United States Environmental Protection Agency
Office of Emergency and Remedial Response
EPA/ROD/R02-91/159
September 1991

EPA

Superfund Record of Decision:

Chemsol, NJ

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R02-91/159	2.	3. Recipient's Accession No.

4. Title and Subtitle	5. Report Date
SUPERFUND RECORD OF DECISION Chemsol, NJ First Remedial Action	09/20/91
	6.
7. Author(s)	8. Performing Organization Rept. No.
9. Performing Orgainization Name and Address	10. Project/Task/Work Unit No.
	11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. Type of Report & Period Covered 800/000
	14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 40-acre Chemsol site is a former solvent recovery and waste reprocessing facility in Piscataway Township, Middlesex County, New Jersey. Land use in the area is predominantly commercial and residential, with an onsite marshy area that may be considered a wetlands. The site overlies a bedrock aquifer that is used as a regional drinking water source. In addition, three streams are located onsite which discharge to nearby Bound Brook. From the 1950's until 1964, Chemsol, Inc., recovered and reprocessed solvents and materials received from various companies through activities such as mixing, blending, and distillation. The site was closed in 1964 after a series of industrial accidents, explosions, and fires. In 1978, the site was purchased by Tang Realty Corporation. In 1984, as a result of previous accidents, the State required Tang Realty to investigate site contamination and to develop a remedial plan. In 1988, Tang Realty removed 3,700 cubic yards of PCB-contaminated soil and discovered several thousand small (less than 1 gallon) containers of unidentified wastes. In October 1991, the drums were removed and disposed of offsite. Between 1980 and 1990, sampling of residential wells indicated the presence of organic contaminants and PCBs. As a result, the township extended

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Chemsol, NJ
First Remedial Action
Contaminated Medium: gw
Key Contaminants: VOCs (benzene, toluene, xylenes), other organics (pesticides, phenols), metals (arsenic, chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
	None	62
	20. Security Class (This Page)	22. Price
	None	

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R02-91/159
Chemsol, NJ
First Remedial Action

Abstract (Continued)

municipal water service to the affected area. This Record of Decision (ROD) provides an interim remedy to restrict the offsite migration of highly contaminated ground water. Subsequent actions will address ground water contamination at a depth of greater than 130 feet, offsite ground water contamination, as well as air and soil contamination. The primary contaminants of concern affecting the ground water are VOCs including benzene, toluene, and xylenes; other organics including pesticides and phenols; and metals including arsenic, chromium, and lead.

The selected remedial action for this interim remedy includes installing a ground water collection trench, which will extend from the surface of the site down to approximately 10 to 15 feet below the surface; installing three ground water extraction wells to a depth of 130 feet; constructing an onsite treatment plant and treating contaminated ground water using air stripping, biological filtration, and activated carbon adsorption; treating and disposing sludge generated by the treatment processes offsite; discharging the treated ground water onsite via an above-ground pipe to the stream flowing along the eastern property boundary; and conducting ground and surface water monitoring to measure the potential migration of hazardous substances from the site. The estimated present worth cost for this remedial action is $7,700,000, which includes an annual O&M cost of $915,000 for 5 years.

PERFORMANCE STANDARDS OR GOALS: Chemical-specific ground water clean-up goals are based on the more stringent of State or Federal standards and include arsenic 0.50 ug/l (State), benzene 1 ug/l (State), chromium 50 ug/l (State), lead 15 ug/l (Federal), phenols 4,000 ug/l (Federal), toluene 1,000 ug/l (Federal), and xylenes 44 ug/l (State).

ROD FACT SHEET

SITE

Name:	Chemsol, Inc.
Location/State:	Piscataway, Middlesex Co., New Jersey
EPA Region:	II
HRS Score (date):	42.69 (August 1982)
NPL Rank (date):	380 (March 1991)

ROD

Date Signed: September 20, 1991

Selected Interim Remedy

Groundwater: Installation of a groundwater extraction system on-site and construction of a groundwater treatment plant to treat collected groundwater prior to discharge to an on-site stream.

