bailer

<sup>3</sup> Purged to dryness

<sup>4</sup> Purged to dryness at the pump depth which ranged from 5 to 10 feet less than total depth.

Table 4  
ORDER OF SAMPLE COLLECTION,  
BOTTLE TYPE AND PRESERVATIVE LIST

Parameter	Bottle	Preservative*
Volatile organic analysis (VOA)		
Purge and trap	2 60-ml VOA vials	
Direct inject	2 60-ml VOA vials	
Purgeable organic carbon (POC)	2 60-ml VOA vials	
Purgeable organic halogens (POX)	2 60-ml VOA vials	
Extractable organics	4 1-qt. amber glass	
Pesticide/herbicide	2 1-qt. amber glass	
Dioxin	2 1-qt. amber glass	
Total metals	1 1-qt. plastic	HNO <sub>3</sub>
Dissolved metals	1 1-qt. plastic	HNO <sub>3</sub>
Total organic carbon (TOC)	1 4-oz. glass	H <sub>2</sub> SO <sub>4</sub>
Total organic halogens (TOX)	1-qt. amber glass	
Phenols	1-qt. amber glass	CuSO <sub>4</sub> + H <sub>3</sub> PO <sub>4</sub>
Cyanide	1-qt. plastic	NaOH
Ammonia	1-qt. plastic	H <sub>2</sub> SO <sub>4</sub>
Sulfate/chloride/nitrate	1-qt. plastic	
Radionuclides (NEIC only)	4-qt. glass container	

\* All samples were stored on ice after collection and during transport to the analytical laboratories.

## FACILITY DESCRIPTION

Task Force personnel obtained information on past and present manufacturing and waste treatment operations and a ground-water remediation system to identify potential sources of hazardous waste releases and aid in interpreting ground-water monitoring data. The information is summarized in this section.

### PROCESS OPERATIONS

UTI manufactures high-precision, small-diameter metal tubing and tubular parts at the Collegeville plant, which is operated as a "job shop" for these products. The plant includes three interconnected buildings designated as Plants 1 and 2 and the Annex [Figure 4]. Plant 1 was built in 1964 and expanded in 1965. Plant 2 was built in 1973 and the Annex, which connects Plant 1 to Plant 2, was added in 1978. Plant 1 is used for making small and intermediate sizes of tubes and Plant 2 is used for making larger tubes. The Annex area is used for inspecting final products, storage, packaging, shipping and receiving.

Plants 1 and 2 are divided into areas for drawing tubing, fabricating parts and ancillary processes. For most products, feedstock tubing is successively drawn through a series of dies, with intermediate processes, to reduce the diameter; then it goes through final processing or is fabricated into parts. The feedstock tubing, usually 3/4-inch diameter, can be made of an alloy or pure metal. The ancillary processes include cleaning (solvent, acid or alkaline degreasing), annealing (softening), pickling (acid etching) and tumbling (polishing).

Process wastewater from three pickling operations (Plants 1 and 2), ground water collected in a foundation sump (Plant 1) and liquid discharged to a floor drain (Plant 1) are pretreated onsite in the hazardous waste management units, as discussed below, before discharge to the municipal sewer system. Pickling is an intermittent operation and involves immersion of tubing into one of several acid-solution baths (typically 15% acid). Most pickling is done with hydrochloric, hydrofluoric, nitric and sulfuric



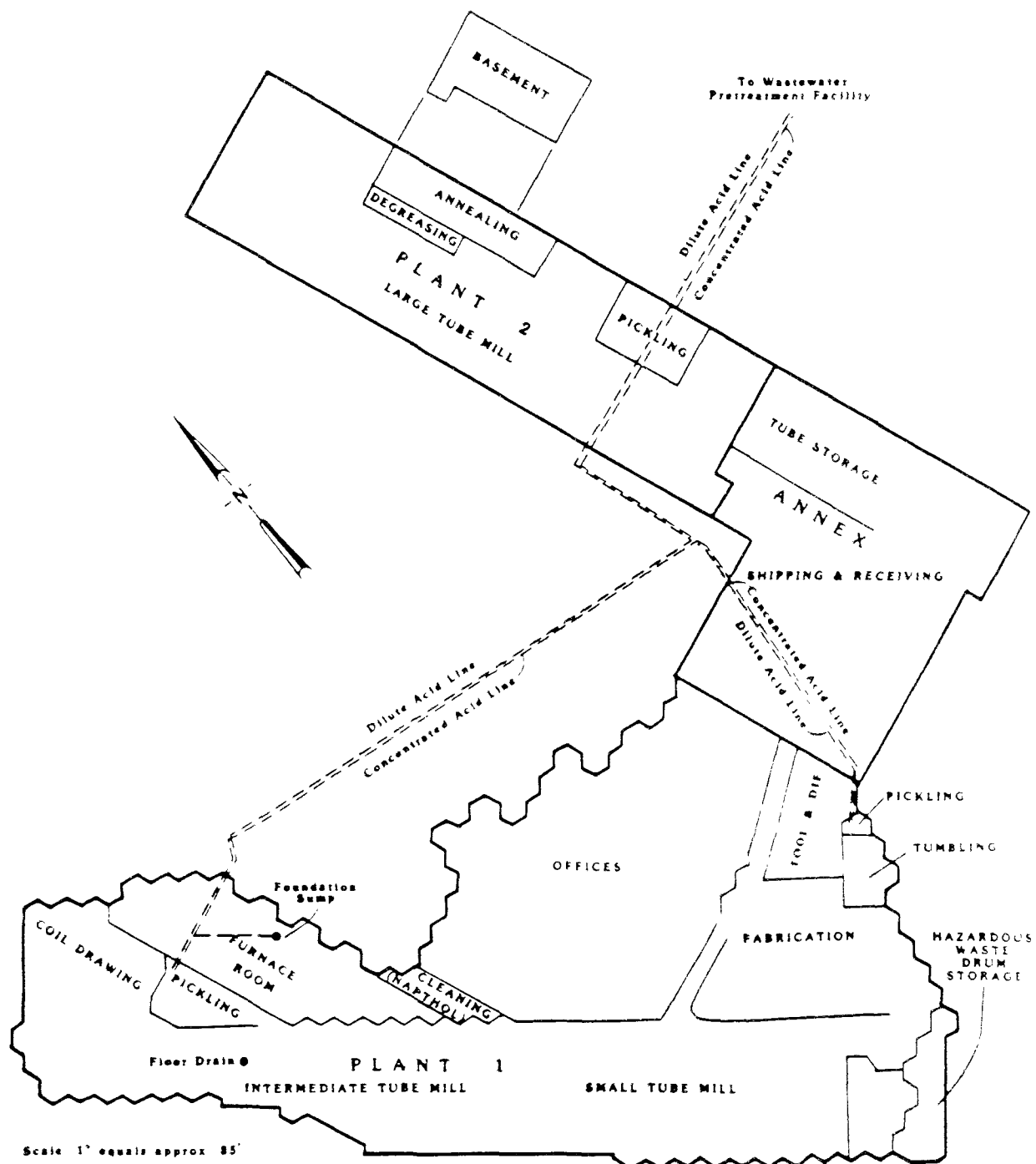


FIGURE 4  
UTI PLANT LAYOUT

acid, and some is done with chromic acid. Following the pickling bath, and depending on the type of acid in the bath, the tubing is rinsed in one to three flow-through rinse tanks. The spent pickling solutions and rinse tank effluents are routed to the wastewater pretreatment system through separate sewer lines made of 3-inch polyvinyl chloride (PVC) pipes.

Plant 1 has a foundation sump, near the degreaser unit, which discharges to the pretreatment system. A floor drain in the Plant 1 drawing area is also connected to the pretreatment facility. The floor drain is not close to any source of waste liquid and is reportedly not frequently used.

Drains to the sewer lines for the pretreatment system are also used, as needed, for other liquids. For example, during the Task Force inspection, rain was leaking through the roof in Plant 2 and the rainwater was being routed along a temporary drainage way, made of plastic sheets, to the rinse-water effluent line in the adjacent pickling area.

#### WASTEWATER PRETREATMENT FACILITY

The wastewater pretreatment facility [Figure 5] is southeast of Plant 2 and is surrounded by a chain-link fence. It consists of three treatment tanks, a control building and two surface impoundments, which are used as settling basins. The facility was constructed in 1969 to treat spent pickle liquor and associated rinsewater (EPA hazardous waste number K062, as defined in 40 CFR §261.32). Effluent from the facility is discharged to the Collegeville-Trappe Municipal Authority wastewater treatment plant.

The three circular treatment tanks are below grade and are 15 feet in diameter by 7 feet deep. The walls of each tank are 6-inch-thick reinforced concrete (gunite) and have a polyester resin coating on the interior surface. Each tank holds 6,000 gallons (with 2 feet of freeboard) and has an agitator for mixing the wastewater with treatment chemicals. Four-inch PVC pipes interconnect the tanks at the 2-foot freeboard level to prevent overfilling. Each tank also has an overflow float switch connected to a central alarm.

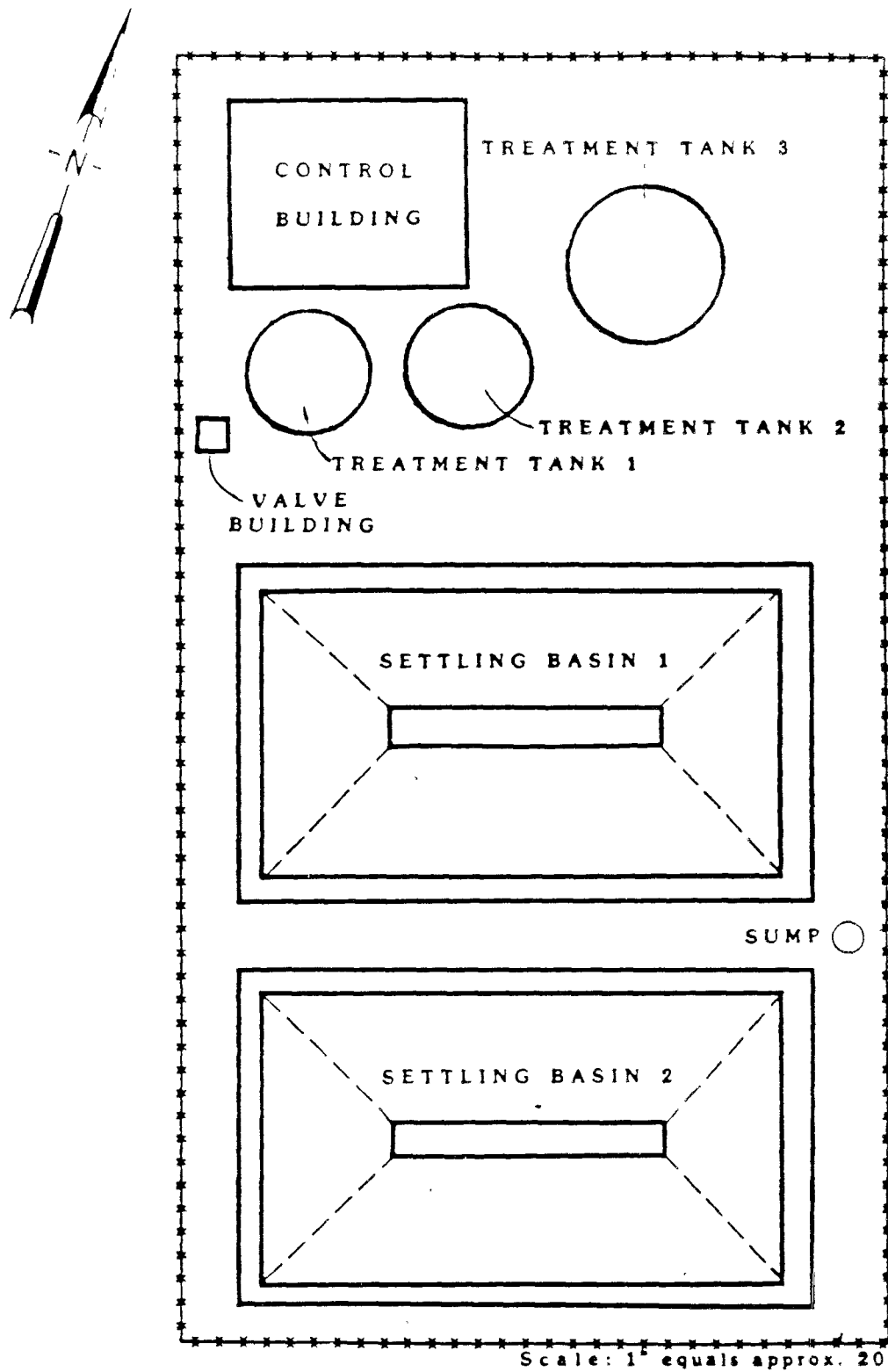


FIGURE 5  
WASTEWATER PRETREATMENT FACILITY

The control building is used for storing chemicals and has equipment for adding those chemicals to the treatment tanks and transferring treated wastewater to the surface impoundments. A pump is used to recirculate the liquids in the tanks while treatment chemicals are added. Two 55-gallon polyethylene tanks with mixers are connected to the recirculation system ahead of the pump. Chemicals used to treat the pickling wastes include lime (acid neutralization/metals precipitation), sodium metabisulfite (chromate destruction) and sulfuric acid (pH adjustment). The building has a concrete floor with a sump. A float switch in the sump activates a pump which discharges to Tank 2.

The two surface impoundments are used as settling basins for metal hydroxide sludges resulting from the treatment process. They are designated as settling basins 1 and 2 and were originally constructed in 1969 as unlined impoundments. In 1975, each basin was lined with 4 inches of concrete reinforced with wire mesh, installed above a 4-inch-thick stone base. The concrete was coated with a polyester resin. Numerous cracks have developed in the concrete walls, which were observed to extend below the water line. Some cracks have been repaired; however, the repairs were inadequate because the material used to fill the cracks was also cracked.

The capacity of each surface impoundment is 58,000 gallons (with 2 feet of freeboard). The surface area dimensions are 80 feet by 45 feet and the bottom (10 feet below the surface) dimensions are 40 feet by 5 feet. Treated wastewater enters each impoundment through a 12-foot-long perforated distribution pipe that is positioned horizontally along the west end of each impoundment, 6 feet above the bottom. The effluent flows through a similar pipe at the east end to a 2-inch PVC pipe, then into a 2-foot-diameter precast concrete sump. Water is pumped from the sump to the municipal sewer system by a 20 gpm pump in a lift station at the east end of the center dike between the two impoundments. The pump is activated by a float switch in the sump. A drain from the lift station to the ground surface was plugged in 1984.

## PRE-RCRA SOLID WASTE MANAGEMENT UNITS

UTI operated several solid waste management units (SWMUs) that were closed before November 19, 1980 (effective date of RCRA regulations) [Figure 6]. These units are potential sources of hazardous waste or constituents that could be released to ground water. Consequently, Task Force personnel obtained information on the following SWMUs previously operated by UTI.

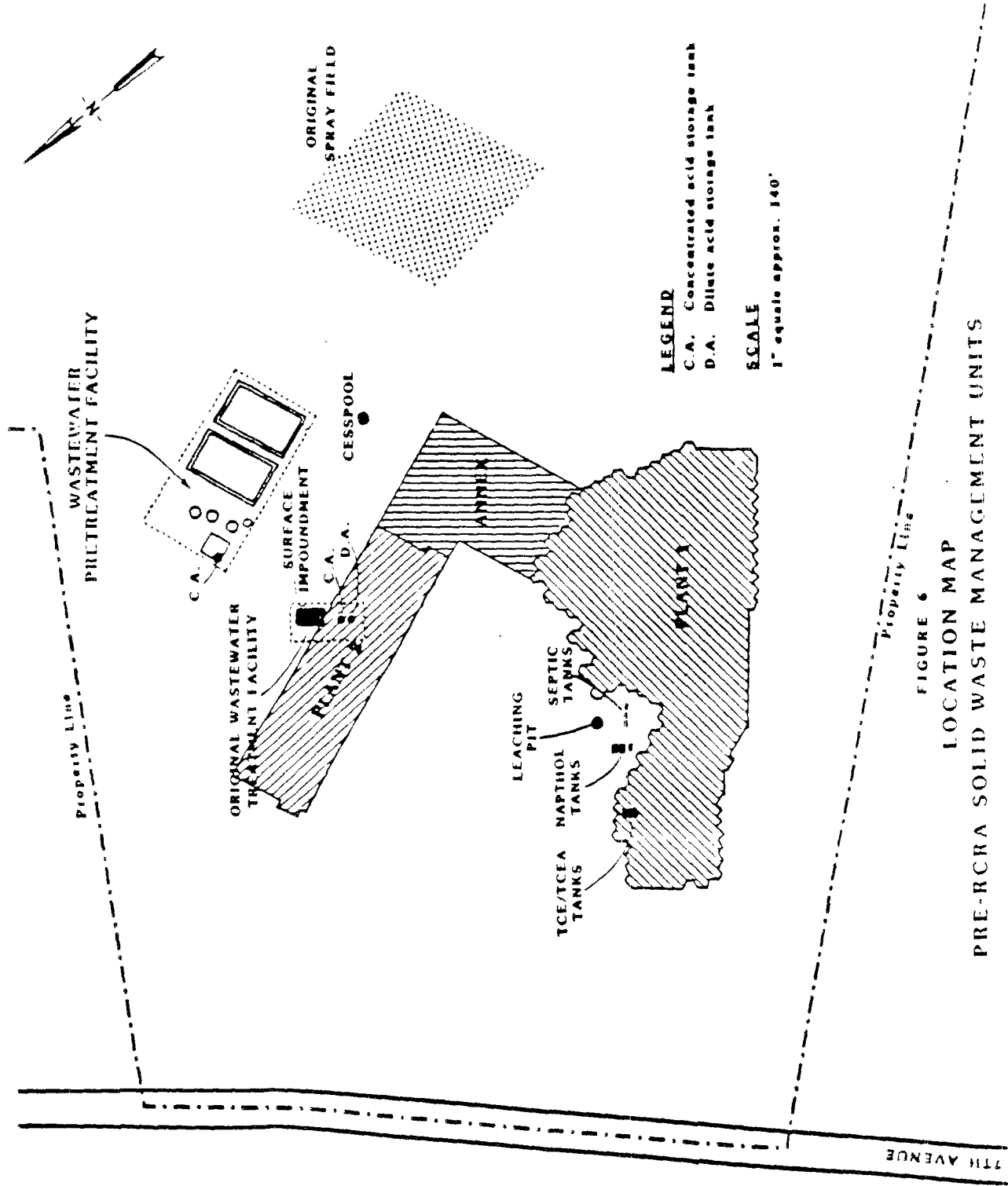
- Concentrated acid storage tank
- Original spray field
- Original wastewater treatment facility
- Cesspools and septic tanks
- Naphthol storage tanks
- TCE/TCEA storage tanks

### Concentrated Acid Storage Tank

A storage tank for concentrated acids (spent pickling solutions) was built in 1969 as part of the current wastewater pretreatment facility. The tank was constructed to be similar to the treatment tanks described previously. It is located just north of the control building, was used only to store spent pickling solutions for offsite transport and disposal. UTI subsequently modified the treatment facility to accommodate the spent pickling solution in addition to the rinsewater. The concentrated acid tank was emptied and backfilled. No samples were taken or tests conducted to determine if the tank had leaked.

### Original Spray Field

From 1969 until 1973, when the treatment system was connected to the municipal sewer system, treated process wastewater was discharged onto a spray field located about 150 feet south of settling basin 2. Ten thousand gallons per day (gpd) of effluent was piped to the field and sprayed from four nozzles over an area of about three-quarters of an acre. UTI has no monitoring records of the effluent or original spray field.



In 1973, the spray system was dismantled. The site of the original spray field is now covered by fill. As discussed below, a second spray field was constructed as part of the ground-water remediation system.

#### Original Wastewater Treatment Facility

The original wastewater treatment facility was built in 1963 when Plant 1 was constructed. This facility was phased out in 1969 when the current pretreatment facility went on line. It was located just north of the area occupied by the Plant 2 pickling area. Plant 2 was constructed over the site. Treatment units included a concentrated acid tank, a dilute acid (rinsewater) tank and an unlined lagoon. Construction and operational details of the original wastewater treatment facility were not available from UTI personnel during the Task Force inspection.

Before Plant 2 was constructed, sludge in the lagoon was excavated and buried just north of the lagoon. The acid tanks were emptied and collapsed, then the entire area was backfilled and graded.

#### Cesspools and Septic Tanks

Cesspools, septic tanks and a leach pit composed the UTI sanitary system before connection to the municipal sewer in 1973. UTI personnel interviewed during the Task Force inspection did not know whether process water or other waste liquids (e.g., solvents, etc.) were disposed of in this system. Some of the containment units were concrete, others were steel; construction details of the former system are incomplete. Liquids in the cesspools, septic tanks and leach pit were pumped out by a UTI contractor, then the units were backfilled.

#### Naphthol Storage Tanks

Three naphthol tanks were installed in 1963 when Plant 1 was constructed. All three were outside, underground and to the east of Plant 1. A 550-gallon tank was used to store clean naphthol, while two 5,000-gallon tanks were

used to store recycled and spent naphthol. In 1978, two new above-ground tanks were installed to store new and spent naphthol. Subsequently, the two 5,000-gallon underground tanks were excavated and disposed of and the excavation area was backfilled with soil. The remaining 550-gallon tank is currently used as a catchment tank for any spilled naphthol. This tank was leak tested in 1984 by a private contractor and certified tight. UTI has conducted no monitoring of soil or ground water in the immediate vicinity of the three underground tanks to determine if any naphthol had been released.

#### TCE/TCEA Storage Tanks

Three underground tanks for solvent storage were installed during the construction of Plant 1 in 1963. Each tank was constructed of steel and held 550 gallons. They were located outside at the northwest end of the building. The tanks were initially used for storing clean, recycled and spent TCE. In 1965, the Plant 1 building was extended over the three TCE tanks; use of the underground tanks did not change. In 1975, UTI discontinued using TCE in the degreasing operations and began using TCEA. The TCE was removed from the three storage tanks and replaced with TCEA.

In 1978, an outside tank storage area (above grade) was completed which included a 2,000-gallon and a 1,000-gallon tank for clean TCEA. A 1,000-gallon tank in the degreaser pit was used for storage of recycled TCEA. The three original storage tanks were abandoned and backfilled. No leak (integrity) tests were conducted on the tanks nor was there any monitoring conducted for indications of leaks. However, in 1977, ground water beneath the site was found to contain both TCE and TCEA. As a result, the State required UTI to construct and operate a ground-water remediation system, which is discussed below.

#### GROUND-WATER REMEDIATION SYSTEM

In 1977, a remediation system was constructed by UTI to extract and treat ground water contaminated by TCE and TCEA. The presumed sources were the underground solvent storage tanks. The system was operating during the



Task Force inspection and included an extraction well (UTM 1), an air-stripping tower and a spray field [Figure 7]. Ground water is pumped from UTM 1 to a wet well near the southeast corner of settling basin 2, then to the stripping tower and, finally, to the spray field, all of which are described below.

### Stripping Tower

The stripping tower, located just east of the wet well, was placed into operation in 1980. Before it was installed, the ground water was pumped directly to the spray field from the wet well. The stripping tower is a 20-foot column mounted on a pre-cast concrete tank supported by a 2-foot-thick concrete base. The column is constructed from a 42-inch (inside diameter) fiberglass-reinforced pipe with a 5/16-inch-thick wall. It is packed with 2-inch-diameter polypropylene rings. Air is drawn from the headspace at the top of the column, which has a sealed cover, by a 2,900 cubic-feet-per-minute (cfm) blower which exhausts to the collection tank. The concrete collection tank under the tower holds about 1,150 gallons and is equipped with a float-activated submersible pump.

Water in the wet well is pumped through a 4-inch PVC pipe to the inside of the stripping tower near the top. As the water trickles down through the column to the collection tank, air is drawn upward by the blower. When temperatures are above freezing, generally from March through November, water in the tank is pumped to the spray field via 2-inch iron and PVC pipes. During colder weather, the pump is turned off and water is discharged to an adjacent drainage channel through an overflow pipe.