Capital Cost:	$	3,833,000
Annual O & M:	$	915,000 (for 5 years)
Present Worth:	$	7,700,000

LEAD

Remedial, EPA
Primary Contact (phone): James S. Haklar (212-264-8736)
Secondary Contact (phone): Janet Feldstein (212-264-0613)

WASTE

Type: Groundwater - Presence of volatile organic compounds, semi-volatile organic compounds, pesticides and metals.

Medium: Groundwater to a depth of approximately 130 feet.

Origin: Not ascertained at this time (currently under investigation).

DECLARATION STATEMENT

RECORD OF DECISION

CHEMSOL, INC.

SITE NAME AND LOCATION

Chemsol, Inc.
Piscataway, Middlesex County, New Jersey

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim remedial action for the Chemsol, Inc. site, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision document explains the factual and legal basis for selecting the interim remedy for this site.

The State of New Jersey concurs with the selected interim remedy. The information supporting this interim remedial action decision is contained in the administrative record for this site.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The interim remedy described in this document represents the first component of a permanent remedy for the Chemsol site. It addresses highly contaminated groundwater underlying the site to a depth of approximately 130 feet. The objective of the interim action is to restrict the migration of this contaminated groundwater until a final remedial action can be implemented.

The major components of the selected remedy include the following:

- Installation of a groundwater collection and extraction system for removal of contaminated groundwater from the perched zone and upper bedrock aquifer;

- Installation of an on-site treatment plant to treat the groundwater;

- o Disposal of the treated groundwater in an on-site surface water body; and

- o Operation and maintenance of the components of this interim remedy and environmental monitoring to ensure continued achievement of the objectives of the interim remedy.

STATUTORY DETERMINATIONS

The selected interim remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the extent practicable given the limited scope of the action, and is cost effective. Requirements which cannot be achieved by the interim remedy may be waived pursuant to Section 121 of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, and will be addressed as part of the final remedial action for the site. Although this interim action is not intended to fulfill the statutory mandate for permanence and treatment to the maximum extent practicable, it does utilize treatment technologies and thus is in furtherance of that mandate.

The statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principle element is also partially addressed by the selected response action. Subsequent actions are planned to fully address these statutory preferences as well as the threats posed by conditions at the site.

Because this remedy will result in hazardous substances remaining on the site above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that it continues to provide adequate protection of human health and the environment.

Constantine Sidamon-Eristoff
Regional Administrator
U.S. EPA Region II

Date 9/20/91

DECISION SUMMARY

CHEMSOL, INC. SITE

SITE LOCATION AND DESCRIPTION

The Chemsol, Inc. site is located at the end of Fleming Street, on Lots 1-A and 1-B of Block Number 229A in the Township of Piscataway, Middlesex County, New Jersey. Interstate 287 is located approximately one-half mile south of the site, and the site is bounded on the south by the Reading Railroad right-of-way (See Figure 1). The site covers approximately 40 acres, and is divided into two main lots. Lot 1-A is approximately 27 acres in area, while Lot 1-B covers approximately 13 acres (See Figure 2). Currently, there are no buildings on the site; however, three concrete foundations or slabs are present on Lot 1-B.

Land use in the vicinity of the site is commercial and residential. Single family residences are located immediately west and southwest of the site. Industrial and retail/wholesale businesses are located south and east of the site. An apartment complex is located north of the site.

Three surface water bodies (streams) are located on the site (See Figure 2) which are tributaries to the Bound Brook. The Bound Brook is classified by the State of New Jersey as FW-2 Non-Trout waters.

Although the site does not lie within a floodplain, there is a marshy area on site that could potentially be classified as wetlands.

Groundwater underlying the site exists in two zones. A perched water zone exists at depths of less than five feet. The second zone is identified as the upper bedrock aquifer; the water table of the upper bedrock aquifer is at depths of approximately ten to thirty feet. The bedrock aquifer is classified as "GW-2" by the State of New Jersey. This zone is a regional water supply resource.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The site was operated as a solvent recovery and waste reprocessing facility in the 1950's through approximately 1964. Chemsol would receive material (such as acetone, ethyl alcohol and lacquers) from companies; this material would then be recovered or reprocessed through activities such as mixing, blending and distillation. The facility was closed after a series of industrial accidents, explosions and fires. In 1978, the site was purchased by Tang Realty Corporation. In September 1983, it was placed on the National Priorities List.

In 1984, after amending a previous Administrative Order, the New Jersey Department of Environmental Protection (NJDEP) entered into an Administrative Consent Order with Tang Realty requiring that Tang Realty perform an investigation to evaluate contamination at the site and develop a remedial action plan for the site.

Between 1980 and 1990, approximately 40 groundwater monitoring wells were installed by Tang Realty on site or downgradient from the site. Sampling from these monitoring wells indicated that groundwater was contaminated with organic compounds. Furthermore, sampling and analyses of soils (performed between 1980 and 1987) revealed the presence of polychlorinated biphenyls (PCBs) and organic compounds.

In the Summer of 1988, Tang Realty removed approximately 3,700 cubic yards of PCB-contaminated soils for off-site disposal. During the soil excavations for removal of PCB-contaminated soils, several thousand small (less than 1 gallon) containers of unknown substances were discovered. These unknown substances (which were stored in a trailer on site) are currently being addressed (for off-site disposal) through a separate removal action by the Environmental Protection Agency (EPA).

Sampling was conducted by Tang Realty and the Middlesex County Health Department at private (residential) wells located downgradient of the site (in the "Nova Ukraine" area of Piscataway). The results of sampling performed in January 1990 indicated the presence of organic contaminants in residential wells. The Township extended municipal water service into the Nova Ukraine area during the Fall of 1990. In February 1991, EPA sampled residences in the Nova Ukraine area that were known not to have requested connection to the public water supply. The analytical results from this sampling indicated the presence of organic contaminants in two of three wells. In May 1991, EPA provided the residents with the analytical results from the residential well sampling. In coordination with EPA, the Township has recommended to the remaining private well users in the Nova Ukraine area that they connect to the public water supply.

On September 4, 1990, EPA issued a notice letter to Tang Realty, identifying Tang Realty as a potentially responsible party (PRP). In the Fall of 1990, EPA and the NJDEP agreed that EPA should perform site investigations and federally fund the remainder of the investigatory work.

EPA retained a contractor to perform a Remedial Investigation and Feasibility Study (RI/FS) to assess the nature and extent of contamination at the site and to evaluate remedial alternatives.

During RI/FS planning activities, EPA determined that a Focused Feasibility Study (FFS) should be conducted to assess interim remedial actions for groundwater.

Based on the results of the FFS, an interim remedy is being selected in this document. The site-wide RI/FS activities will be conducted concurrently with design and implementation of this interim remedy.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

A public availability session was held on June 11, 1991. At this session, representatives from EPA answered questions about the site and described the remedial activities being performed there.

The Focused Feasibility Study Report and the Proposed Plan (identifying the preferred interim remedy) were released to the public for comment on July 15, 1991. These two documents were made available to the public in the administrative record files maintained at the EPA Docket Room in Region II and at the Kennedy Library in Piscataway, New Jersey. The documents were also made available to the public at an information repository maintained at the Westergard Library in Piscataway. The notice of availability for these two documents was published in the "Home News" on July 15, 1991. A public comment period on the documents was held from July 15, 1991 to August 14, 1991. In addition, a public meeting was held on August 1, 1991. At this meeting, representatives from EPA answered questions about the site and the interim remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision (ROD).

SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY

EPA is addressing the Chemsol site in two phases and has organized the RI/FS activities accordingly. The first phase includes an FFS to evaluate interim actions to restrict the off-site migration of highly contaminated groundwater to a depth of approximately 130 feet. The second phase consists of a comprehensive RI/FS to address deeper and off-site groundwater contamination, as well as air and soil contamination.