### Spray Field

The spray field is 50 feet east of the stripping tower and is about one-half acre in size. Two parallel distribution pipes, about 60 feet apart, carry water to the risers. Each riser consists of a horizontal pipe, supported about 4 feet above the ground, with spray nozzles at each end. One of the distribution pipes is connected to four risers with approximately 120 feet between the first and last; the other pipe is connected to five

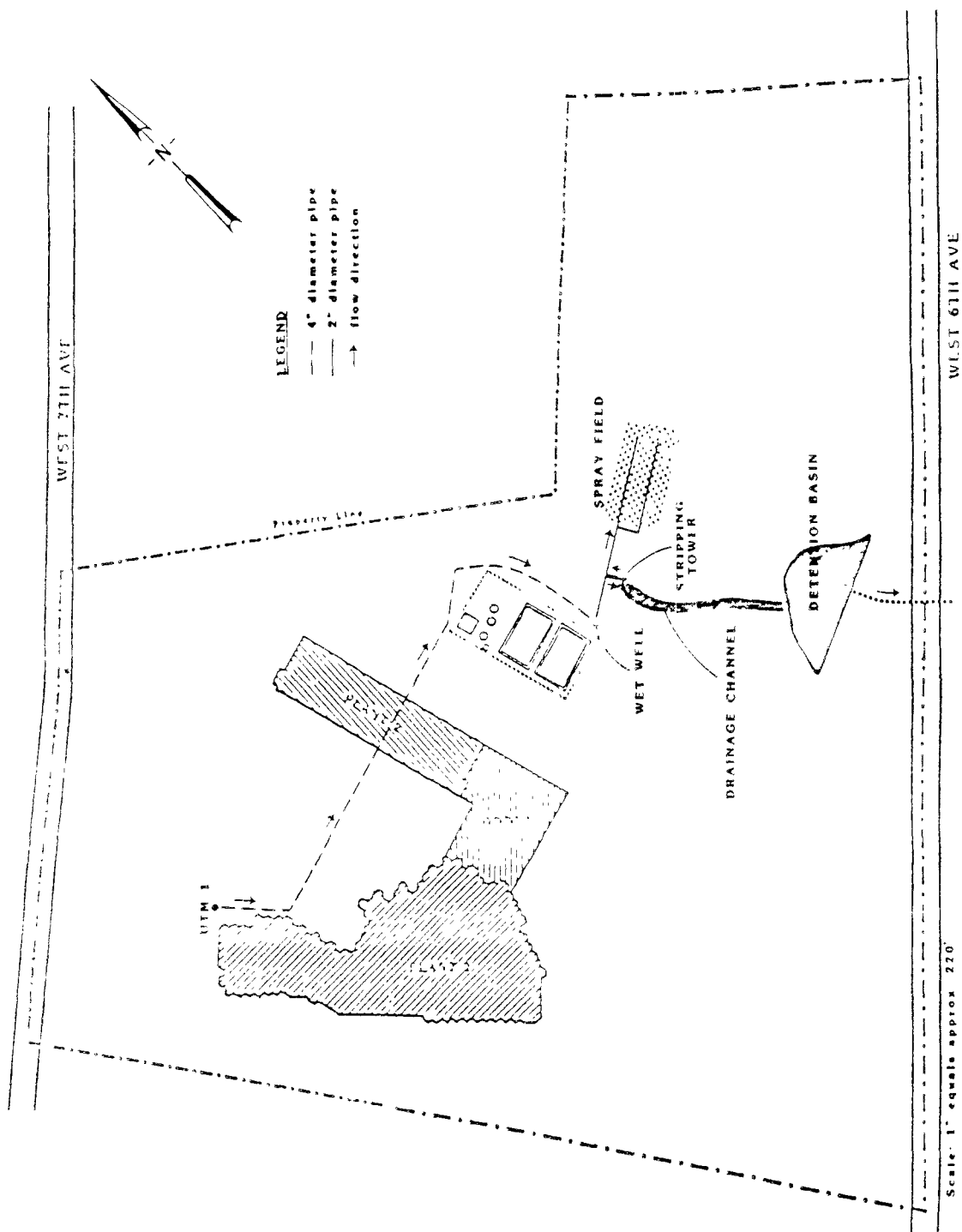


FIGURE 7  
GROUND-WATER REMEDIATION SYSTEM

risers, with about 120 feet between the first and last. The risers are designed to spray 10 gpm at 55 psi of pressure.

The spray field was very boggy during the inspection. The soft, waterlogged ground was covered with vegetation. Cattails up to 6 feet tall were growing in the spray field and were more dense in the southeastern (down-gradient) end. Small erosion channels were observed throughout the spray field. These drain to the drainage channel that also receives overflow from the collection tank at the base of the stripping tower.

The channel drains to a runoff detention basin about 250 feet southeast of the stripping tower. The basin has a capacity of about 2.75 acre-feet and is surrounded by a chain-link fence. It is unlined and was excavated in 1978 as a condition of the State building permit for the Annex connecting Plants 1 and 2. It was designed to control rainwater runoff from the plant roof and parking lots.

Effluent from the detention basin passes through a control structure then through a culvert. The culvert passes under 5th Avenue and empties into an unnamed tributary of Perkiomen Creek. UTI does not have a National Pollutant Discharge Elimination System permit for the discharge from the basin.

## SITE HYDROGEOLOGY

Information presented in the Part B application and other documents on the hydrogeology of the UTI site is limited. Site-specific information was developed principally by a UTI consultant, Roy F. Weston, Inc. (Weston) during (1) the installation of a monitoring/recovery well system in 1977 to clean up a solvent release attributed to underground storage tanks, (2) the preparation of the Part B permit application in 1983, and (3) the installation of four shallow interim status monitoring wells in 1985. The following information was derived primarily from Weston reports and discussions with Weston personnel.

Underlying the UTI site is a soil identified as the Readington Silt Loam by the U.S. Soil Conservation Service. This soil is typically a reddish-brown to dark-brown silt loam weathered from shale, siltstone and sandstone. The Soil Conservation Service characterizes this as a deep, moderately well-drained soil. Usually at a depth of 15 to 22 inches, the subsoil is a very firm, reddish-brown silt loam or silty clay loam that is streaked and mottled (indicating wet conditions) with a greyish color. The permeability of this soil varies from moderately rapid at the surface to moderately slow with depth. Likewise, the quantity of shale fragments increases with depth and the shaley material grades to bedrock. The silt loams and weathered material beneath range in thickness from 7 to 23 feet on the site.

The underlying bedrock consists primarily of reddish-brown shales, mudstones and siltstones of the Brunswick Formation, which ranges from 9,000 to 16,000 feet in thickness. The Brunswick Formation is a member of the Newark Group of late Triassic Age. A few thin beds of green shale and brown shale are present and are composed primarily of feldspar, illite, chlorite, quartz and calcite. Regionally, the rocks are a series of overlapping lens-shaped units that are discontinuous in all directions along the bedding plane.

The bedrock has low primary permeability (i.e., intergranular permeability). Most of the ground-water movement within these rocks follows secondary openings such as fractures and joints. Ground water flows primarily through the nearly vertical joint planes which intersect at various angles throughout the beds and provide an interconnected series of channels. The fractures and joints substantially increase the otherwise low permeability of bedrock. The density of these fractures results in areal variations in permeability. Joints in the formation are also commonly partially filled with calcite and quartz. Occasionally barite and pyrite are also present.\*

In the Brunswick Formation, the regional strike of the beds is northeast and they dip northwest 5 to 15 degrees. The formation is also reported to be more permeable along the strike than across it. Weston personnel reported that there are three major joint sets running north-northeast, northeast and northwest, which have nearly vertical dips (80 to 90 degrees).

#### HYDROGEOLOGIC UNITS

To date, the uppermost aquifer and the hydrogeologic units that need to be monitored at the facility have not been adequately identified. The following describes site characterization work done to date toward identifying these units and the shortcomings of that work.

Under the RCRA interim status requirements, the uppermost aquifer must be monitored [265.90(a)]. An "aquifer" is defined [260.10] as a "geologic formation, group of formations or a part of a formation capable of yielding a significant amount of ground-water to wells or springs". The "uppermost aquifer" is defined as "the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected within the facility's property boundary".

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\* Stanley M. Longwill and Charles R. Wood, "Ground-Water Resources of the Brunswick Formation in Montgomery and Berks Counties, Pennsylvania", Pennsylvania Geological Survey, Bulletin W22, 1965. pp 6-11

State regulations [75.265(n)(1)] require a "monitoring system capable of determining the facility's impact on the quality of any ground-water system which the facility has the potential to affect."

During construction of both the UTM wells in 1977 and the RCRA wells in 1985, there was no indication of saturated zones in either the soil or weathered zones. Ground water was encountered below the bedrock surface in all borings. Logs of the borings are presented in Appendix A.

There were at least four major water-bearing zones penetrated in drilling the UTM wells. They were all composed of the dark reddish-brown shale and yielded between 4 and 125 gpm. These water-bearing zones were encountered at depths greater than 40 feet below the surface and had greater yields with increasing depth. Whether these water-bearing zones have vertical hydraulic connections has not been determined.

Vertical hydraulic discontinuities within the fractured bedrock are suggested by the shallower RCRA wells, which complicate the identification of appropriate monitoring zones. The borings for the RCRA wells were reportedly advanced until water was encountered, then an additional 20 feet was drilled before the screen and casing were installed. Wells RCRA 3 and RCRA 4 are 40 feet apart, at nearly the same surface elevation (0.6 feet difference), yet they were completed to depths of 45 and 78 feet deep, respectively. Depths to water of 31 (RCRA 3) and 58 (RCRA 4) feet were measured during the Task Force inspection, which indicate that the driller was able to follow the design criteria. The large difference in water levels between these wells, which had been reported previously, has not been explained by the Company consultants and testing has not been conducted to determine whether the RCRA wells monitor hydraulically interconnected zones.

Both vertical and areal hydraulic discontinuities are suggested by well yield data. Testing conducted during installation of the RCRA wells yielded an average of less than 2 gpm. Well RCRA 1 had the highest yield of approximately 3 gpm and the water level recovered quickly after development. The other RCRA wells were pumped dry and then recovered very slowly.

With the wide range of depths at which ground water was encountered in the RCRA wells and the varied yields, Weston suggests that, at shallow depths, the distribution of joints and fractures is erratic.

During the installation of the deeper UTM wells, damp zones were identified between 25 and 40 feet below the surface and measurable yields (e.g., greater than 2 gpm) were obtained between 40 and 75 feet. Beyond 75 feet, water production increased significantly (up to 110 gpm).

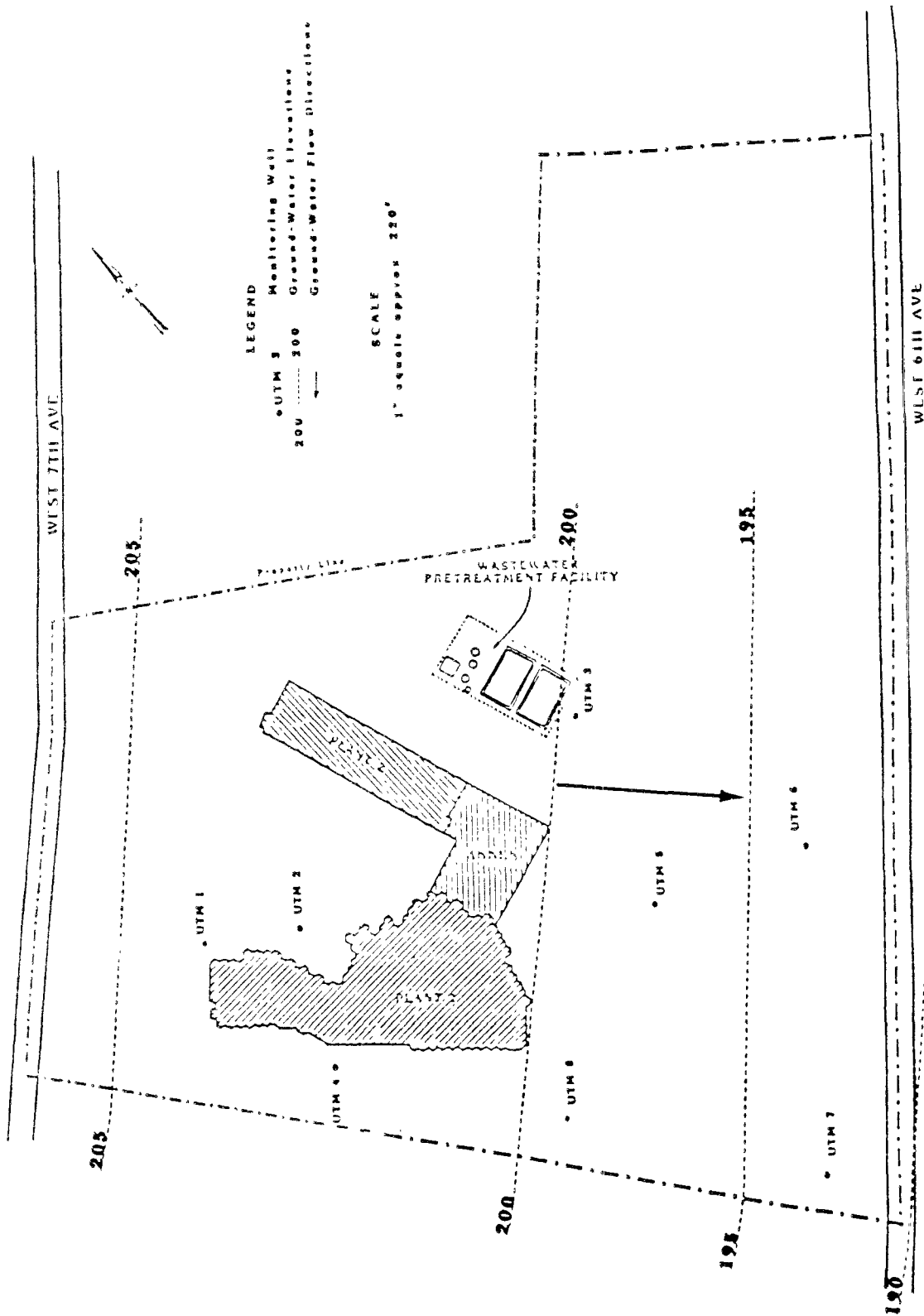
In summary, additional investigation is necessary to define the hydrogeologic units beneath the facility and the degree to which they are hydraulically interconnected. Based on the investigation, the uppermost aquifer can be better defined and appropriate monitoring zones can be identified.

#### GROUND-WATER FLOW DIRECTIONS AND RATES

Ground-water flow directions have not been adequately determined for the facility and previous investigations have yielded conflicting conclusions. Therefore, the locations of upgradient and downgradient monitoring wells, relative to the waste management units, cannot be determined without further study.

Water level measurements made in the UTM wells in 1977, before recovery well UTM 1 began pumping, suggest that ground water flows to the southeast toward Perkiomen Creek [Figure 8] with a gradient of about 0.009 feet/foot or 48 feet/mile. A pump test conducted on UTM 1 after construction yielded a transmissivity value of 3,000 gpd/foot and storativity values in the range of  $10^{-3}$  to  $10^{-4}$ . Based on these limited data, the ground-water flow rate was calculated to be about 0.07 feet/day.

The southeasterly flow direction determined from the UTM wells was used to site the new upgradient and downgradient RCRA wells. However, monitoring of the RCRA wells during the summer of 1985 revealed that ground-water flow (as reinterpreted by Weston) was to the northwest from the spray



**Figure 8**  
**Regional Flow Map by Weston**  
Water levels taken in 1977



field through the surface impoundments toward the recovery well. The recovery well, the spray field and normal seasonal variations in water levels are potential causes of this apparent flow reversal.

Weston investigated the effects of the recovery well (UTM 1) on the ground-water flow system by conducting a pump test in October 1985. The pump test indicated only very localized effects (significant only at UTM 2 and UTM 4) with influences primarily within about 800 feet northeast-southwest (along strike) and 300 feet northwest-southeast (along dip) of the well. The RCRA wells and UTM 3 showed noticeable water level changes, but were less than 0.2 feet. Weston summarized that the small water level fluctuations indicate that UTM 1 is not primarily responsible for the shape of the water table in the vicinity of the RCRA wells.

The effects of recharge from the spray field on ground-water flow have not been investigated by the Company; however, data suggest that investigation is warranted. The spray field is located just east of the impoundments [Figure 7] and is roughly 160 feet wide by 100 feet long. Contaminated water from UTM 1 (recovery well) is piped to the stripping tower then to the spray field. Approximately 75 gpm of treated water is applied to the spray area, weather permitting, as discussed in the Facility Description section.

During the onsite investigation, which occurred in late winter, Task Force personnel made water level measurements on both RCRA and UTM wells. The results are summarized in Table 5 and compared to Weston data for July, August and September 1985. Water levels in wells RCRA 1 and 4 were higher than when measured during the previous summer; water levels in wells RCRA 2 and 3 were about the same.

Water level measurements made in the UTM wells by the Company in 1977 and by Task Force personnel in 1986 revealed areas of the facility that need to be further investigated in order to adequately characterize ground-water flow directions. Task Force and Company data indicate the presence of a significant ground-water depression encompassing well UTM 1 and nearby

Table 5

DEPTH-TO-WATER DATA<sup>1</sup>

Well Number	Total Well Depth (ft) <sup>2</sup> 04/08/86	Top of Surface Casing Elevation <sup>3</sup>	Weston Data		Task Force Data	
			Water-Level Elevation <sup>3</sup> 07/12/85	Water-Level Elevation <sup>3</sup> 08/01/85	Water-Level Elevation <sup>2</sup> 04/08/86	Elevation <sup>2</sup> 09/16/85
RCRA 1	84.88	237.03	178.43	178.54	178.03	183.72
RCRA 2	50.60	231.16	191.96		192.58	191.93
RCRA 3	45.42	234.89	200.97	204.48	204.84	203.43
RCRA 4	78.36	235.24	168.33		168.45	177.15
UTM 1	200.00	247.40				
UTM 2	146.93	244.64			229.94 <sup>4</sup>	154.26
UTM 3	64.67	231.52	206.11	207.05	205.37	206.96
UTM 4	146.35	243.58			142.53	154.54
UTM 5	150.08	235.28			176.01	192.45
UTM 6	155.48	220.13			175.88	192.50
UTM 7	91.48	222.51			180.51	191.30
UTM 8	144.04	240.11			175.11	192.82

<sup>1</sup> All measurements have been reported from the top of the surface casing.

<sup>2</sup> Measured with a tape calibrated to 1/16 inch and converted to feet for table.

<sup>3</sup> Elevations referenced in feet above mean sea level.

<sup>4</sup> This value is from a field data record; however, it is not consistent with other measurements.

wells UTM 2 and UTM 4, which is probably due to operation of the recovery well. The 1977 data suggest the presence of elevated ground-water levels in the vicinity of wells UTM 3 and UTM 8. Neither of these is addressed in reports by Weston.

Task Force data suggest that an elevated water level is still present at UTM 3 when compared to the RCRA and other UTM wells. Construction records indicate that UTM 3 was drilled to a depth of 146 feet; however, measurements made by Task Force personnel revealed a depth of about 65 feet. Whether the borehole totally collapsed or is only partially obstructed is not known. Consequently, the monitored zone that the water level represents is unknown.

Although the nature of the geologic deposits underlying the site is known, the site hydrogeological characterization is inadequate. Hydraulic testing of the monitored zones is needed to determine whether they are hydraulically interconnected. The seasonal variations in the use of the spray field and drainage channel, and their potential effects on ground-water elevations and flow direction in the aquifer need to be investigated

## GROUND-WATER MONITORING DURING INTERIM STATUS

Ground-water monitoring at the Uniform Tubes facility has been conducted entirely under State interim status regulations. The Commonwealth of Pennsylvania enacted Subchapter D of the Solid Waste Management Act on November 28, 1980 with an effective date of November 18, 1980, one day before the Federal RCRA regulations were effective. EPA approved the Pennsylvania interim status program (Part 265 equivalent) on May 26, 1981 and granted final authorization (Parts 264, 265 and 270 equivalents) on January 30, 1986.

UTI did not have a RCRA ground-water monitoring program for the impoundment between November 1981, when applicable provisions of the State regulations became effective, and November 1983. Between July 1981 and about mid-1983, UTI was seeking an administrative waiver from DER and EPA for the waste pretreatment system from the RCRA program and the ground-water monitoring requirements. Although not completely documented in DER and EPA files, the process apparently began with a July 28, 1981 submittal to EPA indicating that the treatment system was a totally enclosed treatment facility (TETF) and, therefore, did not require a RCRA permit. EPA responded in a December 9, 1981 letter, which stated that the treatment system would not qualify as a TETF and requested that a corrected Part A be submitted.

DER notified UTI in September 1981 that the Department was developing criteria and standards for TETFs and would be able to grant a permit by rule to such facilities after November 30. UTI apparently requested TETF status from DER because a denial letter was sent to the Company on August 23, 1982. The letter indicated that UTI had two alternatives for obtaining TETF status. These included (1) enclosing the treatment tanks and (2) either closing the impoundments or getting the hazardous wastes in them delisted.

In September 1982, DER deleted sludge from lime treatment of spent pickling liquor (hazardous waste no. K063) from its list of hazardous wastes.\*

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\* Because the supernatant is, technically, spent pickling liquor (hazardous waste number K062) the impoundments are still subject to the State interim status requirements.

A State inspection report dated May 4, 1983 indicated that, although the sludge in the impoundments had been delisted, the contents of the UTI impoundments should be tested for EP toxicity. According to UTI records, an EP toxicity test was conducted on a sludge sample collected from the impoundments on July 19, 1983. The test results, which were sent to UTI in September 1983 reportedly indicated that the sludge was not EP toxic. Neither UTI, DER or EPA records indicate that the results were sent to the regulatory agencies. In any event, interim status ground-water monitoring was initiated in November 1983.

A State inspection report dated March 29, 1984 indicated that UTI was in noncompliance with ground-water monitoring requirements and specified the need for at least four new monitoring wells.\* On December 11, 1984, DER issued UTI a Notice of Violation for ground-water monitoring. At that time, the State required UTI to discontinue use of the UTM wells and required development of a plan for a new monitoring network. In conjunction with their plan for the new wells, UTI submitted a sampling and analysis plan (monitoring plan). This plan, submitted in May 1985, was verbally approved by DER and implemented. Samples were collected from the new (RCRA) wells in July and September 1985 using methods outlined in that plan. A timeline of these and other events related to ground-water monitoring is presented in Table 6.

The following is an evaluation of the monitoring program between May 1985 and April 1986, when the Task Force investigation was conducted. This section addresses:

- Regulatory requirements
- Ground-water sampling and analysis plan
- Monitoring wells
- Sample collection and handling procedures
- Ground-Water Quality Assessment Program Outline and Plan

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\* State reports on eight previous interim status inspections of UTI conducted between May 1981 and November 1983 indicated that the facility was in compliance with ground-water monitoring requirements.

Table 6

## TIMELINE OF ACTIVITIES RELATED TO GROUND-WATER MONITORING

EPA/DER Activities	Year	UTI Activities
	<u>1969</u>	
	//	Earthen impoundments
	<u>1973</u>	
	<u>1974</u>	
	<u>1975</u>	Impoundments lined
	//	
	<u>1976</u>	
	<u>1977</u>	
	10/	UTM wells constructed to monitor/recover solvent spill
	//	
	<u>1980</u>	
PA DER Hazardous Waste Regulations effective	11/18	
EPA RCRA Regulation effective	11/19	
	<u>1981</u>	
DER delegated interim authorization	05/	
Weston notified of interim status requirements (DER)	05/26	
	07/28	UTI requests TETF status from EPA
Ground-Water Assessment Outline and Monitoring Program due (DER/EPA)	11/19	
EPA denies TETF status	12/09	
	<u>1982</u>	
DER denies TETF status	08/23	
DER requests Part B application	10/27	
	<u>1983</u>	
	04/14	Part B application submitted

Table 6 (cont.)

EPA/DER Activities	Year	UTI Activities
	11/07	Initial Quarter Ground-Water Mon.
No decision on need for Ground-Water Monitoring (DER)	12/20	
	<u>1984</u>	
	04/30	Second Quarter Ground-Water Mon.
NOV-Must monitor, must construct new wells (DER)	12/11	
Must submit Closure Plan, can not return Part B until Closure plan approved (DER)	12/14	
	12/23	Closure Plan Submitted
	<u>1985</u>	
	05/22	Sampling and Analysis Plan for new RCRA wells
	06/10-17	New RCRA wells constructed
	09/	1st quarter Ground-Water Mon. Report
	10/	2nd quarter Ground-Water Mon. Report
Ground-Water assessment/abatement outline required (DER)	11/19	
DER Directs UTI to discontinue quarterly Monitoring-need further study	11/	
	12/15	Decides not to obtain Part B permit
	<u>1986</u>	
DER delegated final authorization	01/30	
	02/	Ground-Water Assessment Outline submitted
	02/13	Work plan submitted for additional study (Assessment Program)
Ground-water Task Force Inspection	04/08	

## REGULATORY REQUIREMENTS

The Pennsylvania requirements for ground-water monitoring during interim status are contained in Section 75.265(n) of the Solid Waste Management Act. They are similar in scope but more stringent than the RCRA Part 265, Subpart F interim status requirements. Regulation counterparts are shown in Table 7.