The interim remedy selected in this ROD is the first planned response action for the site. It will be consistent with any future remedy which EPA will select for the site. Restricting the migration of contaminated groundwater will be a necessary component of any future remedy.

Although this interim remedy is not fully protective in and of itself, it is expected to be effective in temporarily reducing the further migration of contaminated groundwater off the site until a permanent remedy can be implemented.

SUMMARY OF SITE CHARACTERISTICS

EPA's contractor performed FFS activities which included the following:

- o Assessment of well integrity;
- o Measurement of groundwater levels;
- o Hydrogeologic testing to determine aquifer characteristics; and
- o Sampling of 22 existing wells to determine groundwater quality.

In addition, a bench-scale treatability study was performed to evaluate appropriate methods for treating the groundwater.

Site Geology

The results of the FFS indicate that the site stratigraphy consists of the overburden (soil) ranging in thickness from 2 to 3 feet, underlain by weathered bedrock at 3 to 20 feet below grade. Fractured bedrock underlies the weathered bedrock. (See Figure 3).

Groundwater at the site occurs in two zones: a perched zone exists in the overburden and the upper bedrock aquifer exists in the bedrock. The perched zone is located at the interface of the soil and top of weathered bedrock. This zone is generally found at a depth of less than 5 feet in monitoring wells installed in the center of the site. Groundwater flow in this zone is to the northeast.

The upper bedrock aquifer occurs in the weathered bedrock and in interconnected fractures in the bedrock. The water table of the upper bedrock aquifer occurs at depths of approximately 10 to 30 feet beneath ground surface. The fractures in the bedrock provide flow paths through which the water moves.

Historically, groundwater in this zone was found to flow to the southeast. This flow pattern may have resulted from the influence of a nearby production well. Results of the FFS indicate that groundwater flow is currently toward a trough-like feature on the site, with a westward flow component.

The perched groundwater may be hydraulically connected to the groundwater in the bedrock by low primary porosity and fractures through the weathered bedrock zone. As a result, the weathered bedrock is not expected to act as a barrier to the downward migration of contaminants.

Groundwater Contamination

As stated previously, two groundwater zones have been identified at the site: perched groundwater and the upper bedrock aquifer. During the FFS, samples were taken from 22 existing groundwater monitoring wells: five in the perched groundwater zone and 17 in the upper bedrock aquifer (See Figure 4). Sampling results from the wells demonstrated severe contamination of both the perched groundwater and the upper bedrock aquifer. The analytical results from the groundwater sampling efforts are discussed below.

The perched groundwater zone and upper bedrock aquifer are contaminated with a variety of hazardous substances. Tables 1 through 8 provide a summary of the analytical results for the perched groundwater wells (the "OW" wells) and the upper bedrock aquifer (the "TW" wells and well "C-1"). Volatile Organic Compounds (VOCs) were detected at a maximum of 516,380 micrograms per liter (ug/l). Semi-volatile organic compounds were also detected (maximum 11,394 ug/l), as well as pesticides (maximum 1.6 ug/l). Furthermore, the analyses indicate the presence of metals in the groundwater (such as Barium at a maximum concentration of 2,830 ug/l and Lead at a maximum concentration of 33.4 ug/l).

Additionally, while the levels of total volatile organics were higher in the upper bedrock aquifer wells than in the perched water wells, total semi-volatile organic compounds were found to be higher in the perched water wells than in the upper bedrock aquifer wells (See Figures 5 through 8).

The FFS indicated that hazardous substances have been released into the groundwater at the site. Furthermore, based on data collected from off-site monitoring wells, such hazardous substances have migrated and continue to migrate off of the site. The presence of the many hazardous substances, pollutants and contaminants in the groundwater underlying the site poses a threat of continued release of such substances into the environment.

Treatability Study

Three treatment processes were selected for bench scale testing. These included air stripping, activated carbon adsorption and UV (ultraviolet)/chemical oxidation.

The primary objective of the treatability study was to generate sufficient information for developing conceptual treatment alternatives and to identify any additional testing needs which would be required to provide design criteria for a remedial groundwater treatment system at the Chemsol site. Findings of this study include the following:

- Air stripping is effective at removing most of the groundwater VOCs and is recommended for VOC treatment at the Chemsol site. In addition, a vapor phase carbon system (with a dryer and condenser to capture free product) would be incorporated with all alternatives using air stripping as an element of the treatment system.

- Pretreatment prior to air stripping would produce a chemical sludge which would likely be hazardous due to the high concentrations of many organics present in the groundwater. The inorganics present in the groundwater may cause scaling of the air stripper media. However, the cost of periodic replacement of the media or the frequency of acid wash to clean the media would be less costly than disposal of hazardous sludge.

- Based on an evaluation of groundwater data and the results of a literature review, biological treatment is expected to be effective at treating the site groundwater.

- Carbon was effective at treating the air stripper effluent, but the degree of treatment necessary to polish a bio-treated effluent should be determined.

- UV/chemical oxidation did not show any ability to treat the contaminated groundwater.

In summary, the FFS results indicate the following:

- Groundwater down to a depth of at least 130 feet is heavily contaminated with hazardous substances, including volatile and semi-volatile organic compounds, pesticides, and inorganic compounds; and

- Groundwater in off-site monitoring wells is contaminated with hazardous substances similar in type and/or identical to those which were found in the groundwater at the site.

The FFS did not fully define the extent of contamination in off-site areas, the lower bedrock aquifer and in on-site soils, surface water bodies and potential wetlands. Such characterization will be the subject of the site-wide RI/FS, to be conducted during and/or after implementation of this interim remedy.

SUMMARY OF SITE RISKS

A qualitative risk assessment was conducted by EPA through its contractor during the FFS to evaluate the health risks posed by migration of contaminated groundwater off the site. The data collected during the FFS revealed that at least 74 chemicals exist in the groundwater underlying the site (See Tables 1-7). Many of the chemicals detected in the groundwater are known carcinogens in animals and are suspected human carcinogens (e.g. chloroform, 1,2-dichloroethane and methylene chloride). Other chemicals detected at the site are known human carcinogens (e.g. vinyl chloride, arsenic and benzene).

Many of the hazardous substances detected in the groundwater at the site were present at levels which far exceed Federal and State standards and guidelines for groundwater. In particular, the levels of numerous volatile organic compounds exceed the Federal Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act (SDWA) and the New Jersey MCLs by orders of magnitude (See Table 9). In addition, the data collected to date demonstrate that groundwater contaminants have migrated off the site.

The qualitative risk assessment identified pathways through which humans may be exposed to contaminated groundwater. The potential human exposure pathways include direct contact with groundwater, ingestion of groundwater, and inhalation of contaminants present in the groundwater. Additional potential human exposure pathways include direct contact and ingestion of surface water and sediments contaminated by the groundwater.

The qualitative risk assessment and the FFS results indicate that the conditions at the site pose an unacceptable risk to public health, welfare and the environment.

In addition, there will be a continued threat of migration of contaminated groundwater from the site absent the implementation of remedial action. The interim remedial action selected in this ROD will mitigate, for the short term, the unacceptable risk posed by the migration of contaminated groundwater from the site.

The interim remedy identified in this ROD will not achieve the level of protection for the public health, welfare or the environment required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, for a final remedial action. It will also not achieve the requisite reduction in toxicity, mobility and volume of hazardous substances required by that statute. The interim remedy, however, will be a component of a final remedy for the site that will ultimately be fully protective of public health and the environment.

In summary, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the interim remedy selected in this ROD, may present an imminent and substantial endangerment to public health, welfare or the environment.