Table 7  
STATE AND FEDERAL COUNTERPART INTERIM STATUS REGULATIONS

Subpart Title*	Pennsylvania State Regulation Section 75.265(n)	RCRA Regulation 40 CFR Part
Applicability	(1), (2)	265.90
Ground-water monitoring system	(3), (6)	265.91
Sampling and analysis	(7), (12)	265.92
Preparation, evaluation and response	(13), (17)	265.93
Reporting and recordkeeping	(18), (19)	265.94

\* Subpart titles are given for RCRA regulations; the State does not have subparts identified.

The State regulations are more stringent because they require:

1. A monitoring system that evaluates the impact of a facility on any ground water, not just the uppermost aquifer [75.265(n)(1)]
2. Monitoring well locations to be approved by the Department [75.265(n)(3)(iii)]
3. Design specifications that provide for protecting the monitoring wells from damage by heavy equipment or vandals, including:
  - a. Steel surface casing
    - (1) Several inches larger in diameter than the monitoring well



- (2) At least 10 feet in length
  - (3) At least 1 foot above final grade and at least several inches above the monitoring well casing
  - (4) Grouted with a cement collar at least 3 feet deep to hold it firmly in position
- b. A cap on the monitoring well casing which allows the monitoring well to be locked [75.265(n)(6)(i-ii)]
4. Ground-water sampling and analysis plans to be submitted to the Department, when requested, and a copy retained at the facility [75.265(n)(7)]
5. Additional monitoring requirements to those specified in 265.92 (b)(2) and (3), if requested by the DER [75.265(n)(8)(ii)(G) and (iii)(E)]
6. Results of analyses for ground-water quality parameters [265.92(d)(1)] to be submitted semiannually instead of annually [75.265(n)(11)(i)]
7. Results of analyses for ground-water contamination parameters [265.92(d)(2)] to be submitted quarterly instead of semiannually [75.265(n)(11)(ii)]
8. The ground-water quality assessment outline of 265.93(a) to be submitted to the Department for written approval and a copy retained at the facility [75.265(n)(13)]
9. The assessment outline, in addition to the requirements of 265.93(a), to include details of abating any ground-water contamination attributable to the facility [75.265(n)(13)(iv)]
10. Abatement procedures to be included in the assessment plan [75.265(n)(15)(ii)(D)] and submitted to the Department for approval [75.265(n)(15)(vi)(C)]

11. Any changes in the monitoring system [265.93(f)] to be submitted to the Department for written approval before construction begins [75.265(n)(17)]
12. The annual monitoring reports specified in 265.94(a)(2)(ii), to be submitted semiannually [75.285(n)(18)(ii)]
13. Quarterly reports, if there is a significant difference found in the upgradient well(s) [75.265(n)(18)(c)]
14. Quarterly results of ground-water surface elevations rather than annually (on March 1) as specified in 265.94(a)(2)(iii) [75.265(n)(18)(D)]
15. A facility to submit records to the Department in addition to keeping records at the facility for review [75.265(n)(19)(i)]
16. Submission of a report containing results of the ground-water quality assessment program to the Department by January 31 (rather than March 1) which includes, in addition to the requirements of 265.94(b)(2), the volumes of hazardous waste constituents removed from the ground-water using the abatement procedures [75.265(n)(19)(ii)].

#### GROUND-WATER SAMPLING AND ANALYSIS PLAN

The ground-water sampling and analysis plan submitted by UTI in May 1985 is inadequate and does not comply with State regulations [75.265(n)(7)]. The regulations require an owner/operator to develop and follow a sampling and analysis plan which includes procedures and techniques for: (1) sample collection, (2) sample preservation and shipment, (3) analytical procedures and (4) chain-of-custody control. The May 1985 plan addresses each of these required areas, but many necessary details are omitted.

The section on sample collection procedures does not specify the types of equipment used to measure water levels and purge each of the wells. Nor does it address how often the well depths are measured for the purpose of determining total water column heights in purging. It does not indicate whether the sampling equipment is dedicated to the site and/or individual wells, nor does it address disposal of the purged water and the method of filtering samples. The section addresses making field measurements for temperature, specific conductivity and pH; however, procedures are not included for making these field measurements or for calibrating the instruments. Also, no procedures are described for making the required quadruplicate measurements for the indicator parameters.

The plan does not contain a sampling schedule, which is necessary because monitoring frequencies and parameter requirements change after the first year. Without a guide (schedule) for sampling in the plan, it is deficient.

The sample preservation methods in the plan are contrary to EPA recommended methods for the preservation of nitrate samples. The plan indicates that hydrochloric acid is used rather than cooling the sample to 4° C. as recommended by EPA. The samples taken for radium and phenols also require preservation, yet the table listing sample preservatives in the plan does not indicate this. Radium samples need to be preserved with nitric acid to a pH of less than 2. Phenol samples need to be preserved either with one gram of copper sulfate per liter of sample and phosphoric acid to a pH of less than 4 or with sulfuric acid to a pH of less than 2. The plan does not indicate the method of verifying that samples have been preserved to the appropriate pH.

The analytical procedures are cited as EPA or Standard Method numbers. The specific methods need to be listed because these methods have alternate subparts that can yield significantly different results. Both the chain-of-custody procedures and the custody forms need to be included in the plan rather than referenced.

Quality assurance and quality control procedures should also be included rather than referenced. The Weston "procedures for ensuring the collection of samples representative of ground-water quality" should be detailed.

In summary, the plan is not sufficiently detailed to ensure consistent sampling methods or collection of representative samples. It needs to be revised before additional sampling is conducted.

#### MONITORING WELLS

UTI has conducted ground-water monitoring since 1977 at its Collegeville plant. Eight monitoring wells were installed on the property in October 1977 [Figure 9] for assessing the extent of TCEA and TCE that had entered the ground water, probably as leakage from the underground storage tanks.

The initial RCRA ground-water monitoring network for UTI was proposed with the Part B application in October 1983. The monitoring proposal designated four of the UTM wells for interim status monitoring. These wells were:

Upgradient	UTM 1
Downgradient	UTM 3
	UTM 5
	UTM 6

After the second quarterly samples were collected (March 1984), DER personnel determined that the locations of these wells (400 to 800 feet away from the waste boundary) were not appropriate for monitoring the surface impoundments. Following the DER determination, UTI submitted a plan for four new wells to be constructed adjacent to the pretreatment facility. The well construction plan was included in the May 1985 ground-water sampling and analysis plan, which was verbally approved by DER. The new wells, designated as RCRA 1 through 4, were constructed in June 1985 [Figure 10]. DER personnel observed construction of several of the wells.

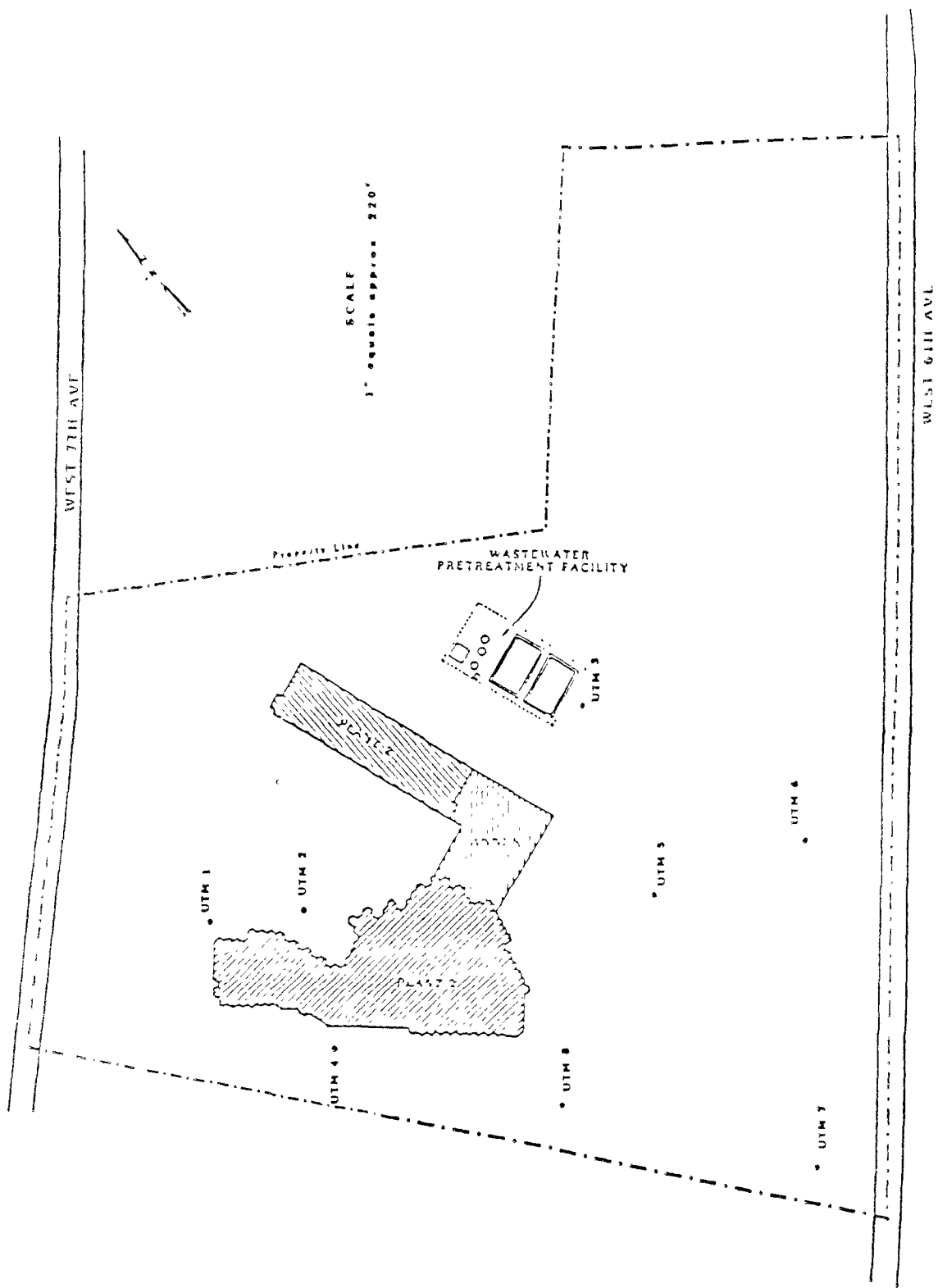


Figure 9  
Spill Monitoring Wells

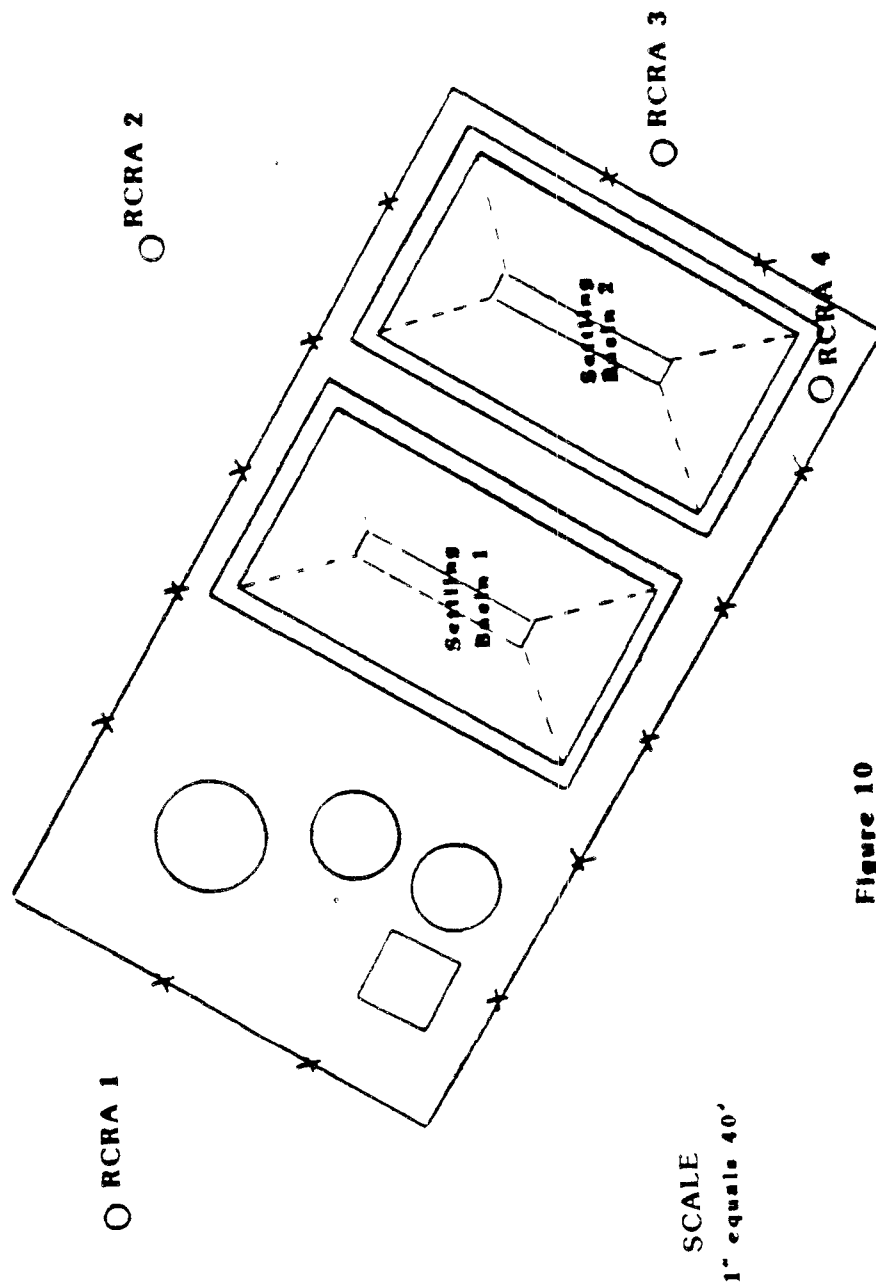


Figure 10  
Interim Status Monitoring Wells  
June 1985

## Well Construction

The RCRA-series wells were constructed between June 10 and 17, 1985 with an air-rotary rig, using a percussion hammer bit. The bit was cooled with water added during drilling. Drilling and construction logs were maintained by a Weston geologist; copies of these logs are in Appendix A. The depth drilled was determined by the location of the first saturated zone. When the first saturated zone was encountered, the driller drilled an additional 20 feet and stopped.

The wells were completed using 4-inch-diameter, Schedule 40 PVC casing with a 20-foot PVC well screen having 0.20-inch slots. All casing and screens had threaded connections; adhesives were not used. The annular space around the screen was filled with a filter pack of fine to medium-grained gravel. The filter pack was extended from the bottom of the well bore to a level about 5 feet above the top of the screen. A bentonite seal, approximately 2 feet thick, was emplaced above the filter pack. The remainder of the annular space was pressure grouted with a bentonite-portland cement mix. A 6-inch-diameter steel surface casing, 5 feet long, was set into the grout around the outside of the PVC well casing. The surface casing was equipped with a locking cap to prevent unauthorized access. Following construction, the wells were developed using compressed air. Additional construction details are presented in Table 8.

Although the construction was generally adequate, some problems were found during the onsite inspection and records review. The surface casing was only 5 feet long instead of the minimum of 10 feet required by State regulations [75.265(n)(6)]. The September 1985 (post-construction) monitoring report and the drilling logs indicate that an 8-inch diameter surface casing was installed; however, 6-inch casing was actually used. The surface casing is supposed to be marked with the well designation [75.265.(n)(5)]; however, none of the wells were so marked.

Construction records indicate that the annular space in each well was pressure grouted, but do not indicate whether there was a surface return

Table 8  
CONSTRUCTION DETAILS FOR INTERIM STATUS WELLS\*

Well Number	Date Completed	Total Depth** (ft)	Screened Interval** (ft)	Filter Pack Interval** (ft)	Development*** Time (min)	Strata Monitored
RCRA 1	06/12/85	83	62.4-82.4	57.5-82.8	48	Gray-green siltstone; last foot of drilling red-brown siltstone
RCRA 2	06/14/85	49	28.0-48.0	22.8-49.0	29	Dark gray siltstone
RCRA 3	06/17/85	43	22.9-42.9	17.0-43.0	58	Dark gray siltstone with red-brown clay
RCRA 4	06/11/85	78	56.0-76.0	50.0-78.0	33	Dark red-brown siltstone with some clay and sand

\* All data from Weston's drilling logs [Appendix A]

\*\* All depth referenced in feet below ground surface.

\*\*\* All wells were developed using a 180-cubic-foot per minute Worthington Air Compressor.



of grout. The purpose of the grout is to seal the annular space. Unless an excess of grout is used, as would be indicated by a surface return, the adequacy of the seal is questionable and surface water may enter the well. The concrete aprons around the wellheads, which are supposed to drain surface water away, were broken at all four wells.

Two of the wells sampled during the Task Force inspection (RCRA 2 and 4) produced very turbid water. This suggests possible deficiencies in the sand pack or well development. The problem needs to be identified and corrected.

#### Well Locations

The location of the RCRA wells was based on the hydrogeologic data gathered from the UTM wells. Since the ground-water flow direction was interpreted as being to the southeast, RCRA 1 was designated as the upgradient well and wells RCRA 2, 3 and 4 designated as the downgradient wells.

Data gathered since the completion of these wells suggest that the areal locations may not be appropriate. If ground-water flow in the uppermost aquifer is to the northwest, as reinterpreted by Weston, then well RCRA 1 is no longer an upgradient well and is not located at the perimeter of the waste management area, as required for a downgradient well [75.265 (n)(4)]. In addition, well RCRA 2, if now an upgradient well, is probably too close to the impoundment to represent background conditions. As indicated in the Site Hydrogeology section, however, ground-water flow directions have not been adequately determined. Further investigation is necessary before the adequacy of the well locations can be determined.

The vertical locations of the well screens are also questionable because they are probably not monitoring the same aquifer zones (see Site Hydrogeology section). As a result, the water level data are not comparable for the purpose of determining flow directions and satisfying the requirements for

the annual report. In the annual report, UTI must determine if the criteria for locating the monitoring wells (i.e., upgradient and downgradient) continues to be satisfied [75.265(n)(17)].

#### UTI SAMPLING PROCEDURES

A UTI contractor, Weston, samples the wells for the required interim status monitoring. Weston was asked to demonstrate their sampling protocol for Task Force personnel. This request was declined; however, a verbal explanation of the procedures used at UTI was provided. Some of the sampling procedures are inadequate and the plan, in several instances, is not strictly followed, as required by State regulations [75.265(n)(7)]. The following was derived from the explanation provided by Weston and a review of field data sheets from sampling during July, August and September 1985.

#### Water Level Measurements

To determine the volume of water in the well casing for calculating purge volumes, water level measurements are taken at each well. Weston uses a Soil Test Water Level Indicator, Model DR-760A, when taking water level measurements. This Water Level Indicator consists of a reel with a control panel, cable and sensor. When the sensor makes contact with water, the needle on the control panel ammeter shows an inflection from zero. The cable is marked every 5 feet. The cable is lowered into the well until the probe reaches the water. The probe is raised and lowered until the exact point of contact is determined. The cable at the top of the PVC tubing is pinched by the sampling contractor and the distance from the bottom of his fingers to the next higher cable marker is measured with a ruler; this measurement is subtracted from the cable marker to determine the water level. Following the measurements at each well, the first 5 feet of cable and the probe are decontaminated with distilled deionized water.

The method for water level measurement is generally acceptable; however, this type of water level indicator requires some interpretation of where the water level is located. The relative inflection of the ammeter needle

can change from well to well and may be influenced by water cascading or dripping into the hole. The precision and accuracy of the water level measurements is questionable. In addition, the entire length of the cable entering the well needs to be decontaminated after use to allow for rubbing against the well bore, etc. The water level markers (imbedded in the insulated cable) should also be checked periodically to determine if the wire has stretched. Weston followed the approved plan for measuring water levels.

### Purging

Monitoring records indicate that the wells were purged of about three water column volumes before sampling. The volume of water in the casing is determined by first calculating the height of the standing water in the casing by subtracting the depth-to-water measurement from the total well depth (from construction records). Next, the volume is calculated by multiplying the water column height by a gallons-per-foot-of-casing conversion factor.

Weston uses a Grundfos<sup>®</sup> submersible pump, model SP-2-7, for purging. The pump is decontaminated with Alconox solution and rinsed with deionized water prior to each well entry. The pump is lowered into the well using whatever rope is available. If nylon rope is used, it is soaked in deionized water between each well. If hemp rope is used, it is discarded after one use.

The volume of water purged is calculated from the estimated pump discharge rate and length of pumping time. The pump discharge rate is reportedly calculated from the time required to fill a 5-gallon bucket during purging; however, this is not indicated on the monitoring records. Purged water is discharged to the ground adjacent to the well. Because this water may contain hazardous waste or constituents, it needs to be disposed of in a more environmentally sound manner.

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<sup>®</sup> Grundfos is a registered trademark and will be shown hereafter without ®.

In addition, the sampling plan was not followed. The plan indicates that at least five times the calculated casing volume is to be purged. In no case, were more than three casing volumes purged from any well; some had less than three volumes removed on different dates.

#### Sample Collection

After purging the wells, each is sampled using a 700-cubic-centimeter, bottom-loading, Teflon Galtek bailer. The bailer cord is similar to that used for lowering the pump. If nylon cord is used, it is soaked in deionized water between samples and reused. If hemp is used, it is discarded after use in one well.

Weston does not use a specific order when sampling the wells. Determining which well is sampled first is more a matter of logistics. Likewise, they have no set order when filling the sample bottles. If the sample is turbid, they will first collect an aliquot for metals to allow time for filtering, then collect inorganics, extractable organics and, finally, volatile organic samples.

The metals samples are collected in one bottle then taken to the treatment building where they are filtered using a 47-mm-diameter (0.45 micron) MF-millipore filter and glass (300 mL) filtering apparatus. They are filtered into a second bottle already containing the preservative, nitric acid. The preservatives for metals and organics are put in the bottles in the lab prior to sampling.

According to the field sheets, measurements for pH, temperature and specific conductivity were not performed due to the unavailability of equipment.

Upon completion of sampling at a well, the bailer is rinsed with deionized water and then reused at the next well.

The sample collection methods need improvement. Dedicated bailers and rope need to be used for each well when sampling. Rinsing the bailers between each well is probably not sufficient to remove contaminants at the levels found in some wells. Also, the random order of sampling needs to be improved now that contaminant concentrations in each well are known. If one bailer is to be used, sampling needs to start at the least contaminated well and progress to the most contaminated well. According to EPA methods, pH measurements should be made immediately after the sample is collected.\*

There are a number of discrepancies between the methods outlined in the sampling plan and those followed by Weston samplers. The sampling plan states that field measurements are to be made for temperature, pH and specific conductivity. Field data sheets indicate that no field measurements were taken. The results presented for these parameters were measured in the lab. The plan also states that a variety of quality assurance/quality control samples will be taken by the samplers. These include: (1) duplicate well samples, (2) trip blanks and (3) field equipment blanks taken each quarter. Field data sheets indicate that one duplicate sample was taken in July but none of the blank samples is mentioned in the notes for either quarter.

#### Shipping and Chain-of-Custody

\* Chain-of-custody forms are filled out before submission of the samples to the lab. Weston personnel stated that they follow EPA procedures for chain-of-custody. Samples are logged in at the Weston lab and custody forms are signed over at that time. Samples are packed in coolers with ice and vermiculite and taken to the lab the same day the samples are taken. Copies of the chain-of-custody forms were not provided; therefore, whether the sampling plan is followed could not be determined.

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\* 40 CFR Part 136, Table II

## SAMPLE ANALYSIS AND DATA QUALITY EVALUATION

This section provides an evaluation of the quality and completeness of interim status ground-water monitoring data gathered by Uniform Tubes between November 1981 and April 1986. Analytical procedures for required interim status monitoring parameters and data quality were evaluated through a laboratory inspection and review of documents containing the required monitoring data. Previous monitoring data revealed that volatile organic compounds were present in the ground water adjacent to the waste management units. As a result, DER was requiring the Company to implement a ground-water quality assessment program. Consequently, the laboratory inspection included an evaluation of analysis procedures for volatile organics.

Analyses for interim status and assessment monitoring are done by a UTI contract laboratory, Weston Analytical Laboratory of Lionville, Pennsylvania. The Weston laboratory was evaluated concurrently with the onsite inspection of the UTI facility. The evaluation involved reviewing laboratory operating and analytical procedures, internal data reports, raw data and quality control records; interviewing key laboratory personnel and inspecting laboratory facilities and analytical equipment.

### Interim Status Analyses

The evaluation revealed that UTI has not completed the first year of quarterly monitoring or statistical analysis of analytical parameters, as required by 75.265(n)(8); only two quarters of monitoring had been completed. The analysis of both laboratory results and reported results indicates the data are neither accurate nor complete. In addition, inconsistencies were found between reported parameters and those actually analyzed.

Table 9 indicates the parameters required for analysis during the first year of monitoring, as required in Section 75.265(n)(8), and the extent to which UTI has performed the required analyses. The facility is required to monitor parameters for drinking water quality, ground-water quality, and indicators of contamination (indicator parameters) quarterly during the

Table 9  
GROUND-WATER MONITORING PARAMETERS AND FREQUENCY

Required Parameters	Monitoring Frequency (first year)	First Quarter Analyses (July 1985)	Second Quarter Analyses (Sep. 1985)
<i>Drinking Water Quality</i>			
<u>75.265(n)(8)(i)</u>	Quarterly		
Arsenic		X	
Barium		X	
Cadmium		X	
Chromium		X	X
Fluoride		X	
Lead		X	
Mercury		X	
Nitrate (as N)		X	X
Selenium		X	
Silver		X	
Endrin			
Lindane			
Methoxychlor			
Toxaphene			
2,4-D		X	
2,4,5-TP (Silvex)		X	
Radium		X	
Gross Alpha		X	
Gross Beta		X	
Turbidity		X	
Coliform Bacteria			
<i>Ground-Water Quality</i>			
<u>75.265(n)(8)(ii)</u>	Quarterly		
Chloride		X	
Iron			
Manganese			
Phenols		X	
Sodium		X	
Sulfate		X	X
<i>Indicators</i>			
<u>75.265(n)(8)(iii)</u>	Quarterly		
pH		X <sup>1</sup>	X <sup>1</sup>
Total Organic Carbon (TOC)		X <sup>1</sup>	
Total Organic Halogen (TOX)		X <sup>1</sup>	
Specific Conductance		X <sup>1</sup>	X <sup>1</sup>

<sup>1</sup> Reported only single measurements for upgradient well instead of quadruplicates as required

first year for both upgradient and downgradient monitoring wells. In addition, quadruplicate measurements were to be taken for the upgradient well for indicator (pH, TOC, TOX, specific conductivity) parameters.

#### Drinking Water Quality Parameters

Analytical results for the drinking water parameters reported to DER for samples collected in July and September 1985 did not include endrin, lindane, methoxychlor, toxaphene and turbidity in July. In September, the only drinking water parameters reported were chromium and nitrate.

Several problems with the reported data were found. Analytical results for metals were reported as total metals for the samples collected in September; however, the samples were filtered in the field. The results should have been reported as dissolved metals. Consequently, the reported metals concentrations are probably biased low. In addition, none of the metals samples were spiked for determining the accuracy of the data. Therefore, the analytical bias of the reported results is unknown. Arsenic, silver and selenium were analyzed by flameless atomic absorption spectroscopy using a calibration curve rather than a standard additions method. By using only the calibration curve, commonly encountered matrix effects are not accounted for, which results in erroneous data. Chromium, copper, cadmium, nickel, barium, beryllium, lead, antimony, thallium and zinc were analyzed by inductively coupled argon plasma (ICAP). Mercury was analyzed by cold vapor atomic absorption.

The sampling and analysis plan states that nitrates will be analyzed using EPA Method 352.2. Laboratory records indicate they used the EPA ion chromatography method, number 300.0, for which samples should not be preserved. However, Weston field personnel preserved the samples with hydrochloric acid. Addition of acid to samples for nitrate analysis causes nitrite to convert to nitrate. Consequently, the analytical results represent the nitrate plus converted nitrite concentrations and are probably biased high.



The accuracy and precision of duplicate spikes of 2,4-D and 2,4,5-TP added to blank water were not acceptable. The percent recovery of the herbicides from one spike was 130-160%; the percent recovery of the herbicides from the duplicate spike was 60-90%. The high percentage recovery appears to be due to a chromatographic interference. The spikes were not rerun because no herbicides were detected in the samples.

Radium samples were not preserved; however, EPA methods recommend preservation with nitric acid to a pH of less than 2. Consequently, the reported results for radium are probably biased low.

#### Ground-Water Quality Parameters

Analyses for the ground-water quality parameters were incomplete. In July 1985, analyses were not performed for iron and manganese. In September 1985, sulfate was the only chemical analyzed for in this group.

Phenol samples were not preserved; however, EPA methods recommend preservation with either (1) sulfuric acid to a pH of less than 2 or (2) phosphoric acid to a pH of less than 4 and 1 gram of copper sulfate per liter of sample. Consequently, the results for phenol are probably biased low.

#### Indicator Parameters

Data submitted for indicator parameters were incomplete and the accuracy is suspect. Quadruplicate measurements must be made each quarter for the indicator parameters. The interim status monitoring data reported to DER for July 1986 contained only one value for each parameter. Laboratory records revealed that quadruplicate measurements were made on samples collected on July 12 and 17 and August 1; however, only one of the 12 values for each parameter was reported for each well.

The laboratory records also indicated a significant variation in pH values from one sample date to the next for the wells. For example, pH values of 5.3 and 7.6 were reported for samples collected from well RCRA 3

on July 12 and 17, respectively. The pH data may be biased because of excessive holding times between sampling and analysis. For example, pH samples collected on July 17, 1985 were not analyzed until July 26, 1985. EPA methods recommend that pH measurements be made immediately after collection (i.e., within 15 minutes).

The total organic halogen (TOX) results are biased low. The amount of halogen measured by volatile organics analysis (VOA) in the monitoring wells during July 1985 was markedly higher than that measured by the TOX analysis. For example, the volatile organic results for the sample taken at RCRA 2 contained more than 100 mg/L halogen, but the corresponding TOX result was only 58.4 mg/L. The cause for the low TOX result could not be determined from available information; however, inconsistencies were found between the EPA method for TOX analysis followed by Weston and actual laboratory practices.

For example, bottles for TOX samples were not baked before use to "burn out" halogenated organics and other compounds. The EPA method being followed by Weston (Method 9020, EPA SW 846) specifies that the TOX sample bottles are to be baked at 400° C. Further, instrument and reagent blanks were not being run in duplicate, as specified by the EPA method. Calibration standards analyzed concurrently with samples did not agree within 3%, as specified in the EPA method. As a result, the reported detection limit of 5 µg/L should have been at least 13 µg/L, based on the variance observed in the blanks.

The reported concentrations for total organic carbon represent only nonpurgeable organic carbon (NPOC) because of the analytical method used. The method involves acidifying the sample and purging it with nitrogen gas before determining the organic carbon content, which results in the loss of purgeable (volatile) organic carbon. Thus, the results as reported for TOC are biased low.

Reported specific conductivity measurements are approximately 15% low because no correction was applied to the cell constant for measured versus theoretical conductivity of chemical standards.

### Volatile Organic Analyses

Volatile organic analyses of ground water from the UTI facility have been performed by the Weston laboratory since the solvent release was discovered in 1977. In early 1986, DER required UTI to conduct a ground-water quality assessment program relative to the surface impoundments. Consequently, the analytical procedures for volatile organics were evaluated.

The inspection revealed that no corrections were being made to the analytical results for volatile organics measured in the blanks. In several of the samples collected in July 1985 for volatile organic analysis (VOA), compounds such as chloroform, methylene chloride, 2-butanone and acetone were reported at levels similar to those found in the blanks. If the blank values had been subtracted, these compounds would have been "non-detected".

The Weston laboratory does not systematically track sample holding times. A review of sample collection and analytical dates revealed that holding times are sometimes exceeded. Exceeding holding times before analysis can result in biased results.

### GROUND-WATER QUALITY ASSESSMENT PROGRAM OUTLINE AND PROGRAM

State regulations [75.265(n)(13)] require a facility to prepare and submit an outline of a ground-water quality assessment and abatement program for written approval by the Department before November 19, 1981. The outline must describe a more comprehensive ground-water monitoring program than the one for routine interim status monitoring and be capable of determining:

1. Which hazardous waste or hazardous waste constituents have entered the ground water
2. The rate and extent of migration of hazardous waste or hazardous waste constituents in the ground water

3. The concentrations of hazardous waste or hazardous waste constituents in the ground water
4. Abatement alternatives for any ground-water contamination attributable to the hazardous waste management facility

#### Assessment Outline

The first assessment outline was submitted to DER in 1983 in the Part B application. The State reviewed this submission for compliance with the interim status requirements and found it to be inadequate, primarily because it specified use of only the UTM wells, which were installed as part of the ground-water remediation system. A second outline was submitted to DER in February 1986, which is still under review.

The assessment outline submitted in February 1986 is a two-page document [Appendix B]. It describes a more comprehensive ground-water monitoring program; however, the outline does not relate directly to the requirements stated above. Although the outline was developed after contaminants were detected in ground water and is more specific about actions to be taken, it needs to address the following items which are either omitted or are not clearly indicated:

- How data triggering assessment would be evaluated to confirm apparent contamination
- Circumstances under which additional monitoring wells would be necessary if the initial phase of the program indicates contamination
- How volume/concentrations of released contaminants would be determined
- How the rate and extent of contaminant migration would be determined

- How the facility would be sure that all potential contaminants were identified in the plume
- How a monitoring plan would be developed and the projected sampling frequency
- Which aquifer(s) would be monitored
- How data would be evaluated to determine when/if the facility could return to regular monitoring, as specified by 75.265(n)(18)
- What restoration, reclamation or recovery of ground water would take place on site, as required for State abatement requirements [75.265(n)(13)(iv)]
- Approximate schedules for the time needed to initiate assessment and abatement sampling, analysis, data evaluation and report evaluation

#### Assessment Program Plan

UTI reported elevated levels of volatile organics, chromium and dissolved solids in the four RCRA wells in July 1985 (first quarter of monitoring). Analysis of samples taken in September verified the presence of contaminants in the wells. In November, DER directed UTI to discontinue routine interim status monitoring and recommended additional subsurface investigation to determine the source of the contaminants. In February 1986, DER received a document titled "Work Plan for Subsurface Investigation" from UTI. This plan was considered to be an assessment program plan by both DER and UTI and was under review at the time of the Task Force inspection.

State regulations [Section 75.265(n)(15)] require an assessment and abatement plan to be submitted, based on the assessment outline, which specifies: (1) the number, location, size and depth of wells; (2) sampling and analytical methods used to identify hazardous waste or constituents;

(3) evaluation procedures, including use of any previously gathered ground-water quality information; (3) abatement procedures and (5) a schedule for program implementation.

The February Work Plan was reviewed by the Task Force and found to be inadequate. Since the plan is based on the outline discussed previously, it has similar problems. The major problems include the lack of both abatement procedures and the schedule of implementation, as required by State regulations [75.265(n)(15)].

In addition, the monitoring wells are inadequate as proposed. The monitoring wells, as designed, do not appear to monitor a single zone. Since contamination is already known to be present, these new wells may provide additional avenues for cross-zone migration of contaminants. The proposed wells will have surface casing down to a depth of 5 feet below the surface of the bedrock; the remainder of the well is designed to have an open borehole. As discussed in the Site Hydrogeology section, several water bearing zones were encountered during the construction of the UTM wells. Several of these water-bearing zones are likely to be penetrated between the bottom of the surface casing and the proposed 100-foot depth of the wells. Water levels measured in these wells will be composites of the water-bearing zones encountered, which may not relate directly to those measured in other site wells due to vertical and lateral hydraulic discontinuities. Consequently, the direction of ground-water flow may still not be adequately defined.

The new wells are designed to be constructed in a manner similar to the UTM wells. One of the UTM wells (UTM 3) collapsed; therefore, wells constructed without screens and sand/gravel packs may not be able to maintain borehole integrity, as required by State regulations [75.265(n)(5)].

## EVALUATION OF MONITORING DATA FOR INDICATIONS OF WASTE RELEASE

This section presents an analysis of both Task Force and UTI monitoring data regarding indications of apparent leakage from the waste management units. Analytical results from and methods used on samples collected by Task Force personnel are presented in Appendix C.

Task Force data indicate the presence of volatile organic compounds at high concentrations (greater than 1,000 µg/L) in six of the eight wells sampled [Table 10]. Samples from the other two wells (UTM 5 and 8) also had detectable volatile organics but at much lower concentrations. All but one of the concentrations (TCE in UTM 5) in these two wells were at or near the limit of quantitation.

Well RCRA 2 had the highest concentrations of volatile organics followed by wells RCRA 1, RCRA 4, UTM 1 (extraction well), RCRA 3 and UTM 3. All but well UTM 1 are near the waste management units (surface impoundments). This pattern is also indicated by Company monitoring data derived from samples from the RCRA wells and UTM 3 collected in July and from all wells in September 1985 [Appendix D]. Samples from wells RCRA 1 and 2 had much higher concentrations of TCE and TCEA than UTM 1, which is the extraction well located near the old solvent tanks. The reason for these concentration differences could not be determined from the information reviewed.

TCE and TCEA were also detected in the surface impoundment sample, but at much lower concentrations than in samples from the adjacent wells. The presence of these compounds was not expected based on the review of wastewater sources to the pretreatment system (see Facility Description section). These compounds were detected in the impoundments by Weston in early 1986, which prompted an in-house investigation to identify the source. In March 1986, Weston analyzed samples from the Plant 1 sump, which discharges to the pretreatment system and found TCE at 25,000 µg/L and TCEA at 48,000 µg/L. The sump is near the abandoned underground TCE/TCEA storage tanks (see Facility Description section).

Table 10

## ORGANIC COMPOUNDS DETECTED IN TASK FORCE SAMPLES\*

Compound	RCRA 1 (Orig)	RCRA 1 (Dup)	RCRA 1 (Trip)	RCRA 2	RCRA 3	RCRA 4
1,1-Dichloroethane	ND**	ND	ND	ND	21***	ND
1,1,1-Trichloroethane	20,000	16,000	16,000	56,000	1,500	4,100
1,1-Dichloroethene	5,100	3,900	4,100	1,500***	80	600
Trans-1,2-Dichloroethene	170***	ND	140***	ND	180	200***
Trichloroethene	12,000	9,200	9,500	88,000	2,200	8,300
Tetrachloroethene	ND	ND	ND	1,200***	23***	ND
Methylene chloride	ND	ND	ND	ND	28***	ND
Compound	UTM 1	UTM 3	UTM 5	UTM 8	Stripp Tower	Surface Impoundment
1,1-Dichloroethane	ND	17***	ND	ND	ND	ND
1,1,1-Trichloroethane	2,500	1,300	8	3***	6	280
1,1-Dichloroethene	100***	63	ND	ND	ND	ND
Trans-1,2-Dichloroethene	ND	170	5	4***	ND	ND
Trichloroethene	7,600	1,300	77	8	19	53
Tetrachloroethene	ND	16***	ND	3***	ND	ND
Acetone	ND	ND	ND	ND	ND	140
4-Methyl-2-Pentanone	ND	ND	ND	ND	ND	24***
di-n-Butyl phthalate	ND	ND	ND	3***	ND	ND
bis(2-Ethylhexyl) phthalate	ND	10***	ND	ND	ND	ND

\* Concentrations are expressed in micrograms/liter ( $\mu\text{g/L}$ ).

\*\* Not detected

\*\*\* Estimated concentration



The inorganic data from the Task Force samples suggest leakage from the impoundments. Data for selected parameters present in high concentrations in the impoundment sampled during the inspection are compared in Table 11 to data for wells having elevated concentrations (relative to concentrations in the other wells) of these chemicals. Data from the stripping tower discharge are also included for comparison because they are probably indicative of parameter concentrations in recharge to ground water from the nearby spray field.

In Table 11, the parameter concentrations for the respective wells are listed in decreasing order from left to right. The well locations are shown on Figure 3. The pattern of elevated concentrations suggests southeasterly migration of chemicals from the impoundments.

TABLE 11  
SELECTED INORGANIC DATA FROM TASK FORCE SAMPLES\*

Parameter	Settling Basin 2	Stripping Tower	RCRA 2	RCRA 3	UTM 3	RCRA 4
Chromium**	2,840	58	1,280	246	395	8
Cyanide**	53	<10	20	<10	<10	<10
Sulfate***	1,250	28.5	500	500	250	44
Sodium***	268	11.5	37.4	45.0	28.4	17.4
Magnesium***	263	7.6	44.7	46.1	25.3	16.9

\* Data are from wells adjacent to the surface impoundments

\*\* Concentrations are in micrograms per liter ( $\mu\text{g/L}$ )

\*\*\* Concentrations are in milligrams per liter ( $\text{mg/L}$ )

APPENDIX A  
BORING LOGS FOR UTI WELLS

## APPENDICES

- A BORING LOGS FOR UTI WELLS
- B GROUND-WATER QUALITY ASSESSMENT OUTLINE AND PROGRAM PLAN
- C ANALYTICAL TECHNIQUES AND RESULTS FOR TASK FORCE SAMPLES
- D UTI MONITORING DATA FOR JULY AND SEPTEMBER 1985

# DRILLING LOG

Hole No. UT - 1

Date Drilled 10/1/77

Location NW of Plant

Project UTX

Depth of Water Table 45' 5"

Casing in Hole 21'

100' of 2 1/2" Sept

From	To	Description	Comments
0'	5'	Dark to reddish brown (10R3.5/5) Silt loam	
5'	7'	Dark to reddish brown (10R3.5/5) Shaley silt loam	
7'	21'	Pale to moderate red (5R5.5/3) Silty shale	
21'	60'	Pale red to greyish red purple (5RP5/2) Silty shale	Damp at 39'; moist to wet at 51'
60'	79'	Dark red brown (10R3/4) Shale	Water at 77' (1 1/2 gpm) Water at 79' (10 gpm)
79'	85'	Greyish red (5R4/2) Fine grained micaceous sandstone (calcite on fracture); some limonite in oxidized wgs	
85'	91'	Greyish red (5R4/2) Mudstone	
91'	96'	Greyish red (5R4/2) Siltstone	Water at 96' (15 gpm)
96'	110'	Greyish red (10R4/2) Micaceous siltstone	
110'	123'	Greyish red (10R4/2) Micaceous siltstone with few calcite stringers	Water at 119' (20 gpm) Water at 121' (30 gpm)
123'	142'	Dark reddish brown (10R3/4) Shale	
142'	146'	Greyish red purple (5RP4/2) Silty shale	(30 gpm) at bottom 146'
		Water sample at 70'	
		Water sample blown from bottom.	
		Water sample bailed at end of drilling	

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## STRATIGRAPHIC LOGS OF BOREHOLES

Borehole No. UTM-1 (Continued) Date Drilled 26-27 October 1977  
 Location UTI Project 1767-001  
 Depth of Water Table 43.91 (ft.) B. L. S. \_\_\_\_\_

LOG

Depth Zone (ft.)	Thickness (ft.)	Description
146-151	5	Gray, red and tan shale with Calcite fracture healings.
151-153	2	Fracture -- Total discharge now 125 gpm.
153-160	7	Gray, red and tan shale with Calcite fracture healings.
160-164	4	Gray, red and tan shale with two small fractures at 162 and 163.
164-176	12	Red shale softer than the red, gray shale.
176-178	2	Red, gray shale.
178-186	8	Lighter gray shale; small fracture at 178.
186-197	11	Brown, gray shale, small fracture at 186; cuttings are occasionally iron stained.
197-200	3	Brown, red shale with a small fracture at 197.
200		End with >100 gpm.
		Set 20 ft. of 6" surface casing with drive shoe and grout.

# DRILLING LOG

Hole No. UT - 2  
 Location NE of Tanks  
 Depth of Water Table 42'

Date Drilled 10/5/67  
 Project UTI  
 Casing in Hole 10'

From	To	Description	Comments
0	1'	Moderate reddish brown (10R4/6) Silty clay	
1'	4'	Moderate Brown (5YR4/4) Clay loam	
4'	9'	Moderate Brown (5YR3.5/4) Silty loam	
9'	12'	Dark reddish brown (10R3/4) Shaley silt loam	
2'	20'	Pale to dark reddish brown (10R4/4) Shale	
0'	40'	Dark reddish brown (10R3/4) Shale	Wet at 22'; sewage odor Damp at 30'; sewage odor Sample at 30' and at 46' soil
0'	50'	Greyish red (5R4/2) Silty shale	
0'	70'	Dark reddish brown (10R3/4) Shale	
0'	80'	Greyish red (5R4/2) Silty Shale	Water at 72' (1 gpm)
0'	105'	Dark reddish brown (10R3/4) Shale	
5'	122'	Greyish red (5R4/2) Silty shale	
2'	125'	Pale greyish red purple (5RP5/2) Fine grained micaceous sandstone	Water at 122-127' (60 - 70 gpm)
5'	130'	Pale greyish red purple (5RP5/2) Fine grained micaceous sandstone.	
0'	132'	Grey (N6) Shale	
2'	134'	Bluish grey (5B6/1) Shale	
4'	136'	Brown (5YR3/4) Shale	
6'	140'	Alternating greyish red (5R4/2) to greyish purple (5P4/2) Shale	
0'	145'	Medium to medium dark grey (N4.5) Shale	
5'	146'	Greenish grey (5G6/1) Very fine grained quartz sandstone.	
		Water sample at 46'	
		Water sample blown from bottom	
		Water sample bailed at end of drilling	

# DRILLING LOG

Hole No. UT -3  
 Location East of ponds  
 Depth of Water Table 24'10"

Date Drilled 10/4/57  
 Project UTI  
 Casing in Hole 10'

From	To	Description	Comments
0	4'	Moderate brownish red (1OR4/6) Silt loam	
4'	8'	Dark Reddish brown (1OR3/4) Silt loam	
8'	12'	Dark reddish brown (1OR3/4) Shaley silt loam.	
12'	23'	Dark reddish brown (1OR3/4) Shale	
23'	28'	Greyish red (5R4/2) Shale	Damp at 25'
28'	60'	Dark reddish brown (1OR3/4) Shale	Wet seam 32' - 35' Wet at 39' Water at 40' (25psi)
60'	62'	Olive grey (5Y4/1) Shale	
62'	67'	Greyish red purple (5RP4/2) Siltstone	
67'	68'	Greyish red (5R4/2) Fine grained, bedded sandstone.	Water at 67' (45psi)
68'	70'	Pale red to greyish red purple (5RP5/2) Very fine grained sandstone.	Water at 68' (75psi)
70'	71'	Dark reddish brown (1OR3/4) Very fine grained ferruginous sandstone. Vuggy gossany appearance on bedding plane fractures	
71'	80'	Greyish red purple (5RP4/2) Very fine grained sandstone	
80'	82'	Dusky red (5R3/2) Shale	
82'	87'	Greyish red purple (5RP4/2) Very fine grained sandstone	
87'	95'	Light bluish to greenish grey (5B6.5/1) sandstone. Limonite on fractures	Water at 95' (100psi)
95'	100'	Greyish red (1OR4/2) Micaceous ferruginous siltstone.	
100'	146'	Moderate to dark reddish brown (1OR3.5/5) Ferruginous shale. Limonite in oxidized vugs.	Water at bottom (125psi)
		Water sample at 40'	
		Water sample at bottom	
		Water bailed at bottom	

DRILLING LOG

Hole No. WT - 4  
Location SE of Tanks  
Depth of Water Table 41'6"

Date Drilled 10-2-55  
Project U-1  
Casing in Hole 4'

From	To	Description	Comments
0	1'	Moderate to dark brown (5YR4/4) Organic silt loam.	
1'	4'	Moderate reddish brown (10R4/6) Silty clay loam.	
4'	7'	Moderate Brown (5YR4/4) Silt loam	
7'	12'	Dark reddish brown (10R3/4) Shaley silt loam.	
12'	22'	Greyish red (5R4/2) Siltstone	
22'	33'	Greyish red purple (5RP4/2) Siltstone	
33'	45'	Dark reddish brown (10R3/4) Silty shale	
45'	60'	Greyish red (5R4/2) Silty shale	Damp spot at 53'
60'	105'	Dark reddish brown (10R3/4) Shale	
105'	111'	Greyish red purple (5RP4/2) Fine grained sandstone	Water at 105' (15gpc)
111'	125'	Dark greyish red (5R3.5/2) Shale	Water at 117' (25gpc)
125'	146'	Dark reddish brown (10R3/4) Shale with calcite stringers	Water at 132' (30gpc)
Water sample at 105'			
Water sample blown from bottom			
Water sample bailed at end of drilling			



# DRILLING LOG

Hole no. UT - 5  
 Location 200' S of No. 3  
 Depth of Water Table 33' 6"

Date Drilled 10/10  
 Project UT  
 Casing in Hole 10'

From	To	Description	Comments
0	4'	Moderate Brown(5YR3/4) Clay loam	
4'	6'	Moderate reddish brown (10R4/6) Hard clay loam.	
6'	7'	Dark reddish brown (10R3/4) Clay loam	
7'	9'	Dark reddish brown (10R3/4) Silt loam	
9'	16'	Dark reddish brown (10R3/4) Shaley silt loam.	
16'	18'	Moderate brown (5YR3/4) Shale	
18'	24'	Greenish grey (5GY6/1) Siltstone	
24'	27'	Light olive grey (5Y6/1) Siltstone	
27'	30'	Dark yellowish brown (10YR4/2) Siltstone	
30'	36'	Greyish red (5R4/2) Siltstone	Damp spot at 32'
36'	41'	Dark reddish brown (10R3/4) Shale	Water at 41' (1gpm)
41'	46'	Greyish red (5R4/2) Micaceous siltstone	
46'	52'	Moderate Brown (5YR3/4) Shale	
52'	55'	Dusk yellowish brown (10YR2/2) Shale	
55'	60'	Greenish red (5R4/2) Siltstone	
60'	69'	Medium grey (N5) to greyish red Very fine grained sandstone	
69'	127'	Dark reddish brown (10R3/4) Shale	Water at 77' (4gpm)
127'	134'	Greyish red (5R4/2) Siltstone possibly argillite (well indurated)	Water at 131' (75g)
134'	135'	Greyish red micaceous ferruginous bedded siltstone.	
135'	139'	Greyish red (5R4/2) Siltstone with few small seams of interbedded greenish grey (5GY6/1) siltstone.	
139'	140'	Dark reddish brown (10R3/4) Siltstone	Water at 139' (100+g)
140'	146'	Greyish red (5R4/2) Siltstone (argillite?)	
		Water sample at 41'	
		Water sample blown from bottom	
		Water sample bailed at end of drilling	

ROY F. WESTON  
STRATIGRAPHIC LOGS OF BOREHOLES

Borehole No. UTM-6

Date Drilled 31 October 1977

Location UTI

Project 1767-001

Depth of Water Table 30 (ft.)