DESCRIPTION OF ALTERNATIVES

Alternatives analyzed for the interim action are presented below. All alternatives discussed below have operation and maintenance (O & M) costs are based on the five year expected duration of the interim remedy. "Months to Implement" includes the time estimated for design and construction of each alternative.

Alternative 1: No Action

Capital Cost:	$ 16,000
Annual O & M Costs:	$ 269,000
Present Worth (PW):	$ 1,153,000

Months to Implement: 4

The Superfund regulations require that the No Action alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, EPA would take no interim action at the site to restrict off-site migration of contaminated groundwater. The No Further Action alternative includes periodic monitoring of groundwater (through use of both on-site and residential wells) and surface water. It should be noted that the capital costs of implementing this alternative include surveying the residential wells and developing a sampling and analysis plan.

Alternative 2: Groundwater Extraction, Treatment and Disposal Through Discharge of the Treated Groundwater to an On-Site Surface Water Body

Capital Cost: $ 3,833,000
Annual O & M Cost: $ 915,000 (for 5 years)
Present Worth: $ 7,700,000

Months to Implement: 28

Major features of this alternative include: installation of a groundwater extraction system on site and construction of a groundwater treatment plant to treat collected groundwater prior to discharge to a stream at the eastern boundary of the site (identified as a tributary to the Bound Brook).

On-site and off-site groundwater and on-site surface water monitoring would be performed to determine the effectiveness of the system.

Based on a conceptual design of the extraction system, it is anticipated that the extraction system would consist of approximately three wells in the 30-foot to 130-foot range. These wells would each extract groundwater at a rate of approximately 10 gallons per minute.

Additionally, an interceptor trench would be used to collect shallow groundwater in the perched zone.

For costing purposes, it is assumed that the treatment plant would consist of the following processes: air stripping, biological treatment, sedimentation, filtration and activated carbon adsorption. An effluent pipe would then convey the treated groundwater to the stream. Additionally, it is assumed that, during testing of the constructed system, the treated effluent would temporarily be discharged to the sewer system.

For costing purposes, it is also assumed that the sludge generated by the treatment process would be non-hazardous. This sludge would be dewatered prior to disposal off site. If found to be hazardous, this sludge will be handled in accordance with applicable Federal and State regulations. Please see the discussion under the Summary of Comparative Analysis of Alternatives regarding compliance with applicable or relevant and appropriate requirements (ARARs).

As required by NJDEP, EPA will be performing an 8-week surface water sampling program to collect water quality data for the previously mentioned on-site stream. This data will be used by NJDEP to develop final discharge limitations.

However, since this data is not yet available, EPA used the NJDEP surface water quality standards to prepare the FFS and, based on a treatability study, a conceptual design and cost estimate of the best available technology for treating the groundwater was developed. Should any NJDEP-developed limit not be technically achievable within the range of the system identified in the FFS and ROD, this limit may be waived pursuant to CERCLA Section 121(d)(4) for this interim measure.

<u>Alternative 3: Groundwater Extraction, Treatment and Disposal Through On-Site Reinjection of the Treated Groundwater Back into the Ground</u>

Capital Cost: $ 5,601,000
Annual O & M Cost: $ 1,015,000 (for 5 years)
Present Worth: $ 9,891,000

Months to Implement: 32

The extraction system for this alternative is identical to that described for Alternative 2. For costing purposes, it is assumed that the treatment plant would consist of the following processes: air stripping, biological treatment, sedimentation, chemical softening, filtration, activated carbon adsorption and ultraviolet disinfection. On-site and off-site groundwater and on-site surface water monitoring would be performed to determine the effectiveness of the system.

Additionally, it is assumed that, during testing of the constructed system, the treated effluent would be temporarily discharged to the sewer system. The treatment plant would be designed to meet Federal and State groundwater quality standards.

As with Alternative 2, it is assumed that the sludge generated by the treatment process would be non-hazardous. This sludge would be dewatered prior to disposal off site. If found to be hazardous, this sludge will be handled in accordance with applicable Federal and State regulations (see discussion below under the Summary of Comparative Analysis of Alternatives regarding compliance with applicable or relevant and appropriate requirements).