B. L. S. \_\_\_\_\_

LOG

Depth Zone (ft.)	Thickness (ft.)	Description
0 -11	11	Regolith of red shale fragments.
11-20	9	Soft red shale.
20-23	3	Harder red, brown shale.
20-57	37	Soft red, brown shale.
57	--	Small fracture
57-60	3	Red brown shale
60-146	86	Mud, no flowing water; red, brown shale fractures at 68, 91, 140, 143, 144.
		Set 11 ft. of 6" surface casing with grout.

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## STRATIGRAPHIC LOGS OF BOREHOLE

Borehole No. B<sup>1</sup> UTM-7Date Drilled 28 October 1977Location UTIProject ---Depth of Water Table 30 (ft.)B. L. S. ---LOG

Depth Zone (ft.)	Thickness (ft.)	Description
0- 2	2	Soil.
3- 8	5	Weathered red clay; very fine grained.
9-30	21	Predominately red clays and siltstones interbedded with gray siltstones (harder than red).
31-34	3	Predominately gray beds with red layers between.
35-55	20	Red shales and brown micaceous siltstones. No grain beds noted. 48-55 - homogeneous red shale; very fine grained.
56-85	29	Same lithology with siltstones and sandstones (fine grained) becoming more predominate. Fractures noted in this section but no free water. Calcite deposits on cuttings.
86-92	6	Fracture zone of same lithology. Free water at 86'. Q = 4.0-4.5 g/m very quickly after reaching 86'. 88' Large fracture Damp spots - 30', 55', 78', Water - 86'.
Water samples not taken. End drilling at 4:20 p.m. D.T.W. 33.5 at 4:45 p.m.		

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STRATIGRAPHIC LOGS OF BOREHOLES

Borehole No. 8 11-M-8

Date Drilled 28 October 1977

Location UTI

Project

Depth of Water Table 25-26 (ft.)

B. L. S.

LOG

Depth Zone (ft.)	Thickness (ft.)	Description
0-10	10	Brown/gray topsoil loam.
11-20	90	Red and gray siltstone.
21-26	5	Dark brown F.O. Sandstone.
27-93	66	Interbedded micaceous siltstone mudstones and some sandstone. Predominately red with some gray and brown.
94-105	11	Harder sandstone -- fine grained. Brown - micaceous. 0 = 6 g/m.
106-115	9	Brown sandstone - fractured throughout (106-107 greater fracturing). Calcite traces on many pieces.
116-145		Interbedded red siltstones and brownish fine-grained sandstone. Numerous fractures noted. 118' = 40 g/m = Q
End - 145'		
Sample #1 - Air Blown 130'		Predominately the red siltstones with grays and browns noted intermittently.
Sample #2 - Bailor at end - 145'		
Final Q = 60-65 g/m		
End Drilling at 1:55 p.m.		
D.T.W. - 36.17' at 4:20 p.m.		

## WELL LOG

Page 1 of 3Well No. RCRA #1 Drill Company Brookover Log By John CramerClient U.T.I. Driller G. Brookover Field Book No. \_\_\_\_\_Job No. 1767-09-01 Date Began 6/12/85 End 6/12/85 Log Date 6/21/85Drilling Method Air Rotary Rig SchrammSampling Method Grab No Samples 19  
No. 20 (0.02 in)Casing Size and Type 4" PVC Screen Size Slots Joint Type Thread Pipe Length 20'Type of Pack Gravel (trap rock - 1/2" to 3/4") Type of Seal Bentonite & grout (neat cement)Emplacement Method Shoveled in Emplacement Method Grout was pumped inInterval 25', 82'5" to 57'5" Interval Bentonite 2' (to 55'5") grout to sDevelopment Method Worthington Air Compressor Gallons Removed approx.Comments Date Developed: 6/19/85; 180 cu. ft/min Worthington Air Compressor;Total Run Time: 48 min; \*WL<sub>1</sub> (initial water level) = 57.23 feet: TD (depth to bottom of screen) = 82.4'

Lithology and Well Construction	Depth	Sample No	Interval	Recovery	Description	Remarks (includes cut descrip.)
Top of weathered zone.	1	4'			Dark red brown CLAY, mod. silty, slightly to mod. cohesive, saturated.	
	2	6'			Siltstone very dark red brown, ~ 60% clay, sand?, slightly moist.	Small 1/2" max. rock chips becoming at
** T.O.R.	3	10'				Less clay (10% - some sand.
	4	12'			Siltstone, dark red brown, less clay (10-15%)? trace sand, slightly moist.	Angular cuttings 3/4".
	5	15'				
	6	16'				
** Top of Rock	7	22'			Siltstone, red brown to gray, some clay (10%)	3/4" max. chip fine particles
	8	29'			Siltstone, red brown to gray, some clay (10%?)	Larger, angular cuttings 1 1/2" over 1"
	9					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					

\*WL<sub>1</sub> (measured from top of casing)

Well No RCRA #1 Client U.T.I. Job No 1767-09-01 Log By John A. Grader

Lithology and Well Construction	Depth	Sample No	Interval	Recovery		Description	Remarks
<div data-bbox="152 1181 327 1246">6/12/85 First Water</div> <div data-bbox="152 1763 344 1828">Bottom of Screen 82'5"</div>	8						
	38-39						
	9						
	10	43					
	11	48				Siltstone, red brown to lighter gray, some clay (10-20%).	<u>Essentially the same.</u>
	12	53					
	13	58				Siltstone, red brown to lighter gray, less clay (~10%).	
	14	63					
	15	68				Siltstone, sandy, silvery blue gray with dark red brown clay (30-40%), moist.	Avg. 1" max. particle size, generally 1/4" and smaller particles.
	16	73				Siltstone, same?, less moisture?, less clay (~20-25%).	Maybe less sandy, gray-green-blue color in some 1/4" particles.
	17	78				Siltstone, more sand (fn.-med.), med. to dark silvery gray.	
	18	83					Overall appearance of samples is dark red brown containing from ~5% to 10% clay at the bottom of the hole, and saturated.

# WELL LOG

W.D. Allen

Page 2 of 2

Well No RCRA #1 Client U.T.I. Job No 1767-09-01 Log By John Grader

Lithology and Well Construction	Depth	Sample No	Interval	Recovery		Description	Remarks
T.D. 86'	<div> <div>85</div> <div>19</div> <div>86'</div> </div>						

# Well Construction Summary

Location or Coords \_\_\_\_\_ Elevation Ground Level \_\_\_\_\_  
 \_\_\_\_\_ Top of Casing \_\_\_\_\_

## Drilling Summary:

Total Depth Drilled to 82.83'  
 Borehole Diameter 8"  
 Driller Brookover Well Drilling Co.  
George Brookover  
 Rig Schramm  
 Bit(s) \_\_\_\_\_  
 Drilling Fluid Air Rotary  
Water  
 Surface Casing 5' length 8" diameter

## Well Design:

Basis Geologic Log X Geophysical Log  
 Casing String(s) C = Casing S = Screen  
+2.6' - 62.4' C1 \_\_\_\_\_  
62.4' - 82.4' S1 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Casing C1 65' Schedule 40  
4" diameter PVC  
 C2 \_\_\_\_\_

Screen S1 20' of Schedule 40,  
PVC Screen, No. 20 (0.021 in. slots)  
 S2 \_\_\_\_\_

Centralizers \_\_\_\_\_

Filter Material Gravel (Trap Rock - 1/2" -  
3/4") bottom of hole to 57.42' depth

Cement Keystone Portland Cement  
Type I - 15 bags

Other \_\_\_\_\_

## Construction Time Log:

Task	Start		Finish	
	Date 1985	Time	Date 1985	Time
Drilling	6/12	0955	6/12	1600
Geophys Logging				
Casing				
65' Schedule	6/12	1615	6/12	1625
40 PVC				
20' PVC Screen				
Filter Placement	6/12	1630	6/12	1645
Cementing	6/13	0900	6/13	1020
Development	6/19	1104	6/19	1215
Other				

## Well Development:

Date: 6/19/85; 180 cu ft/min Worthington  
Air Compressor; Total Run Time: 48 min  
WL<sub>i</sub> (initial water level) = 57.23 ft.  
TD (depth to bottom of screen) =  
82.4'.

\*WL<sub>i</sub> (Measured from top of casing  
 - T.O.C.)

## Comments:

40 lbs. of bentonite used.

**WESTERN**  
 EQUIPMENT COMPANY



Page 1 of 1

Limnology and Well Construction	Depth	Sample No	Interval	Recovery	Description	Remarks
*T.O.W.Z. —	5	1	5'		Very dark red brown CLAY, silty, only slightly cohesive, moist, some small (to 1/4") silt particles.	
	10	2	10'		Dark red brown CLAY, very silty with siltstone pebbles to 1" max. average size mixed in.	Siltstone pebbles go from rounded to angular
**T.O.R. —	15	3	15'		<u>Siltstone</u> , sandy (med-fine grained) silvery gray with pink dusting of clay (20 - 30% clay gray brown in 30' sample)	Less dust coming from hole at 15'
	20	4	20'			Moisture felt in sample at 30'
	25	5	25'			
6/14/85 — First Water	30	6	30'		<u>Siltstone</u> very sandy, dense, hard, dark silvery gray, some (approx. 10 - 20%) red brown clay.	At ~34' water coming into the hole. [Hardening at 33'].
	35	7	35'		<u>Siltstone</u> verging onto a sandstone (actually a siltstone with a high percentage of medium grained sand), very dark gray, dense and very hard, some to very little red brown clay.	Cutting size less.
	40	8	40'			
Bottom of Screen at 48 TD 49'	45	9	45'			
	50	10	49'			
					NOTE: WL <sub>1</sub> (Measured from top of casing = T.O.C.)	
					* Top of weathered Zone	
					** Top of rock	

## W011-\_\_\_\_\_

Elevation Ground Level

Top of Casing

### Construction Time Log:

Borehole Diameter 8"

Rio Schramm Air Rotary

Bit(s)

Drilling Fluid Air Rotary  
Water

Surface Casing 5' length 8" diameter

## Geophys Logging

### Casing

30' Schedule

40 PVC

20' PVC Screen

### Filter Placement

## Cementing

## Development

Other

Basis Geologic Log X Geophysical Log

**Casing String(s) C = Casing S = Screen**

$$\underline{+2'} - \underline{28'} \quad C_1$$

28' - 48' S.

Casing C1 30' Schedule 40  
4" diameter PVC

C2

Screen S1 20' of Schedule 40 PVC  
screen, No. 20 (0.02 in.  
slots.

52

## Centralizers

Filter Material: Gravel ("Trap Rock" -  
1/4" - 3/4") bottom of hole to 22.83  
depth.

Cement Keystone Portland d  
Cement Type I - 11 bags

Other

**Well Development:**

Date: 6/19/85; 180 cu.in.

Worthington Air Compressor

Total Run Time: 29 min.

WL (initial water level) = 38.-

 TD | (depth to bottom of screen |

\*WL (Measured from top of casing  
T.O.C.)

**Comments:**

30 #'s of bentonite used

Location Collegeville, PA

~~Personnel~~ John Cramer

Uniform Tubes, Inc.  
Monitor Well Installation

## Project

WEST

## WELL LOG

Page 1 of 3

Well No RCRA #3 Drill Company Brookover Log By John CramerClient U.T.I. Driller G. Brookover Field Book No. \_\_\_\_\_Job No. 1767-09-01 Date Began 6/17/85 End 6/17/85 Log Date 6/21/85Drilling Method Air Rotary Rig SchrammSampling Method Grab No Samples 11Casing Size and Type 4" PVC Screen Size No. 20 (0.02 in) slots Joint Type Thread Pipe Length 20'Type of Pack Gravel (Trap Rock 1/4" to 1/2") Type of Seal Bentonite & Grout (neat cement)Emplacement Method Shoveled in Emplacement Method Grout was pumped in.Interval 25'4", 42'4" to 17' Interval Bentonite 2' (to 15'), Grout to surDevelopment Method Worthington Air Compressor Gallons Removed ApproxComments Date Developed: 6/19/85, 180 cu.ft./min. Worthington Air Compressor;Total Run Time: 58 min., WL (initial water level) = 33.35'; TD (depth to bottom of screen) = \_\_\_\_\_

Lithology and Well Construction	Depth	Sample No	Interval	Recovery	Description	Remarks
*T.O.W.Z.	5	1	5'		Dark red brown CLAY, moderately silty, slightly cohesive, moist.	
	10	2	10'		Dark red brown CLAY, silty with lumps of siltstone. The number of siltstone lumps increase with depth.	Rounded lumps of siltstone become angular and more numerous.
**T.O.R.	15	3	15'			
	17	4	17'		Siltstone, with shale, yellow-gray cast over dark gray mixed shale particles and clay.	
	20	5	20'			
6/17/85 First Water	22	6	22'		Siltstone, dark gray with ~50% red brown, mod. cohesive clay mixed in.	Siltstone chips (cuttings).
	25	7	25'		Siltstone, red brn., with ~60% silty mod. cohesive saturated gray-green clay with a pink tint and some coarse sand.	
	30	8	30'			From 30 to 35' drill with more siltstone chips.
					*Top of weathered zone	

Well No RCRA #3 Client U.T.I. Job No 1767-09-01 Log By John Crater

Lithology and Well Construction	Depth	Sample No	Interval	Recovery	Description	Remarks
Bottom of Screen at 42'11" TD 43'	35	9	35'			
	40	10	40'		Siltstone, red-brown gray with about 40% red brown, mod. cohesive, saturated clay mixed in.	Siltstone pebbles - chips to a little over 1" max.
	43	11	43'		Siltstone, moderately to very sandy, red brown with shiny flecks, 30 to 40% red-brown clay.	Siltstone chips measure up to 1" average size.

WYOMING

Well RCRA #:

# Well Construction Summary

Location or Coords \_\_\_\_\_

Elevation Ground Level \_\_\_\_\_

Top of Casing \_\_\_\_\_

## Drilling Summary:

Total Depth Drilled to 43'

Borehole Diameter 8"

Driller Brookover Well Drilling Co.

George Brookover

Rig Schramm Air Rotary

Bit(s) \_\_\_\_\_

Drilling Fluid Air Rotary  
Water

Surface Casing 5' length 8" diameter

## Well Design:

Basis Geologic Log X Geophysical Log \_\_\_\_\_

Casing String(s) C = Casing S = Screen

+2' - 22.9' C1

22.9' - 42.9' S1

Casing C1 24.9' Schedule 40

4" diameter PVC

C2 \_\_\_\_\_

Screen S1 20' of Schedule 40 PVC

Screen, No. 20 (0.02 in) slots

S2 \_\_\_\_\_

Centralizers \_\_\_\_\_

Filter Material Gravel ("Trap Rock" -  
1/4"-3/4") bottom of hole to 17' depth

Cement Keystone Portland Cement

Type I - 5 bags

Other \_\_\_\_\_

## Construction Time Log:

Task	Start		Finish	
	Date	Time	Date	Time
Drilling	1985		1985	
	6/17	1115	6/17	1
Geophys Logging Casing				
	6/17	1330	6/17	1
Filter Placement	6/17	1405	6/17	1
	6/17	1455	6/17	1
	6/19	1343	6/19	15
Cementing Development	6/19	1343	6/19	15
Other				

## Well Development:

Date: 6/19/85; 180 cu.ft./min.

Worthington Air Compressor

Total Run Time: 58 min.

WT<sub>1</sub> (initial water level) = 33.35'

TD (depth to bottom of screen) =

42.9'

WT<sub>1</sub> (measured from top of casing)

Comments:

50 lbs. of bentonite used.

Location Collegeville, PA  
Personnel John Cramer

Project Uniform Tubes, Inc.  
Monitor Well Installation

# WELL LOG

Page 1 of 2

Well No RCRA #4 Drill Company Brookover Log By John Cramer

Client U.T.I. Driller G. Brookover Field Book No. \_\_\_\_\_

Job No 1767-09-01 Date Began 6/10/85 End 6/11/85 Log Date 6/21/85

Drilling Method Air rotary Rig Schramm

Sampling Method Grab No Samples 15

Casing Size and Type 4" PVC Screen Size No. 20 (0.02 in) Joint Type Thread Pipe Length 20'

Type of Pack Gravel (trap rock - 1/2" - 3/4") Type of Seal Bentonite and grout

Emplacement Method Shoveled in Emplacement Method Grout was pumped

Interval 26', 76' to 50' depth Interval Bentonite 2' (to 48' depth) <sup>GRC</sup>Surface

Development Method Worthington Air Compressor Gallons Removed 200 <sup>APPT</sup>

Comments Date developed: 6/19/85; 180 cu. ft/min. Worthington Air Compressor;

Total Run Time: 33 min., WL (initial water level) = 69.05 ft.; TD (depth to bottom of screen) = 76'


Limnology and Well Construction	Depth	Sample No	Interval	Recovery	Description	Remarks
Top of weathered zone	0	1	7'		Dark reddish brown CLAY	7' top of weather zone.
	5	2	8-9		Dark reddish brown CLAY, very silty, with a few siltstone pebbles to 1/2" size. More rounded siltstone pebbles to 17' depth.	
Transition to bedrock	10	3	12'			Siltstone chips a round.
** T.O.R.	15	4	17'			
	20	5	18'			
	25	6	20-		Siltstone reddish tan with some clay in the upper 1' to little or no clay at 20 ft.	Siltstone cuttings are more angular
	30		21			
	35		23-			
	40		24			
	45		26			
	50		28		Siltstone, light, reddish gray-green, some shale or clay.	Siltstone chips flattened and ang.
	55	10	33-			
	60		34		Siltstone, med. gray to reddish tan, some clay (10-20%).	
	65	11	40'			40' Change of col. mod. gray siltstone with some clay.
	70	12	41'		Siltstone, dark red-brown with more clay (30-40%).	Small to 1/2" max. f and angular cuttings
	75	13	43'			Driller added water to hole at 50'.
	80		50-			
	85	14	51'			
6/11/85 First Water	90					
**Top of rock	95	15	59-			
	100		60		Siltstone, dark red-brown with same amount of clay containing some (5-10%) fine to med. sand.	Essentially the same but some sand.

# WELL LOG

A-20

Page 2 of 2

Well No RCRA #4 Client U.T.I. Job No 1767-09-01 Log By

Log and Well Construction	Depth	Sample No	Interval	Recovery	Description	Remarks
Bottom of Screen 76' TD 78'	<div>70</div> <div>75</div> 				Same	NOTE: WL <sub>1</sub> (measured from top of casing - T.O.C.)





APPENDIX B

PART 1: ASSESSMENT OUTLINE  
PART 2: ASSESSMENT PLAN

1. The first part of the document is a list of the names of the members of the committee who have been appointed to study the problem of the

APPENDIX B  
PART 1: ASSESSMENT OUTLINE

GROUND-WATER ASSESSMENT PROGRAM  
UNIFORM TUBES, INC.  
COLLEGEVILLE, PA

INTRODUCTION

In compliance with Federal Register, Volume 45, No. 98, pages 33194 and 33195, Monday, May 19, 1980, Rules and Regulations, the following outline of a ground-water quality assessment program (see outline in Appendix A) has been developed by WESTON for Uniform Tubes, Inc., Collegeville, Pennsylvania. This plan is to be kept at the facility.

BACKGROUND

Presently, there are twelve on-site monitor wells at Uniform Tubes, Inc. Eight of the wells are designated UTM-1 (Uniform Tubes, Inc. Monitoring Well) through UTM-8 as indicated in Figure 1. These eight wells were installed in October of 1977 as part of an initial groundwater monitoring and recovery program, which continues at present.

The remaining four shallower wells were installed in June of 1985 as part of a Resource Conservation and Recovery Act (RCRA) ground-water monitoring program around the two waste treatment settling basins (Figure 1). These wells have been designated RCRA monitoring wells (RCRA-1 through RCRA-4) in Figure 1.

Ground water flow direction is variable. It is westerly in the vicinity of the four RCRA wells - apparently part of a convergent flow to pumping well UTM-1 from an apparent areal extent bounded by UTM-3, UTM-5, and UTM-8. RCRA-2 is the upgradient well in the localized flow regime of the RCRA wells. There is an apparent southwesterly flow from the vicinity of the RCRA wells and UTM-3. There is a southeasterly flow vector from near UTM-6 and UTM-7.

Water level data was collected on all on-site wells and one off-site well (Collegeville-Trappe Authority Well CT-8) during September and October of 1985. Earlier (1977-1978) water level data had been collected from just the UTM wells.

The previously described on-site wells and four proposed additional wells (recommended in October 1985 report entitled "Groundwater Monitoring Program - Supplement No. 1") will be used in the ongoing ground-water assessment program at UTI. The approximate locations of the four proposed wells are shown in Figure 1. These wells will penetrate the subsurface to at least 100 ft. to more completely define the flow regime and potential contaminant migration.

A list of existing monitor wells is shown in Table 1.

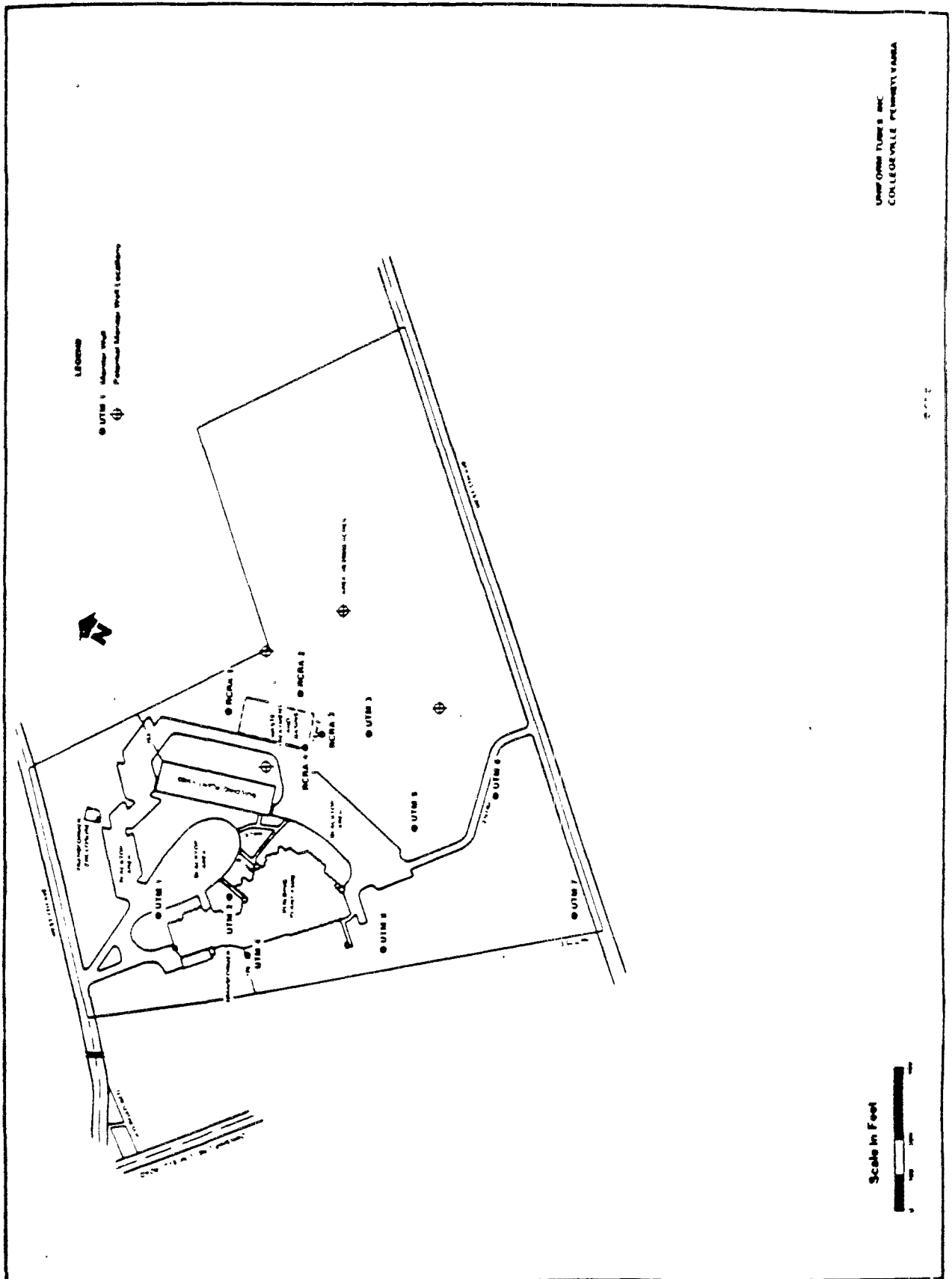


TABLE 1

## MONITOR WELLS

UNIFORM TUBES, INC.  
COLLEGEVILLE, PA

<u>Well</u>	Depth Below <u>Ground Surface</u> (ft.) Sounded Sept. 1985
UTM-1 (pumping well, approx. 75 gpm)	200
UTM-2	146.00
UTM-3	64.67
UTM-4	146.00 (taken from log)
UTM-5	150.00
UTM-6	156.09
UTM-7	92.6
UTM-8	144.60

RESOURCE CONSERVATION AND RECOVERY ACT WELLS  
(RCRA WELLS)

<u>Well</u>	Depth Below <u>Ground Surface</u> (ft.)
RCRA-1	86
RCRA-2	49
RCRA-3	43
RCRA-4	78

### Sampling Method

The initial step, prior to sample collection, will be to measure the depth to ground-water level, in each well, and calculate the ground-water elevation. An electric water level probe or other accurate means of depth measurement will be used for the water level measurements. These data along with the date and time of each measurement will be recorded and filed.

Prior to sample collection, each of the monitor wells will be pumped so that a quantity of water, equal to three times (3x) the volume of water standing in the well is removed. All samples taken for metals analysis will be field-filtered to remove all material that cannot pass through a 0.45 micron filter.

The samples will be stored in the specified containers, see Table 2, and analyzed within the specific "holding times" of the respective sample parameters. The sampling equipment should be washed with available public water supply andalconox, then rinsed in distilled/deionized water several times between well samples.

### PARAMETERS FOR ANALYSIS

The four RCRA wells have been sampled for required RCRA parameters. All on-site wells have been sampled for the parameters found to be of primary concern in the RCRA wells. These parameters include volatile organic compounds, nitrate (as nitrogen), sulfate, specific conductivity, pH, chromium, copper, and nickel. The ground-water samples to be collected from the existing and additional on-site monitoring wells during subsequent sampling periods will be analyzed for the same parameters. Ground-water samples will be analyzed for volatile organic compounds (VOA's) using a gas chromatographic technique under EPA Method 601 and 602.

Table 2 contains the EPA sampling and analytical methods for the remaining required parameters.

The previous analyses will aid in defining the migration, extent and degree of contamination under the site area.

TABLE 2  
SAMPLING SPECIFICATIONS FOR  
ANALYTICAL PARAMETERS  
UNIFORM TUBES, INC.  
COLLEGEVILLE, PA

Parameter	Sample Type	Minimum Volume	Container (2)	Preservatives (3)	Maximum Holding Time	EPA Method of Analysis
Volatile Organic Compounds (VOC's)	Grab	40 ml	G, teflon lined septum	Cool, 4°C	14 days	601 and 602
Nitrate (as N)	Composite	1 liter	P, G	Cool, 4°C	48 hours	152.1
Sulfate	Composite	1 liter	P, G	Cool, 4°C	28 days	175
Metals	Composite	1 liter	P	HNO <sub>3</sub> , pH<2	6 months	
Chromium	--	--	--	--	--	218.2
Copper	--	--	--	--	--	220.2
Nickel	--	--	--	--	--	249.2

(2) P = plastic, G = glass

(3) Sample preservation should be performed shortly before sample collection.



APPENDIX B

PART 2: ASSESSMENT PLAN



## APPENDIX A

GROUNDWATER QUALITY ASSESSMENT PLAN OUTLINE FOR  
UNIFORM TUBES, INC.  
COLLEGEVILLE, PENNSYLVANIA

I. INTRODUCTION

## A. Background

1. Well depth, origin, and evolution under the changing regulations.

## B. Purpose

II. FACILITY AND LOCATION

## A. Map of location

## B. Site location

## C. Well locations (existing and planned)

## D. Water level data

## E. Well draw down data

III. EXISTING MONITORING PROGRAM

## A. Review of existing plan

## B. Compilation of all existing monitoring data

IV. ADMINISTRATIVE ACTION

## A. Description of immediate action to be taken

1. Installation of additional on-site monitor wells.
2. Resampling of the monitoring wells.
3. Review of the resulting analysis.

B. Sequence of notification and deadlines

1. Pennsylvania Department of Environmental Resources (DER)
2. U.S. Environmental Protection Agency (EPA), Region III.

V. EXPANDED MONITORING PROGRAM

A. Expanded testing of existing wells

1. GC-MS scan of possible pollutants.
2. Atomic absorption scan for metal contaminants.

B. New monitoring wells

1. Review possible direction and depth of plume migration.
2. Review location of existing monitoring wells.

C. Expanding analytical parameters

1. Modification of analytical procedures to address specific sample conditions.
2. Quality control procedures for delineation of possible interfering substances.

D. Schedule for additional analytical result reporting

1. List of regulatory agencies and specific authorities to be contacted.
2. Format for reporting the additional analysis.

- A. Determination of the rate and extent of groundwater contamination
  - 1. Review all data to determine the direction and extent of plume migration.
- B. Concentration of the hazardous waste constituent(s) contaminating the groundwater.
- C. Comparison of upgradient and downgradient well results.

VII. SCHEDULE FOR IMPLEMENTATION OF THE ASSESSMENT PROGRAM

- A. Phase I      Resample for those parameters which exceed the ground water contamination requirements.
- B. Phase II     Reassess the existing groundwater monitoring plan and assess the future needs as specified in the ground water assessment plan.
- C. Phase III    Final report and proposed corrective actions.

WORK PLAN FOR SUBSURFACE INVESTIGATION  
IN VICINITY OF SETTLING BASINS  
UNIFORM TUBES, INC.  
COLLEGEVILLE, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Background

In September 1985, Uniform Tubes, Inc., (UTI) submitted a report to the Pennsylvania Department of Environmental Resources (DER) summarizing the implementation activities performed in accordance with the 28 February 1985 Groundwater Monitoring Plan for the existing surface impoundments at the UTI facility near Collegeville, Pennsylvania. The report presented the purpose, objectives and construction details of four (4) additional RCRA monitor wells approved by DER and installed at the site in June 1985; groundwater geology and flow characteristics encountered at the site both during and after the well installation operations; and the results and findings of chemical analyses performed of samples obtained from the on-site wells to assess groundwater quality at the site. In general, the report concluded that the groundwater in the immediate vicinity of the surface impoundments contained elevated levels of chlorinated organics, chromium and dissolved solids.

Based on the preliminary findings and recommendations provided within the September 1985 report concerning groundwater quality at the UTI site, further activities were conducted at the site to collect supplemental groundwater data using all existing on-site wells and a nearby municipal well. The additional information obtained from these wells provided a somewhat better definition of the areal extent and possible source(s) of contaminants (by parameter) and the effects of on-site recovery well UTM-1 on groundwater flow direction at the site in general and in the immediate vicinity of the surface impoundments. A report was subsequently submitted to DER in October 1985 which presented the results and findings of the supplemental activities. The report recommended that additional subsurface investigation, including the excavation of test pits and installation of additional monitor wells, be conducted to (1) further define the groundwater flow system beneath the eastern portion of the UTI property (near the surface impoundments) and (2) identify the source(s) and extent of the contaminants encountered in the RCRA monitor wells.

1.2 Scope of Work

This document contains the work plan for additional subsurface investigation in the vicinity of the existing surface impoundments. The primary elements of the plan are:

- o Excavate approximately six (6) to ten (10) test pits around the perimeter of the two existing settling basins (surface impoundments) at preliminary locations shown in Figure 1-1. These test pits will be excavated to determine the presence of contaminants in the unconsolidated materials above the underlying bedrock. The proposed locations of four supplemental monitor wells will be finalized based on the data (logs) obtained from these test pits.
- o Install four (4) additional on-site monitor wells to the east, southeast and west of the existing settling basins. Preliminary locations for these monitor wells are shown in Figure 1-1. The wells will be installed to determine possible source(s) of the elevated contaminant levels detected in the RCRA monitor wells and potential migration pathways for contaminants; to further define the area groundwater flow regime(s); and to define possible receptors of contaminated groundwater.
- o Clean out monitor well UTM-3 to its original depth of 150 feet. This operation will be carried out concurrently with the drilling of the new monitor wells.
- o Collect and analyze groundwater samples from the new wells and previously-sampled wells for a set of indicator parameters, similar to those examined for during the September 1985 investigation. Results from supplemental sampling and analysis will be evaluated in conjunction with previously-collected data to define the movement, extent and degree of subsurface contamination in the site area.

## 2.0 SOILS INVESTIGATION

### 2.1 Test Pit Excavation and Sampling

Test pits will be excavated to screen for contaminants in the soil profiles surrounding the settling basins. Approximately six (6) to ten (10) test pits will be excavated to the north, east, south, and possibly west of the basins. Proposed locations for these test pits are shown in Figure 1-1. The findings from the initial six (6) test pits will be used to determine whether more than six (6) test pits are needed and whether subsequent test pits will be relocated to locations different than those shown in Figure 1-1 to delineate the depth and areal extent of contamination in the soil.

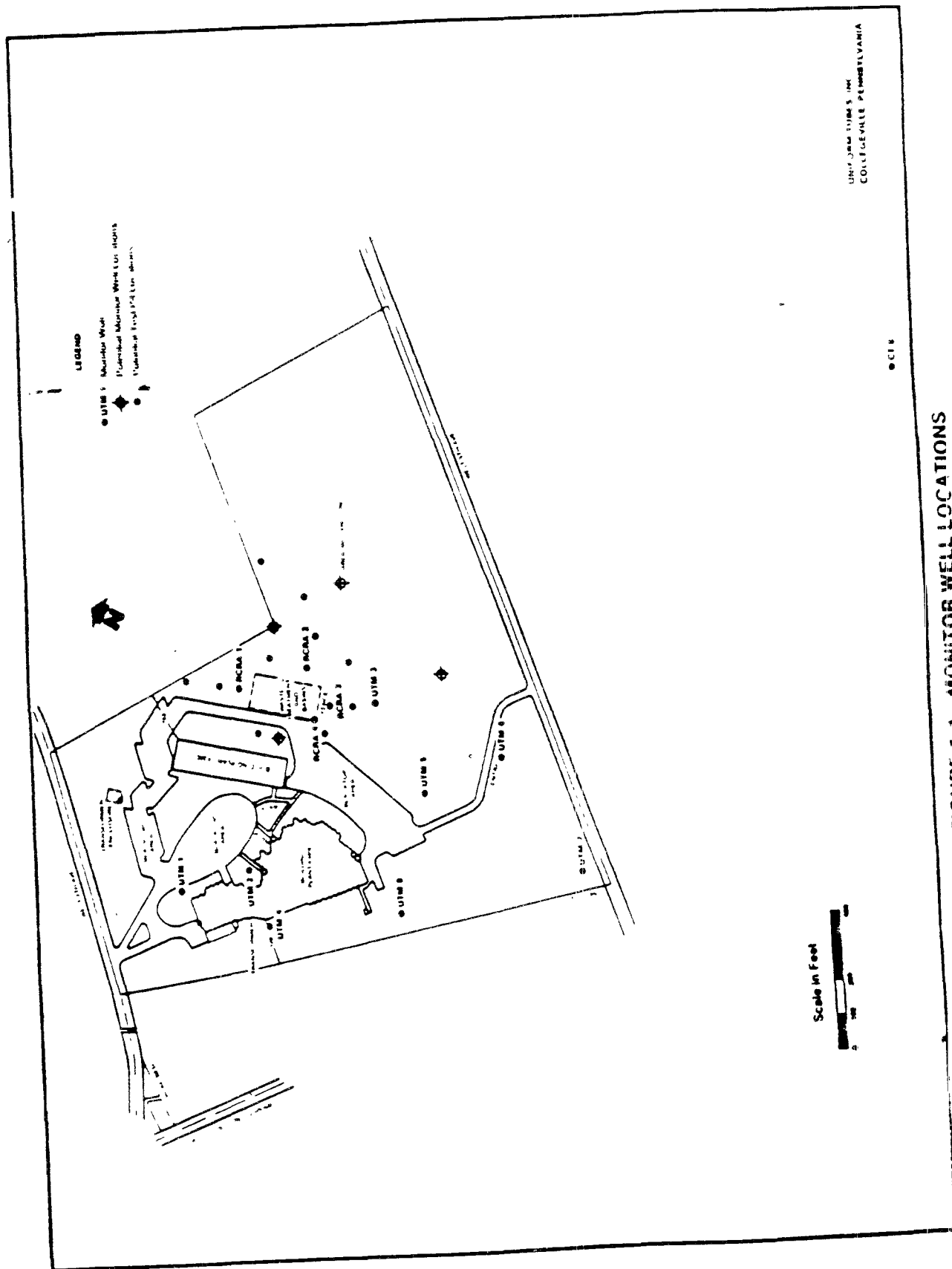


FIGURE 1-1 MONITOR WELL LOCATIONS



TABLE 2-1  
SAMPLING AND ANALYSIS FOR SOIL SAMPLES

UNIFORM TUBES, INC.  
COLLEGEVILLE, PA

PARAMETERS	SAMPLE TYPE	MINIMUM QUANTITY	CONTAINER (1)	PRESERVATIVES	MAXIMUM HOLDING TIME	EPA METHOD OF ANALYSIS
Volatile Organic Compounds (VOC)	Grab	50 grams per vial	2-G, 40 ml, teflon-lined, septum-topped vials	Cool, 4°C	14 days	624, GC/MS
Nitrate	Grab	20 grams	A, G, 950 ml (2)	Cool, 4°C	--	300.1
Sulfate	Grab	20 grams		Cool, 4°C	--	300.1
Metals	Grab	20 grams		Cool, 4°C	6 months	--
Chromium	--	--		--	--	7141
Copper	--	--		--	--	7211
Nickel	--	--		--	--	7521

(1) G = glass, A = amber

(2) One 950 ml sample can be tested for all the parameters covered by the continuation arrow

Each test pit will be excavated to bedrock or to the limitation of the backhoe (about 10 to 12 feet below grade) used for excavation. Based on the data contained in existing well logs, the depth to bedrock in the vicinity of the settling basins is expected to be approximately ten feet. Each test pit will be provided with adequate side slopes or shored and braced in accordance with applicable OSHA guidelines. According to available drawings, the settling basins were excavated to a depth of 10 feet below grade or to about bedrock.

During excavation of the test pits, a WESTON geologist will log each test pit, recording a description of soil composition, texture, color and possible visual evidence of contamination.

In addition to recording a log of the test pits, the geologist will conduct air monitoring with field equipment such as a photoionization detector (PID) and/or organic vapor analyzer (OVA). Each soil horizon will be monitored as soon as it is exposed. Where ambient contaminant measurements exceed background levels, selected samples of the exposed soil horizon will be collected expediently to minimize the loss of volatiles to the atmosphere. The depth and description of each contaminated horizon (based on field measurements/observations) will be recorded and collected samples will be submitted, along with chain-of-custody documentation, to the WESTON analytical laboratories in Lionville, PA.

Each test pit will be backfilled immediately after excavation and evaluation have been completed. The backhoe shovel will be washed with a water/Alconox decontamination solution and rinsed with potable water before excavating each subsequent test pit.

## 2.2 Sample Analyses

Selected soil samples will be analyzed for volatile organic compounds (VOC), nitrate (as nitrogen), sulfate, chromium, copper, and nickel. Table 2-1 shows the sampling specifications for each parameter.

## 3.0 GROUNDWATER INVESTIGATION

### 3.1 Monitor Well Installation

Four (4) new monitor wells will be installed to the east, southeast, and west of the settling basins as illustrated in Figure 1-1. These locations are subject to modification based upon the results of the test pit survey. The objectives of installing these additional wells are:

- o To provide groundwater monitoring points in areas where data gaps exist for the collection of additional representative groundwater samples.

- o To supplement the existing monitor wells and collect additional subsurface stratigraphic and water level data.

The new wells, along with the previously-sampled wells, will be utilized to more completely define the site groundwater hydrogeology. Construction data for the proposed monitor well are presented in Table 3-1 and Figure 3-1. The new wells will be 6 inches in diameter and approximately 100 feet deep. Each well will be constructed of standard steel well casing grouted at least 5 ft. into bedrock and the remainder of the borehole will be left open. The borings for the wells will be drilled with air rotary drilling equipment.

After completion of each boring and installation of the steel casing, the annular space around the steel casing will be filled with a neat cement-bentonite grout (5:1). At least 2 ft. of stick-up above ground surface will be provided for the steel well casing. A locking cap will be installed over the top of the steel well casing as shown in Figure 3-1. The borings will be logged by a WESTON geologist, who will also prepare construction summaries for each of the wells.

After installation, the wells will be developed by surging with compressed air and pumping to remove sediment within the wells.

The tops of the well casings will be surveyed and referenced to the same coordinate system as the existing wells. Groundwater elevations will be determined for the new wells and all previously-installed wells. The elevations of groundwater in the monitor wells will be used to determine the groundwater flow direction(s) at the site.

### 3.2 Groundwater Sampling and Analysis

Groundwater sampling will be performed after the newly-installed monitor wells have been properly developed and allowed to stabilize for approximately one calendar week. Table 3-2 presents the sampling specifications for the analytical parameters for testing of samples collected from each well. Sample containers and preservatives will be prepared by WESTON's laboratory.

Prior to collecting samples from each on-site well and the Collegeville Trappe Authority Well No. 8 (CT-8), water levels will be measured and a minimum of three well volumes will be purged from each well by pumping or bailing. This procedure will be used to obtain a representative sample of water from each well. The field procedures used for purging each monitor well will include the following:

- o Prior to placing any pumping or bailing equipment into the well, scrub the equipment with an Alconox solution and rinse with distilled water.

TABLE 3-1

MONITOR WELL SUMMARY  
UNIFORM TUBES, INC.  
COLLEGEVILLE, PA

<u>WELL NO.</u>	<u>DEPTH (Feet)</u>	<u>CASING<sup>(1)</sup> MATERIAL</u>	<u>WELL DIAMETER</u>
UTM-9	100	Steel	6 inch
UTM-10	100	Steel	6 inch
UTM-11	100	Steel	6 inch
UTM-12	100	Steel	6 inch

(1) All wells to be cased 5 ft. into bedrock.  
The remaining length of each well is to be  
left as an open hole.

TABLE 3-2  
SAMPLING AND ANALYSIS FOR GROUNDWATER SAMPLES  
UNIFORM TUBES, INC.  
COLLEGEVILLE, PA

PARAMETER	SAMPLE TYPE	MINIMUM VOLUME	CONTAINER (1)	PRESERVATIVES (2)	MAXIMUM HOLDING TIME	EPA METHODS OF ANALYSIS
Volatile Organic Compounds (VOC)	Grab	40 ml per vial	2-G, Teflon-lined, septum-topped vials	Cool, 4°C	14 days	601 and 602
Nitrate (as N)	Comp	1 liter	P, G <sup>(1)</sup>	Cool, 4°C	48 hours	300.1
Sulfate	Comp	1 liter	P, G <sup>(3)</sup>	Cool, 4°C	28 days	300.1
Metals	Comp	1 liter	P	HNO <sub>3</sub> , pH<2	6 months	--
Chromium	--	--	--	--	--	218.2
Copper	--	--	--	--	--	220.2
Nickel	--	--	--	--	--	249.2

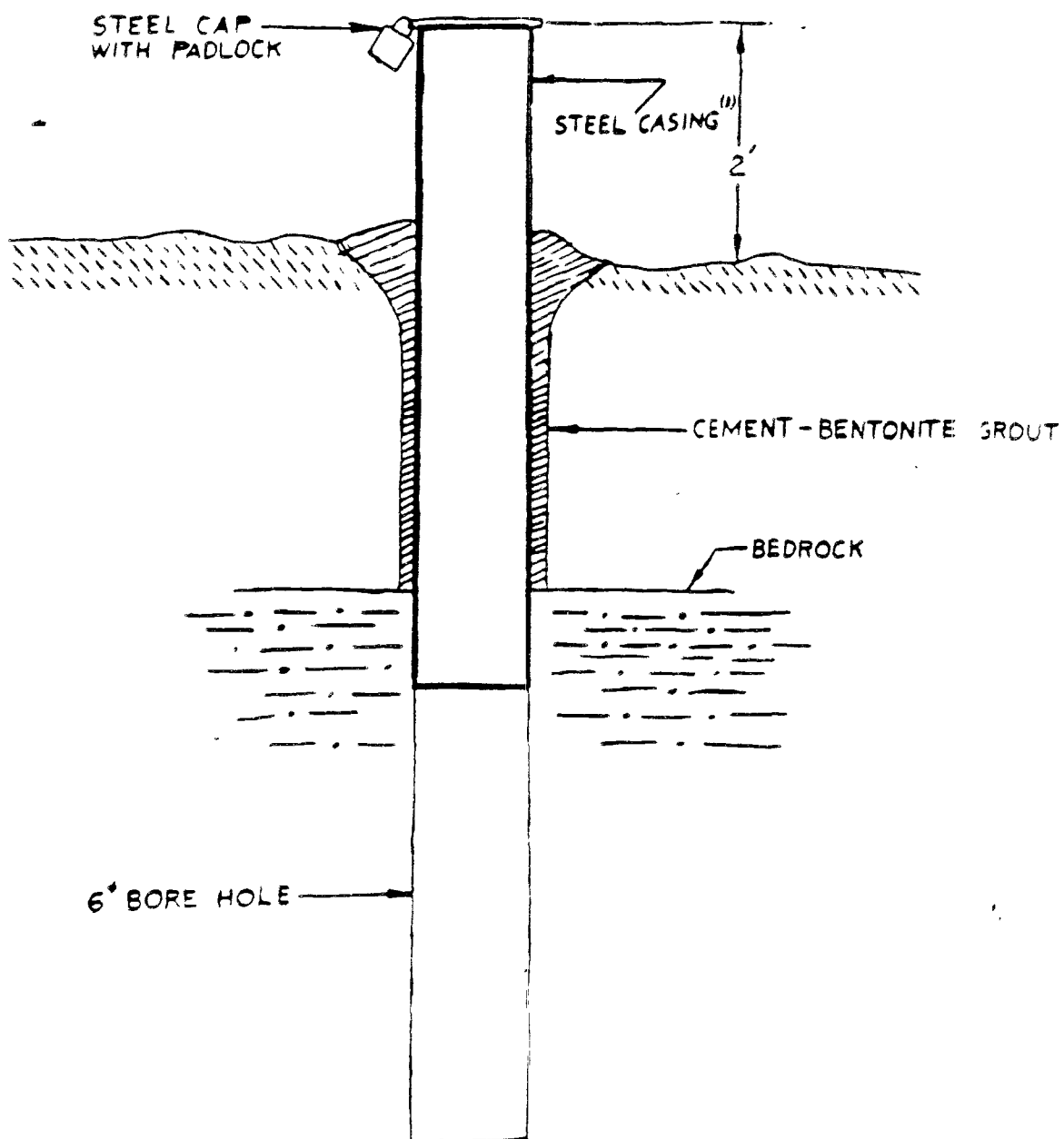
(1) P = plastic, G = glass

(2) Sample preservation should be performed shortly before sample collection.

(3) One 1-liter sample can be tested for both nitrate and sulfate.

FIGURE 3-1

## Monitor Well Specifications



(11) CASING IS SET 5 FT. INTO THE BEDROCK

- o Before purging, measure and record the depth to water from the measuring point on the well casing.
- o Calculate the volume of water to be purged from the well based on the amount of standing water in the well casing.
- o Purge the well by pumping or bailing at least three times the calculated volume of standing water in the well casing.