Based on a conceptual design of the reinjection system, it is anticipated that the reinjection system would be comprised of approximately 9 reinjection wells (three groups of three wells), with reinjection occurring at depths of approximately 400 to 450 feet.

Alternative 4: Groundwater Extraction, Treatment and Disposal Through Discharge of the Treated Groundwater to the Publicly Owned Treatment Works (POTW)

Capital Cost: $ 2,342,000
Annual O & M Cost: $ 805,000 (for 5 years)
Present Worth: $ 5,744,000

Months to Implement: 20

The groundwater extraction system for this alternative is identical to that proposed for Alternatives 2 and 3. For costing purposes, it is assumed that the treatment plant would consist of an air stripping process. On-site and off-site groundwater and on-site surface water monitoring would be performed to determine the effectiveness of the system. The treatment system for this alternative will be designed to meet Federal, State and Local pretreatment requirements.

The treated groundwater will be conveyed via a discharge pipe to the sanitary sewer system leading to the Middlesex County Utilities Authority (MCUA).

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The selected alternative is to take interim action at the site by implementing Alternative 2. This alternative is a necessary component of any permanent future remedy for the site and would appear to provide the best balance of trade-offs with respect to the criteria that EPA uses to evaluate alternatives.

This section profiles the performance of the selected alternative against the criteria which apply to this interim action, noting how it compares to the other options under consideration.

Overall Protection of Human Health and the Environment: This criterion addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated or controlled through treatment, engineering controls or institutional controls.

Alternative 1 would not be protective of human health and the environment since contaminants in the shallow groundwater would continue to migrate off site.

It is expected that Alternatives 2 and 4 would protect human health and the environment in the short term by reducing further the off-site migration of contaminants in the groundwater until a final remedy is in place.

Due to the complex hydrogeology at the site, additional information would be necessary to evaluate the protectiveness of Alternative 3, since reinjection of the treated groundwater could either have a positive or negative effect on the migration of contaminated groundwater off the site. This additional information will be obtained through the activities associated with the site-wide RI/FS.

Compliance With ARARs: This criterion addresses whether or not a remedy will meet all of the ARARs of Federal and State environmental statutes (other than CERCLA) and/or provide grounds for invoking a waiver.

There are several types of ARARs: action-specific, chemical-specific, and location-specific. Action-specific ARARs are technology or activity-specific requirements or limitations related to various activities. Chemical-specific ARARs are usually numerical values which establish the amount or concentrations of a chemical that may be found in, or discharged to, the ambient environment.

Location-specific requirements are restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because they occur in a special location.

Section 121 (d)(4) of CERCLA provides that EPA may select a remedial action that does not attain ARARs where the remedial action selected is only a part of a total remedial action that will achieve such ARARs when completed. For example, since Alternatives 2, 3 and 4 constitute interim actions which are part of a total remedial action, final cleanup levels for groundwater do not have to be achieved, since final groundwater cleanup will be achieved as part of a final remedial action for the site.

However, certain action-specific and location-specific requirements, discussed below, will be attained as part of implementation of Alternatives 2, 3 or 4.

Alternatives 2, 3 and 4 will comply with the Federal Resource Conservation and Recovery Act (RCRA) requirements and State requirements for storage, transportation and disposal of hazardous materials. Specifically, the residuals generated through operation of the treatment systems will comply with RCRA and State hazardous materials requirements. Additionally, the treatment plant for this alternative (as well as for Alternatives 3 and 4) will be designed and operated in compliance with Federal and State air emissions requirements.

Alternatives 2, 3 and 4 will also comply with Executive Order 11990 pertaining to protection of wetlands, the Endangered Species Act and the National Historic Preservation Act.