Sample collection activities will consist of the following procedures:

- o Inspect sample containers and chain-of-custody forms and check for consistency with well number, if previously marked. If not, label the container in accordance with chain-of-custody and laboratory procedures.
- o Decontaminate bailer by scrubbing with Alconox solution and rinsing with copious amounts of deionized water.
- o Retrieve water sample(s) from the well using the clean bailer.
- o Rinse each sample container and cap with appropriate sample before filling, unless the container contains preservative.
- o Add preservative, if appropriate, to sample container(s).
- o Add sample and secure the cap on the sample container(s). Each VOC sample container should be filled in accordance with WESTON sampling procedures so that no bubbles are present in the container.
- o Collect a grab sample from the well for immediate field measurement of temperature, pH and conductivity; record the results in the daily log.
- o Enclose each sample container in a "Zip Loc" bag; place the sealed container in a thermal chest; pack with sufficient ice to provide for cooling to 4°C.
- o Wash and rinse the bailer and fill with deionized water; collect a sample of rinse





water in a blank container for quality control analyses.

- o Prepare the chain-of-custody form and proceed to the next sampling (well) location.

### 3.3 Sample Handling and Preservation

The following sample handling and preservation procedures will be used at UTI:

- o Acidify soluble metals samples with 2 ml of 1:1 nitric acid to a pH of <2, after field filtration to remove sediment.
- o For inorganic parameters, collect proper sample size; eliminate or minimize sediment in samples.
- o Measure conductivity and pH in the field.
- o Collect, preserve and analyze organic parameters in accordance with EPA procedures and requirements.

Samples will be placed in thermal chests, packed with ice and transported immediately after completion of sampling to the laboratory.

### 3.4 Quality Assurance

Sampling personnel will implement routine quality assurance procedures for the collection of representative groundwater samples and production of high quality analytical data. Analyses will be performed in accordance with the WESTON analytical laboratory quality assurance/quality control procedures.

### 3.5 Chain-of-Custody Procedures

Sampling personnel will follow EPA chain-of-custody and recordkeeping procedures to maintain the integrity of all samples.

### 3.6 Sample Packaging and Shipment

Sample packaging procedure will comply with Department of Transportation requirements for shipment of environmental samples. Individual samples will be sealed in "Zip Loc" plastic bags and placed in a thermal chest to cool the samples to 4°C. When the chest contains the requisite number of sample containers or is full of containers, vermiculite will be placed in the space between the sample containers to provide cushioning during transport and to act as an absorbent in the event a sample bottle is accidentally broken.



B-20

#### 4.0 RESULTS AND FINDINGS

The data collected and findings reported during test pit excavation, monitor well installation and sampling effort will be summarized in a report, which will subsequently be made available to the Pennsylvania Department of Environmental Resources (DER) and the Environmental Protection Agency (EPA). The report will include the following:

- o Presentation of soil profile descriptions for the test pits.
- o Tabulation of analytical results of soil samples taken from the test pits.
- o Discussion of findings made from test pit excavations and how these findings were used to select the final locations of the proposed monitor wells.
- o Graphical display of water level data from the sampling effort for on-site monitor wells and CT-8.
- o Tabulation of analytical results for on-site monitor wells and CT-8.
- o Plotting of concentration values to display concentration density maps (by parameter) in plan view.
- o Comparison of groundwater flow pattern and water quality results with results from previously-obtained information.
- o Discussion of potential contaminant source(s) and migration patterns, e.g., movement direction(s) and approximate rate.

Recommendations will be presented based upon the findings of the investigation.

APPENDIX C  
ANALYTICAL TECHNIQUES AND RESULTS FOR TASK FORCE SAMPLES

**prc**

Planned Research Corporation

PRC Engineering

**EVALUATION OF QUALITY CONTROL ATTENDANT  
TO THE ANALYSIS OF SAMPLES FROM THE  
UNIFORM TUBES, INC. FACILITY  
COLLEGEVILLE, PENNSYLVANIA**

**FINAL MEMORANDUM**

*Prepared for*

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

Work Assignment No.	548
EPA Region	Headquarters
Site No.	N/A
Date Prepared	August 21, 1986
Contract No.	68-01-7037
PRC No.	15-5480-10
Prepared By	PRC Environmental Management, Inc. (Ken Partymiller)
Telephone No.	713/292-7568
EPA Primary Contact	Anthony Montone Barbara Elkus
Telephone No.	202/382-7912

**PROVIDED WORK PRODUCT PREPARED**

MEMORANDUM

DATE: August 22, 1986

SUBJECT Evaluation of Quality Control Attendant to the Analysis of Samples  
from the Uniform Tubes, Inc. Facility, Collegeville, Pennsylvania

FROM: Ken Partymiller, Chemist  
PRC Engineering

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

TO: HWGWTF Ed Berg (EPA 8214)\*  
Jo Ann Duchene (ICAIR)\*  
Tony Montrone\*  
Gareth Pearson (EPA 8231)\*  
Richard Steimle\*  
Charles Jones, Jr., Region III  
Pat Krantz, Region III

This memo summarizes the evaluation of the quality control data generated by the Hazardous Waste Ground-Water Task Force contract analytical laboratories (1). This evaluation and subsequent conclusions pertain to the data from the Uniform Tubes, Inc. facility, Collegeville, Pennsylvania sampling effort by the Hazardous Waste Ground-Water Task Force.

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

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

The evaluation process consisted of three steps. Step one consisted of generation of a package which presents the results of quality control procedures, including the generation of data quality indicators, synopses of statistical indicators, and the results of technical qualifier inspections. A report on the results of the performance evaluation standards analyzed by the laboratory was also generated. Step two was an independent examination of the quality control package and the performance evaluation sample results by members of the Data Evaluation Committee. This was followed by a meeting (teleconference) of the Data Evaluation Committee to discuss the foregoing data and data presentations. These discussions were to come to a consensus 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

\* HWGWTF Data Evaluation Committee Member

correctable or inherent in the analytical process.

## Preface

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

## I. Site Overview

Uniform Tubes, which is located in Collegeville, Pennsylvania, manufactures high precision, small diameter, tubing and tubular parts. The facility contains, on site, several impoundments which treat facility wastes. These wastes include pickle liquor, dilute hydrofluoric, hydrochloric, sulfuric, chromic, and nitric acids, and various organics in settling basins and tanks. In 1978 there was a release due to a leak in an underground storage tank at the facility. The contaminated groundwater at the facility is being pumped and treated as a result. The contamination included 1,1,1-trichloroethane and trichloroethene. The geology of the site is soil over weathered bedrock. The soil is a silty clay material between seven and 25 feet deep. The bedrock is composed of layers of shale and mudstone. The water levels in the wells are between 30 to 50 feet below the surface which places the contaminated aquifer in the bedrock where it is more difficult to recover than if it was in the soil.

Seventeen samples including a stripping tower sample, a surface impoundment sample, ten low concentration ground water samples (including a triplicate sample), two field blanks, two equipment blanks, and a trip blank were collected at this facility. Four of five field, equipment, and trip blanks were used for spikes or duplicates for one or more parameters.

## II. Evaluation of Quality Control Data and Analytical Data

### 1.0 Metals

#### 1.1 Performance Evaluation Standards

No metals performance evaluation (PE) standards were analyzed for this sampling effort.

#### 1.2 Metals QC Evaluation

Fifteen of 23 total metal average spike recoveries were within the data quality objectives (DQO) for this Program. No spike sample recoveries were reported for total tin. The average percent recoveries were high and above the DQO for total antimony (average percent recovery of 123 percent), calcium (115 percent), magnesium (112 percent), manganese (116 percent), sodium (114 percent), and zinc (119 percent). The average percent recoveries were below the DQO for total mercury (83 average percent recovery) and thallium (70 percent). No dissolved metal samples were analyzed. All reported laboratory control standard (LCS) recoveries were within DQO. The average relative percent differences (RPDs) for all parameters were within the DQO.

Required analyses were performed on all metals samples submitted to the laboratory. Dissolved metal analyses were cancelled for all samples. No samples

were analyzed for tin. No PE samples or PE blanks were supplied for analysis for this facility.

No contamination was reported for laboratory blanks. Trip, equipment, and field blanks show metal contamination involving one or more of the following: aluminum, calcium, iron, and/or sodium at concentrations as high as 1140 ug/L (see Appendix 1, Reference 3).

Reported detection limits (DL) are contract required detection limits (CRDL) or lower for all metal parameters except total mercury in samples MQO457, 493, and 499 where the DL is four to ten times CRDL.

### 1.3 Furnace Metals

One of three thallium and two of three selenium and antimony matrix spikes were outside DQO. The thallium matrix spike recoveries were low and thus the thallium data is likely to be biased low. The antimony matrix spikes were high and thus the antimony data is likely to be biased high.

The arsenic, cadmium, and lead data should be considered quantitative. The selenium, antimony, and thallium data, for reasons mentioned above, should be considered semi-quantitative.

### 1.4 ICP Metals

No initial calibration blank was analyzed prior to the beginning of the first ICP run as required.

Serial dilution results for chromium in sample MQO499 and calcium in MQO450 were outside of DQO limits. Physical or chemical interferences were unlikely. Data from these samples should be considered semi-quantitative for chromium and calcium, respectively. High dissolved solids concentrations in samples MQO453, 457, and 497 may have been high enough to cause physical interferences in the ICP. The results for these three samples may be biased low and should be considered semi-quantitative.

The overall spike recoveries for zinc were biased high. One zinc spike recovery was outside DQO. The zinc data may be biased high and should be considered to be semi-quantitative.

The chromium and manganese percent recoveries for the low level linearity range checks (this was the first case where the laboratory used the new ICP protocol requiring a calibration standard at twice CRDL) were very low. Chromium data below 230 ug/L (samples MQO449, 450, 452, 454, 455, 456, 459, 460, 493, 494, 496, 497, and 498) should be considered to be biased low by 60 to 100 percent (0 to 40 percent recovery). Manganese data below 300 ug/L (samples MQO449, 450, 452, 453, 454, 455, 456, 459, 460, 493, 494, 496, 497, and 498) should be considered to be biased low by 30 to 40 percent (63 to 67 percent recovery).

High sulfate concentrations were present in some of the samples but it does not appear to have biased the barium results. The barium spike data were within DQO limits for a matrix spike run on sample MQO453 although the sulfate concentration was 1250 mg/L.

Aluminum, barium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, silver, sodium, and vanadium data, with exceptions

noted below, should be considered quantitative. Data for chromium in sample MQO499 and calcium and zinc in MQO452 should be considered semi-quantitative. Manganese in samples MQO449, 450, 452, 453, 454, 455, 456, 459, 460, 493, 494, 496, 497, and 498 and chromium in samples MQO449, 450, 452, 454, 455, 456, 459, 460, 493, 494, 496, 497, and 498 should be considered qualitative.

### 1.5 Mercury

One of three matrix spikes was outside DQO for mercury. The mercury results should be considered quantitative.

## 2.0 Inorganic and Indicator Parameters

### 2.1 Performance Evaluation Standard

No inorganic or indicator parameter PE samples were analyzed for this facility.

### 2.2 Inorganic and Indicator Parameter QC Evaluation

For the inorganics and indicator parameters, the average percent recoveries were within the accuracy DQO's for all parameters. This indicates good recoveries of these analytes. Accuracy DQO's have not been established for bromide and nitrite. Three individual sample recoveries were outside the accuracy DQO (sulfate in sample MQO460 and cyanide and POX in sample MQO459). All LCS recoveries reported for inorganic and indicator parameters were within Program DQO's. Average RPD's for all parameters were within Program DQO's. Precision DQO's have not been established for bromide and nitrite.

Analyses for all parameters were performed on all samples, including the bromide and nitrite analyses which were added by a contract modification. No laboratory blank contamination was reported for any inorganic or indicator parameter. Contamination in field blanks is reported in Appendix 1, Table A1-1 of Reference 3 and involves low levels of one or more of: sulfate, total phenols, TOX, and/or POX. All reported detection limits are CRDL or lower except for total phenols in sample MQO496 (DL two times CRDL) and nitrate nitrogen in samples MQO454 and 497 (DL 17 and 167 times CRDL, respectively). CRDL's have not yet been established for bromide and nitrite.

### 2.3 Inorganic and Indicator Parameter Data

Four of five field, equipment, and trip blanks were used for spikes or duplicates for one or more inorganics and indicator parameters. The traffic reports shipped with the samples to the laboratories were supposed to indicate which samples were blanks but did not do so on the inorganics traffic reports.

The ion chromatography (IC) spectra look clean and are acceptable. The laboratory has some problems with change over to new equipment which has lead to confusion about analysis dates. It was not possible to verify whether the quality control (QC) parameters for the IC analysis for nitrate nitrogen, chloride, sulfate, bromide, and nitrite were run in conjunction with the samples as required. The laboratory claims that they were but the analyses dates were not recorded due to the equipment change over. Enforcement use of the IC data is not recommended although the data is acceptable.

It is unclear whether the laboratory calibrated their instrument prior to the cyanide analysis as required. It is possible that a recommended holding time of 48



hours for unpreserved nitrate nitrogen samples was exceeded as the holding time prior to this analysis was 23 days. The sulfate spike recovery for sample MQO460 was outside the DQO.

Samples MQO496, 497, and 498 were triplicate samples from the same well. The sulfate and chloride results from sample MQO497 are much higher (by factors of 10 and 35, respectively) although all the other data agrees with the data from the other two triplicate samples. TOX results for sample MQO496 were substantially higher than those for the other two triplicate samples indicating poor precision for the method.

The laboratory should run their TOC calibration verification standard and blank every 10 samples as well as at the beginning and end of the series of analyses. This is not being done. No TOC instrument calibration data were reported on the raw data. The laboratory should perform daily calibrations before each analysis.

No POC initial calibration verifications or continuing calibration verifications were analyzed to verify the calibration. The POC holding times were 12 to 14 days. The recommended holding time is seven days.

TOX data for samples containing chloride concentrations greater than 500 mg/L should not be used due to interferences from the chloride. Samples containing high chloride concentrations include MQO453 and 497.

Two of three RPD's for POX were slightly above DQO although the average RPD was within DQO. Holding times for POX ranged from one to 14 days with a recommended holding time of seven days. No continuing calibration verification or continuing calibration blank was run at the end of the POX analyses run, as recommended. This affects samples MQO496, 497, 498, and 499.

Recommended holding time for unpreserved nitrite samples is 48 hours. Holding times for the nitrite analysis was approximately 23 days.

The inorganic and indicator parameter data should be considered acceptable and quantitative for ammonia nitrogen, total phenols, TOX (with two high chloride exceptions), and bromide. The data should be considered acceptable and semi-quantitative for cyanide, nitrate nitrogen, sulfate, TOC, POX, and nitrite. As previously mentioned the nitrate nitrogen, chloride, sulfate, bromide, and nitrite IC data lacks verification that QC was performed on the same dates. POX data correlates well with the sum of the individual chlorinated volatiles found in the samples. The POC data should be considered unreliable due to the lack of any verifications.

### 3.0 Organics and Pesticides

#### 3.1 Performance Evaluation Standard

No organic PE samples were analyzed for this facility.

#### 3.2 Organic OC Evaluation

All average percent recoveries for organic parameters were within Program DQO for accuracy and for precision (DQO's for 2,4-D, 2,4,5-T, the dioxins, and various surrogates have not yet been established) for matrix and surrogate spikes. Two samples had acid surrogate recoveries below DQO for phenol and 2-fluorophenol (samples QO495, 495RE, 499, and 499RE) and for 2,4,6-tribromophenol

(sample QO495RE) No average RPD or surrogate spike RPD, for any compound was outside Program DQO

One laboratory blank (CC860417C03) associated with samples QO495, 496, 497, 498, and 499 contained acetone at 10.2 ug/L (the acetone CRDL is 10 ug/L). All other blanks either contained no detectable contamination or acetone at concentrations below CRDL and ranging from 3.8 to 9.8 ug/L.

All organic analyses were performed as requested. All detection limits were CRDL or lower except for the following. Nine samples (QO453, 454, 457, 493, 495, 496, 497, 498, and 499) required dilutions of the volatiles fraction resulting in DL's of 1.5 to 500 times CRDL. For all semivolatile samples the DL's are two times CRDL except for di-n-butylphthalate in samples QO460 and 494 and bis(2-ethylhexyl)phthalate in sample QO499 where the reported DL's are CRDL. Dioxin analyses were performed on all of the samples in this case. The percent recovery for dioxin spikes ranged from 89 to 109 percent but no dioxins were found in any samples. No contamination was reported in any of the dioxin blanks. Overall, the QC data are acceptable.

### 3.3 Volatiles

Quality control data indicate that volatile organics were run acceptably. The chromatograms appear acceptable. The spikes and surrogates are acceptable. Acetone was detected in four blanks at concentrations ranging from 3.8 to 10.2 ug/L (CRDL equals 10.0 ug/L for acetone). This raises questions about acetone contamination and makes low level positive results for acetone unreliable. As mentioned above, dilutions were required on nine samples containing high levels of 1,1,1-trichloroethane and trichloroethene. These dilutions resulted in elevated detection limits and the possibility of false negatives for these samples. Samples involved and the new detection limits are: QO453 (DL 2.5 times CRDL), QO499 (7.14), QO495 (10), QO454 (40), QO493 (50), QO498 (100), QO496 and 497 (143), and QO457 (500).

The volatiles data are acceptable. Data for compounds present at concentrations near the DL should be considered semi-quantitative while data for compounds present at higher concentrations should be considered quantitative. The probability of false negative results is significant in the above mentioned samples with elevated detection limits.

### 3.4 Base/Neutrals and Acids

Matrix spike results for both the base/neutral and acid fraction are acceptable. Base/neutral fraction surrogates are also acceptable. Acid fraction surrogates, including phenol-D5, 2-fluorophenol, and 2,4,6-tribromophenol, in samples QO495, 495RE, 499, and 499RE had recoveries ranging from zero to seven percent. The semivolatile blank was slightly below DQO for 2-fluorobiphenyl recovery. The chromatographic quality for the semivolatiles is acceptable.

No semivolatiles were positively identified in the samples from this facility. Overall, the semivolatile data are acceptable and should be considered semi-quantitative for the base/neutral fraction and suspect but usable for the acid fraction (due to predictably low recoveries on phenols). Estimated detection limits were twice CRDL on the semivolatiles.

### 3.5 Tentatively Identified Compounds

Several tentatively identified compounds (TIC) were reported at high concentrations. While there is little doubt that non-HSL organics are present in these samples, the confidence in the identification of the actual chemicals is in question and needs to be clarified by the data users.

### 3.6 Pesticides and Herbicides

There were few obvious laboratory analytical problems with the pesticides or herbicides. Average recoveries are excellent with relative standard deviations of about ten percent. The chromatographic quality for both pesticides and herbicides look generally clean and acceptable. Dilutions/concentrations appear to be properly performed. The duplicate precision and the average percent recovery for the matrix spike compounds are acceptable.

No pesticides or herbicides (other than spikes) were found in any of the samples. The pesticides data should be considered qualitative and usable with an acceptable probability of false negatives. The herbicides data quality should be considered qualitative with an acceptable probability of false negatives. The achieved method detection limit is CRDL for both the pesticides and herbicides.

### 3.7 Dioxins and Dibenzofurans

Recoveries of dioxin spikes by the organics laboratory appear to be nearly quantitative (89 to 109 percent). Response factors for several dioxin spike compounds were outside CLP (but not Method 8280) criteria. Problems with chromatography are suspected due to split peaks for the octachlorodibenzo-p-dioxin spike compound.

Based upon past PE samples, a significant problem, possibly adsorption of the dioxins and dibenzofurans to the walls of the sample bottle, is probably affecting (diminishing) the concentration of the dioxins, if any dioxins are present, in the field samples. Although no dioxins were detected in the field samples, the probability of false negatives is not acceptable. Based upon data from past facilities, the detection limits for the dioxins in field samples should be considered to be approximately 500 ppt and it is probable that no dioxins were present above this level in the samples from this facility. The dioxins data should be considered unreliable.

### III. References

1.   Organic Analyses     CompuChem Laboratories, Inc  
                          P.O. Box 12652  
                          3308 Chapel Hill/Nelson Highway  
                          Research Triangle Park, NC 27709  
                          (919) 549-8263  
  
      Inorganic and Indicator Analyses:  
                          Centec Laboratories  
                          P.O. Box 956  
                          2160 Industrial Drive  
                          Salem, VA 24153  
                          (703) 387-3995
  
2.   Hazardous Waste Ground-Water Task Force Laboratory Data Quality Control  
      Evaluation Report for Uniform Tubes, Inc., Collegeville, Pennsylvania, 7/31(actualy  
      July 23rd)/1986, Prepared by Life Systems, Inc., Contract No. 68-01-7037, Work  
      Assignment No. 549, Contact: Timothy E. Tyburski; Prepared for US EPA, Office of  
      Waste Programs Enforcement, Washington, DC.
  
3.   Revised Draft Inorganic Data Usability Audit Report and Draft Organic Data  
      Usability Report, for Site #16, Uniform Tubes, Prepared by Laboratory Performance  
      Monitoring Group, Lockheed Engineering and Management Services Co., Las Vegas,  
      Nevada, for US EPA, EMSL/Las Vegas, 7/23/1986 and 7-22/1986.

Table C-1  
Sample Preparation and Analysis Techniques and Methods

Parameter	Preparation Technique	Analysis Technique	Method Reference
Specific Organic Constituents			
Volatiles	Purge and trap Direct Injection	Gas Chromatography - Mass Spectroscopy Gas Chromatography - Mass Spectroscopy or Gas Chromatography with Flame Ionization Detection Gas Chromatography - Mass Spectroscopy Gas Chromatography with Electron Capture Detection Gas Chromatography with Electron Capture Detection Gas Chromatography - Mass Spectroscopy	CLP Method (a) CLP Method CLP Method CLP Method CLP Method Method 8150 (b) Method 8280 (b)
Semi-volatiles	Methylene chloride extraction		
Pesticides/PCB	Methylene chloride/hexane extraction		
Herbicides	Diethylether extraction/methylation		
Dioxins and Dibenzofurans	Methylene chloride/hexane extraction		
Elemental Constituents			
Mercury	Wet digestion for dissolved and total	Cold Vapor Atomic Absorption Spectroscopy	CLP Method
Sb, As, Cd, Pb, Se and Ti	Acid digestion for total	Furnace Atomic Absorption Spectroscopy	CLP Method
Other Elements	Acid digestion for total	Inductively Coupled Plasma Emission Spectroscopy	CLP Method
Field Measurements			
Conductance	None	Electrometric, Wheatstone Bridge	Method 120.1 (c)
pH	None	Potentiometry	Method 150.1 (c)
Turbidity	None	Nephelometric	No reference
Non-specific Organic Parameters			
POX	None	Purgable combust, Microcoulometry	EPA 600/4-84-008
TOX	Carbon absorption	Carbon combust, Microcoulometry	Method 9020 (b)
POC	None	Purgable combust, Non-dispersive Infrared	No reference
NPOC	Acidify and purge	UV Persulfate, Non-dispersive Infrared	Method 415.1 (c)
General Constituents			
Ammonia	Particulates settled	Ion Selective Potentiometry of supernatant	Method 450.3 (c)
Bromide	Particulates settled	Ion Chromatography of supernatant	CLP Method
Chloride	Particulates settled	Ion Chromatography of supernatant	CLP Method
Nitrate	Particulates settled	Ion Chromatography of supernatant	CLP Method
Sulfate	Particulates settled	Ion Chromatography of supernatant	CLP Method
Cyanide	Manual distillation	Pyridine Pyrazolone Colorimetry	CLP Method
Phenol	Automated distillation	Ferricyanide 4-Aminoantipyrene Auto-Colorimetry	Method 420.2 (c)

a) Contract Laboratory Program, IFB methods.

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

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

Table C-2

Specific Organic Constituents Analysis Results  
Uniform Tubes, Inc., Collegeville, PA

Compounds Detected	Station: SMO No.: Well RCRA-1 MQ0496	Well RCRA-1 MQ0497	Well RCRA-2 MQ0457	Well RCRA-3 MQ0495	Well RCRA-4 MQ0493
	Value, ug/L	Value, ug/L	Value, ug/L	Value, ug/L	Value, ug/L
Methylene chloride	ND a	ND	ND	28. b	ND
1,1-Dichloroethane	ND	ND	ND	21. b	ND
1,1,1-Trichloroethane	20,000.	16,000.	56,000.	1,500.	4,100.
1,1-Dichloroethene	5,100.	3,900.	1,500. b	80.	600.
trans-1,2-Dichloroethene	170. b	ND	ND	180.	200. b
Trichloroethene	17,000.	9,200.	9,500.	2,200.	8,300.
Tetrachloroethene	ND	ND	1200. b	23. b	ND
L00 FACTORS (c)					
Volatile	140X	140X	500X	10X	50X
Semivolatile	2X	2X	2X	2X	2X
Pesticide	1X	1X	1X	1X	1X
Herbicide	1X	1X	1X	1X	1X

Compounds Detected	Station: SMO No.: Well UTM-1 MQ0454	Well UTM-3 MQ0499	Well UTM-5 MQ0456	Well UTM-8 MQ0494	S. Tower MQ0452	Impoundment MQ0453
	Value, ug/L	Value, ug/L	Value, ug/L	Value, ug/L	Value, ug/L	Value, ug/L
1,1-Dichloroethane	ND a	17. b	ND	ND	ND	ND
1,1,1-Trichloroethane	2,500.	1,300.	8.	3. b	6.	280.
1,1-Dichloroethene	100. b	63.	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	170.	5.	4. b	ND	ND
Trichloroethene	7,600.	1,300.	77.	8.	19.	53.
Tetrachloroethene	ND	16. b	ND	3. b	ND	ND
Acetone	ND	ND	ND	ND	ND	140.
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	24. b
di-n-Butyl phthalate	ND	ND	ND	3. b	ND	ND
bis(2-Ethylhexyl) phthalate	ND	10. b	ND	ND	ND	ND
L00 Factor (c)						
Volatile	40X	7X	1X	1X	1X	3X
Semivolatile	2X	2X	2X	2X	2X	2X
Pesticide	1X	1X	1X	1X	1X	1X
Herbicide	1X	1X	1X	1X	1X	1X

a) Compound was not detected.

b) Estimated concentration. Compound was detected but the concentration was below the limit of quantitation (100).

c) L00 factor is the factor that the 100s given in Table C-1 must be multiplied by to correct for dilutions.

1. 2017年12月31日，甲公司“应付账款”科目所属各明细科目期末贷方余额如下：应付账款—A公司100万元，应付账款—B公司200万元，应付账款—C公司150万元。甲公司2017年12月31日资产负债表“应付账款”项目期末余额为（ ）万元。

Table C-3  
LIMITS OF QUANTITATION FOR ORGANIC COMPOUNDS  
UNIFORM TUBES, INC  
Collegeville, Pennsylvania

Limit of Quantitation (µg/L)		Limit of Quantitation (µg/L)		Limit of Quantitation (µg/L)	
Volatile Compounds (Purge & Trap)		Semi-Volatile Compounds		Semi-Volatile Compounds (cont.)	
Bromomethane	10	Aniline	20	N-nitrosodiethylamine	20
Chloromethane	10	4-Chloroaniline	20	Acetophenone	40
Bromodichloromethane	5	2-Nitroaniline	100	N-nitrosodipiperidine	40
Dibromochloromethane	5	3-Nitroaniline	100	Safrole	40
Bromoform	5	4-Nitroaniline	100	1,4-Naphthoquinone	40
Chloroform	5	Benzidine	100	2,3,4,6-Tetrachlorophenol	40
Carbon tetrachloride	5	3,3'-Dichlorobenzidine	40	2-Naphthylamine	40
Carbon disulfide	5	Benzyl alcohol	20	Pyridine	40
Chloroethane	10	Benzyl chloride	40	Pentachloroethene	40
1,1-Dichloroethene	5	1,2-Dichlorobenzene	20	1,3,5-trinitrobenzene	40
1,2-Dichloroethane	5	1,3-Dichlorobenzene	20	Ethylmethacrylate	40
1,1,1-Trichloroethane	5	1,4-Dichlorobenzene	20	o-Toluidine hydrochloride	40
1,1,2-Trichloroethane	5	1,2,4-Trichlorobenzene	20	2,6-Dichlorophenol	40
1,1,2,2-Tetrachloroethane	5	1,2,4,5-Tetrachlorobenzene	40	p-Dimethylaminoazobenzene	40
trans-1,2-Dichloroethene	5	1,2,3,4-Tetrachlorobenzene	40	1,2,3-Trichlorobenzene	40
Trichloroethene	5	Pentachlorobenzene	40	1,3,5-Trichlorobenzene	40
Tetrachloroethene	5	Hexachlorobenzene	20	1,2,3,5-Tetrachlorobenzene	40
Methylene chloride	10	Pentachloronitrobenzene	40	Ethyl-methanesulfonate	40
Vinyl chloride	10	Nitrobenzene	20	alpha, alpha-	
1,2-Dichloropropane	5	2,4-Dinitrotoluene	20	Dimethylphenethylamine	40
cis-1,3-Dichloropropene	5	2,6-Dinitrotoluene	20	Methapyrene	40
trans-1,3-Dichloropropene	5	N-Nitrosodimethylamine	20	7,12-Dimethylbenzanthracene	40
Benzene	5	N-Nitrosodiphenylamine	20	Benzal chloride	40
Chlorobenzene	5	N-Nitrosodipropylamine	20	Zinophos	40
Ethylbenzene	5	bis(2-Chloroethyl) ether	20	4-Aminobiphenyl	40
Toluene	5	4-Chlorophenyl phenyl ether	20	Tetraethyldithiopyrro-	
Xylenes	5	4-Bromophenyl phenyl ether	20	phosphate	40
Acetone	10	bis(2-Chloroisopropyl) ether	20	3,3'-Dimethylbenzidine	40
2-Butanone	10	bis(2-Chloroethoxy) methane	20	Pronamide	40
2-Pentanone	10	Hexachloroethane	20	Chlorobenzilate	40
4-Methyl-2-pentanone	10	Hexachlorobutadiene	20	o-Phenylenediamine	40
2-Chloroethyl vinyl ether	10	Hexachlorocyclopentadiene	20	m-Phenylenediamine	40
Styrene	5	bis(2-Ethylhexyl) phthalate	20	p-Phenylenediamine	40
Vinyl acetate	10	Butyl benzyl phthalate	20	Isosafrole	40
Crotonaldehyde	50	di-n-Butylphthalate	20	N-Nitrosopyrrolidine	40
1,2-Dibromo-3-chloropropane	20	di-n-Octylphthalate	20	Aramite	40
1,1,1,2-Tetrachloroethane	20	Diethylphthalate	20	Diallate	40
1,2-Dibromoethane	5	Dimethylphthalate	20	Dimethoxybenzidine	40
1,2,3-Trichloropropane	5	Acenaphthene	20	Benzotrithionide	40
1,4-Dichloro-2-butene	20	Acenaphthylene	20	Nitrosomethylethylamine	160
Trichlorofluoromethane	5	Anthracene	20	N-Nitroso-di-N-butylamine	40
Acrolein	50	Benzo(a)anthracene	20	Cyclophosphamide	160
Acrylonitrile	50	Benzo(b)fluoranthene and/or		Hexachloropropene	40
		Benzo(k)fluoranthene	20	Phenacetin	40
		Benzo(g,h,i)perylene	20	Resorcinol	40
		Benzo(a)pyrene	20	Dimethoate	40
		Chrysene	20	4,4 Methylene-bis	
		Dibenzo(a,h)anthracene	20	(2-chloroaniline)	40
		Dibenzofuran	20	Paraaldehyde	40
		Fluoranthene	20	Methyl methane sulfonate	40
		Fluorene	20	N-nitrosomorpholine	40
		Indeno(1,2,3-c,d)pyrene	20	1-Naphthylamine	40
		Isophorone	20	1,2-Diphenylhydrazine	40
		Naphthalene	20	Benzoic acid	100
		2-Chloronaphthalene	20	Phenol	20
		2-Methylnaphthalene	20	2-Chlorophenol	20
		Phenanthrene	20	2,4-Dichlorophenol	20
		Pyrene	20	2,4,5-Trichlorophenol and/or	
		5-Nitro-o-toluidine	40	2,4,6-Trichlorophenol	100
Volatile Compounds (DAI) <sup>b</sup>					
Acrylonitrile	50				
1,4-Dioxane	100				
Allyl alcohol	50				
Ethyl cyanide	100				
Isobutyl alcohol	100				
Methacrylonitrile	25				
2-Propyn-1-ol	100				
Acrolein	100				
Methyl Methacrylate	50				



Table C-3 (cont.)

Limit of Quantitation (µg/L)		Limit of Quantitation (µg/L)		Limit of Quantitation (µg/L)	
Semi-volatile Compounds (cont.)		Pesticides PCBs		Herbicides	
Pentachlorophenol	100	Aldrin	0.05	Dicamba	2
4-Chloro-3-methylphenol	20	alpha-BHC	0.05	Galapon	2
2-Methylphenol	20	beta-BHC	0.05	MCP	100
4-Methylphenol	20	gamma-BHC	0.05	MCPA	2
2,4-Dimethylphenol	20	delta-BHC	0.05	Dichloroprop	2
4,5-Dinitro-2-methylphenol	100	Chlordane	0.5	2,4-Dichlorophenoxy	4
2-Nitrophenol	20	4,4'-DDD	0.1	acetic acid	1
4-Nitrophenol	100	4,4'-DDE	0.1	2,4,5-T	4
2,4-Dinitrophenol	100	4,4'-DDT	0.1	2,4-DB	1
		Dieldrin	0.1	Dinoseb	1
		Endosulfan I	0.05		
		Endosulfan II	0.1	Dioxins & Dibenzofurans (ng/L)	
		Endosulfan sulfate	0.1	TCDD (Tetra)	1
		Endrin	0.1	PeCDD (Penta)	5
		Endrin aldehyde	0.1	HxCDD (Hexa)	6
		Heptachlor	0.05	HpCDD (Hepta)	4
		Heptachlor epoxide	0.05	OCDD (Octa)	44
		Toxaphene	1	TCDF (Tetra)	1
		Methoxychlor	0.5	PcCDF (Penta)	3
		Endrin ketone	0.1	HxCDF (Hexa)	3
		PCB-1016	0.5	HpCDF (Hepta)	17
		PCB-1221	0.5	OCDF (Octa)	13
		PCB-1232	0.5		
		PCB-1242	0.5		
		PCB-1248	0.5		
		PCB-1254	1		
		PCB-1260	1		
		Kepone	0.1		

a Measured as diphenylamine

b Direct aqueous injection

Table C-4  
Total Metals Analysis Results

Station: SMD No.:	Well RCRA-1 MQ0496	Well RCRA-2 MQ0457	Well RCRA-3 MQ0495	Well RCRA-4 MQ0493	Well UTM-1 MQ0454	Well UTM-3 MQ0499
Element	Value, ug/L (a)	Value, ug/L	Value, ug/L	Value, ug/L	Value, ug/L	Value, ug/L
Al	< 118. b	20,100.	18,800.	1,640.	< 118.	69,600.
Sb	< 60. c	< 60. c	< 60. c	< 3. c	< 3. c	< 60. c
As	7.3	15.9	10.1	< 10.	< 10.	20.6
Ba	362.	275.	394.	218.	365.	452.
Be	< 4.	< 4.	8.	< 4.	< 4.	29.
Cd	< .5	< .5.	< .5	< .5	< .5	< 5.
Ca	142,000. d	334,000. d	128,000. d	101,000. d	62,500. d	51,700. d
Cr	23. d	1,280. d	246. d	< 8. d	< 8. d	395. d
Co	< 16.	< 16.	< 16.	< 16.	< 16.	53.
Cu	< 13.	42.	294.	< 12.	< 12.	205.
Fe	116.	13,800.	8,670.	1,200.	< 10.	34,900.
Pb	< 2.	36.9	< 5.	< 2.	< 5.	88.4
Hg	22,200.	44,700.	46,100.	16,900.	7,770.	25,300.
Mn	< 4.	705.	1,670.	47.	< 3.	11,900.
Hg	< .1 c	< .8 c	< .2 c	< .4 c	< .4 c	< 2. c
Ni	< 20.	< 20.	100.	< 20.	< 20.	84.
K	2,680.	17,000.	5,430.	3,830.	< 2,160.	10,700.
Se	< 5. c	< 5. c	< 3. c	< 5. c	< 3. c	< 3. c
Ag	< 10.	< 10.	< 10.	< 10.	< 10.	< 10.
Na	20,700.	37,400.	45,000.	17,400.	11,600.	28,400.
Tl	< 5. c	< 5. c	< 5. c	< 5. c	< 10. c	< 10. c
V	< 21.	29.	< 21.	< 21.	< 10.	51.
Zn	16. c	82. c	87. c	12. c	< 12. c	130. c

a) Average of the field triplicate sample values.

b) Sample concentration was less than the given concentration.

c) Batch spike sample recovery was not within control limits indicating possible bias.

d) Interference was detected in the analysis indicating possible bias.

Table C-4 (continued)

## Total Metals Analysis Results

Station: SMD No.:	Well UTM-5 MQ0456	Well UTM-8 MQ0494	Stripper Tower MQ0452	Impoundment MQ0453
Element	Value, ug/l	Value, ug/L	Value, ug/L	Value, ug/L
Al	574.	342.	< 118. b	6,860.
Sb	< 3. c	< 60. c	< 3. c	< 60. c
As	< 10.	< 6.	< 10.	< 10.
Ba	116.	96.	381.	16.
Be	< 4.	< 4.	< 4.	< 4.
Cd	< .5	< .5	< .5	< .5
Ca	53,300. d	13,600. d	61,700. d	382,000. d
Cr	< 8. d	< 8. d	58. d	2,840. d
Co	< 16.	< 16.	< 16.	< 16.
Cu	< 12.	< 12.	< 12.	116.
Fe	987.	341.	235.	136.
Pb	< 5.	< 2.	< 5.	< 5.
Mg	8,060.	2,760.	7,560.	263,000.
Mn	128.	34.	< 3.	< 3.
Hg	< .2 c	< .2 c	< .2 c	< .2 c
Ni	< 20.	< 20.	< 20.	92.
K	< 2,160.	< 2,160.	< 2,160.	14,800.
Se	< 3. c	< 3. c	< 3. c	< 5. c
Ag	< 10.	< 10.	< 10.	< 10.
Na	10,700.	6,820.	11,500.	268,000.
Li	< 10. c	< 5. c	< 5. c	< 5. c
V	< 21.	< 21.	< 21.	< 21.
Zn	< 12. c	< 12. c	< 12. c	< 12. c

a) Average of the field triplicate sample values.

b) Sample concentration was less than the given concentration.

c) Batch spike sample recovery was not within control limits indicating possible bias.

d) Interference was detected in the analysis indicating possible bias.



Table C-5 (continued)  
Field Measurements and General Analysis Results

Parameter	Station:		Well UTM-1		Well UTM-3		Well UTM-5		Well UTM-8		Stripper Tower		Surface Impoundment	
	SMO No.:	Units	Value		Value		Value		Value		Value		Value	
pH		Units	7.4		5.9		7.2		5.7		8.1		8.7	
Conductance		umhos/cm	381		600		333		126		473		4140	
Turbidity		NTU	.28		.22		.35		1		.3		16	
POX		ug/l Cl	7540		2130		69		6		29		235	
FOX		ug/l Cl	16900		1300		55		14		26		200	
POC		mg/l C	1.7		.4		< .1 a		< .1		< .1		.17	
TPOC		mg/l C	< 1		1.5		< 1		< 1		< 1		13	
Ammonia		mg/l N	< .1		6.2		< .1		< .1		< .1		.74	
Bromide		mg/L	< .05		< 50		< .05		< .05		< .05		< .05	
Chloride		mg/L	20		140		18		7		19		575	
Nitrate		mg/l N	< 5		< .05		3.3		1.85		8.9		< .05	
Nitrite		mg/l N	< .05		< .05		< .05		< .05		< .05		< 125	
Sulfate		mg/L SO4=	35		250		10.1		30.1		28.5		1250	
Cyanide		ug/L	< 10		< 10		< 10		< 10		< 10		53	
Phenol		ug/L	35		38		< 10		22		24		15	

a) Not detected at the given detection limit.

APPENDIX D

UTI MONITORING DATA FOR JULY AND SEPTEMBER 1985

SUMMARY OF ANALYTICAL RESULTS FOR SPECIFIC PARAMETERS  
UNIFORM TUBES, INC., COLLEGEVILLE, PENNSYLVANIA  
(All Data Except pH, Specific Conductance and  
Coliform Bacteria are in mg/l)

Well Identification	RCRA-1	RCRA-2	RCRA-3	RCRA-4	UTM-3
Parameter	Detection Limits				
pH	7.8	7.7	7.6	7.4	6.7
Spec. Cond (uMHOS)	700	1800	850	520	405
Sulfate	10/25	35.0	-	134	94
Chloride	5	9	65	34	41
Fluoride	0.2	<0.2	2.0	3.6	0.2
Nitrate (as N)	5	<5	102	43	7
Cyanide	0.01	<0.01	<0.01	<0.01	<0.01
Phenols	0.005	0.009	0.005	0.006	0.007
TOC <sup>(C)</sup>	0.5	1.1	3.1	2.3	3.7
TOR <sup>(H)</sup>	5	11.0	58.4	3.22	4.76
Coliform Bact. (I)	1	TN	23	10	SD
(C)	Total Organic Carbon				
(H)	Total Organic Halogen				
(I)	Colonies/100 ml of water				
TN	Too numerous to count				
SD	Settling interfered with reading				

Notes: Data was accumulated from three sampling dates 7/12/85, 7/17/85, and 8/1/85.

WESTERN

SUMMARY OF ANALYTICAL RESULTS  
FOR TOTAL METALS  
UNIFORM TUBES, INC., COLLEGEVILLE PENNSYLVANIA  
(All Data in ug/l)

Well Identification	RCRA-1	RCRA-2	RCMA-3	RCMA-4	UTM-3
Parameter	Detection Limits				
Silver	ND	ND	ND	ND	ND
Arsenic	ND	ND	14	ND	ND
Barium	320	104	133	122	109
Beryllium	ND	ND	5	ND	ND
Cadmium	12	ND	12	ND	11
Chromium	36	1020	226	<50 (B)	287
Copper	23	ND	40	21	43
Mercury	ND	ND	ND	ND	ND
Lead	ND	ND	ND	ND	ND
Sodium	20,000	42,000	37,000	32,000	26,000
Nickel	ND	ND	ND	ND	ND
Antimony	ND	ND	ND	ND	ND
Selenium	ND	ND	ND	ND	ND
Thallium	ND	ND	ND	ND	ND
Zinc	59	17	93	86	270

ND Not Detectable

(B) Detection Limit less than 50 with Chromium for RCMA-4 (due to excessive suspended particles present in the extracted sample from this well).



SUMMARY OF ANALYTICAL RESULTS  
FOR VOLATILE ORGANICS  
UNIFORM TUBES, INC., COLLEGEVILLE, PENNSYLVANIA  
(All Data in ug/l)

Sampling Date	7/12/85	7/17/85	7/12/85	7/17/85	7/12/85
Well Identification	RCRA-1	RCRA-2	RCRA-3	RCRA-4	UTM-3
Parameter	Detection Limits (A)				
Chloroform	100	3	ND	ND	ND
1,1 Dichloroethane	100	35	42	22	120
1,2 Dichloroethane	100	8	12	ND	13
1,1 Dichloroethylene (DCE)	100	3,600	2,000	130	220
Methylene Chloride	100	2	5	2	63
Tetrachloroethylene	100	86	850	26	33
1,2 Trans Dichloro-ethylene (t-DCE)	100	260	260	270	130
1,1,1 Trichloroethane	100	12,000	38,000	1,300	2,300
Trichloroethylene	100	11,000	96,000	4,600	5,500
Vinyl Chloride	100	4	ND	ND	ND
Acetone	100	2	ND	ND	ND
Chloromethane	100	ND	ND	ND	ND
2-Butanone	100	ND	3.5	29	26
Carbon Tetrachloride	100	ND	ND	ND	190
Toluene	100	ND	24	ND	30
Benzene	100	ND	ND	ND	25

ND Not Detectable

(A) Detection Limit of 10 for all RCRA-1 parameters (cleaner sample extracted) 500 for RCRA-4

SUMMARY OF ANALYTICAL RESULTS FOR BASE NEUTRALS AND ACID COMPOUNDS  
UNIFORM TUBES, INC., COLLEGEVILLE, PENNSYLVANIA  
(All Data in ug/l)

Sampling Date Well Identification	7/12/85 RCRA-1	7/17/85 RCRA-2	7/12/85 RCRA-3	7/17/85 RCRA-4	7/12/85 UTM-30
Parameter	Detection Limits				
Base Neutrals	ND	—	—	—	—
Acids	ND	ND	ND	ND	ND
Bis (2 ethylhexyl) phthalate	—	ND	ND	31	—
1,2 dichlorobenzene	—	—	—	—	ND
Isophorone	—	—	—	—	ND
Tetrachloroethene	—	230	—	—	—
Branched Alkanes >C <sub>10</sub>	—	35	—	—	—
Hydrocarbons	—	—	—	<800	—
Toluene	—	—	—	—	—

ND - Not Detectable

SUMMARY OF ANALYTICAL RESULTS FOR PESTICIDES, HERBICIDES  
AND RADIOLOGICAL PARAMETERS  
UNIFORM TUNES, INC., COLLEGEVILLE, PENNSYLVANIA  
(All data in ug/l picocuries/liter)

Sampling Date Well Identification	7/12/85 RCRA-1	7/17/85 RCRA-2	7/12/85 RCRA-3	7/17/85 RCRA-4	7/12/85 UTM-3
Parameter	Detection Limits				
Pesticides	ND	ND	ND	ND	ND
2,4-D	ND	<100	ND	<100	ND
2,4-S-TP Silvex	ND	<10	ND	<10	ND

Sampling Date Well Identification	7/17/85 RCRA-1	7/17/85 RCRA-2	7/17/85 RCRA-3	7/17/85 RCRA-4	7/17/85 UTM-3
Parameter	Detection Limits				
Radium-226 (1)	ND				
Gross Alpha	3.8 (-2.5)				
Gross Beta	2.2 (-1.4)				
Radium-228	ND				

RADIOLOGICAL DATA (picocuries/liter, PCI/liter)

WESTERN

Sampling Date Well Identification	7/17/85 RCRA-1	7/17/85 RCRA-2	7/17/85 RCRA-3	7/17/85 RCRA-4	7/17/85 UTM-3
Parameter	Detectable Limits				
Radium-226	0.9	1.8 (+0.6)			
Gross Alpha	4.95	3.8 (+3.3)			
Gross Beta	0.3	1.0 (-0.2)			
Radium-228	2.0	ND			
Radium-226	1.0		ND		
Gross Alpha	3.0		ND		
Gross Beta	2.4		2.5 (-1.6)		
Radium-228	2.0		ND		
Radium-226	1.35			1.8 (+0.9)	
Gross Alpha	4.8			5.2 (+3.2)	
Gross Beta	2.85			7.7 (+1.9)	
Radium-228	2.0			ND	
Radium-226	1.0				ND
Gross Alpha	1.0				ND
Gross Beta	1.95				3.0 (+1.3)
Radium-228	2.0				ND

ND Not Detectable

(1) Is Equal to Approximately

(C) Detection limit higher for RCRA 2 and RCRA 4 due to more suspended particles being present in the extracted samples from these wells.

(D) Variable with different compounds within this category.

## Summary of Analytical Results Uniform Tubes, Inc., Chillicothe, Pennsylvania

Volatiles (ug/l)	R-1	R-2	R-3	R-4	U-1	U-2	U-3	U-4	U-5	U-6	U-7	U-8	CR-9
1,1, Dichloroethylene (DCP)	2100	1900	96	190	86	26	50	<2	<2	27	<10	<2	<2
Perchloroethylene	85	86.0	21	8	<2	<4	11	<2	<2	<2	<10	<2	<2
1,2, Trans Dichloroethylene (1-DCP)	180	275	160	195	110	220	165	11	<2	<2	<10	<2	<2
1,1,1 Trichloroethane	8100	30,000	86.0	1700	1300	310	660	30	11	120	<10	20	8
Trichloroethylene	17,000	96,000	2700	4700	6100	1600	1500	30	31	100	24	60	8
Toluene	<2	20	<2	<2	<2	<2	<2	8	5	<2	65	93	3
Inorganics (mg/l)													
Nitrate (as N)	36	110	70	7	5	6	24	<5	<5	<5	<5	<5	<5
Sulfate	37	710	235	25	19	17	105	27	20	21	24	27	16
Specific Conductance (A)	730	1970	1000	576	372	422	512	279	314	235	317	290	186
Chromium (Hexavalent)	<0.1	0.6	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
pH (mln)	7.3	7.4	5.4	7.3	7.3	6.7	5.4	6.9	6.8	6.7	7.3	6.5	6.4
Total Metals (mg/l)													
Chromium	0.028	1.31	0.29	<0.01	<0.01	0.02	0.26	0.015	<0.01	0.01	<0.01	<0.01	0.017
Copper	0.110	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.047 <sup>(B)</sup>	<0.5	<0.5	<0.5	<0.5	0.052 <sup>(B)</sup>
Nickel	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.041 <sup>(C)</sup>	<0.5	<0.5	<0.5	<0.5	0.053 <sup>(C)</sup>

(A) - Specific Conductance is in umhos/cm.  
 (B) - Detection Limit - 0.01 mg/l for all samples analyzed by atomic absorption; 0.5 mg/l for analysis by ICP.  
 (C) - Detection Limit - 0.04 mg/l

Sampled September 1984