With respect to the discharge of treated effluent, as discussed previously for Alternative 2, should any NJDEP-developed effluent limitation for discharge to the on-site stream not be technically achievable within the range of the treatment system identified in the FFS and ROD, the limit will be waived pursuant to Section 121(d)(4) for this interim measure under CERCLA.

For Alternative 3, Federal and State requirements pertaining to reinjection to groundwater will have to be met. To implement Alternative 4, the treated discharge will need to comply with Federal, State and Local pretreatment requirements.

Long-Term Effectiveness: This criterion refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. Given that this is an interim action, effectiveness need only be maintained for the duration of the interim action, which is expected to be no more than five years. Therefore, this criterion will evaluate long-term effectiveness over a five year period.

Alternative 1 is not effective in the long term, since it allows contaminants to continue to migrate from the site. Alternatives 2 and 4 will be effective in reducing the migration of contaminated groundwater from the site, once implemented, and should maintain their effectiveness for the expected duration of the interim remedial action.

As indicated previously, additional information is needed to determine if Alternate 3 will be effective in reducing the migration of contaminated groundwater from the site.

Reduction of Toxicity, Mobility or Volume Through Treatment: This criterion addresses the degree to which a remedy utilizes treatment to reduce the toxicity, mobility, or volume of contaminants at the site.

Alternatives 2, 3 and 4 involve the treatment of contaminated groundwater, and should reduce the toxicity, mobility and volume of contaminants in the shallow groundwater.

Short-Term Effectiveness: This criterion refers to the time in which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

Alternative 1 presents the least short-term risks to on-site workers since no construction activities are involved in implementing the No Action alternative. However, it will not reduce any of the existing risks at the site. Alternatives 2, 3 and 4 will require the execution of health and safety protection measures during the remedial construction to adequately protect workers. These measures may include requirements for protective clothing and respiratory protection.

Health and safety measures to protect the community, such as dust or vapor suppression during excavation, may also be required. However, Alternatives 2, 3 and 4 do not present health and safety problems which cannot be successfully addressed by available construction methods. Additionally, the treatment systems proposed for Alternatives 2, 3 and 4 will be comprised of processes that are well established and readily available.

As indicated previously, additional information is needed to determine if Alternative 3 will be effective in reducing the migration of contaminated groundwater from the site.

With regard to time periods in which the alternatives achieve protection, Alternative 1 will not achieve protection, since contaminants will continue to migrate from the site. The estimated time periods for design of the other alternatives, and periods for construction and testing are estimated as follows: Alternative 2 - 18 months for design, 6 months for construction and 4 months for testing; Alternative 3 - 22 months for design, 6 months for construction and 4 months for testing; Alternative 4 - 10 months for design, 6 months for construction and 4 months for testing.

Implementability: Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the selected alternative.

Alternative 1 is the simplest alternative to implement from a technical standpoint since it only involves actions to periodically inspect and sample the site, and continue to provide information about the site to the surrounding community.

The operations associated with Alternative 2 (construction of a groundwater extraction, treatment and surface water discharge system) employ well established, readily available treatment processes and construction methods.

The operations associated with Alternative 3 would require the implementation of pilot studies to determine the effectiveness of groundwater reinjection. Due to the complex hydrogeology at the site, further information is needed to evaluate the technical feasibility of reinjection, and to determine the effect reinjection would have on contaminant migration in the groundwater (i.e., whether reinjection would assist or restrict off-site migration of contaminated groundwater).

The information required to adequately assess the feasibility of groundwater reinjection will be obtained as part of the site-wide RI/FS, at which time the discharge to groundwater alternative will again be reviewed.

The operations associated with Alternative 4 (construction of a groundwater extraction, treatment and sanitary sewer discharge system) employ well established, readily available treatment processes and construction methods.

Administrative requirements associated with Alternative 2 include compliance with substantive National Pollutant Discharge Elimination System and New Jersey Pollutant Discharge Elimination System requirements for discharge of treated groundwater to a tributary of the Bound Brook. For Alternative 3, reinjection will require compliance with NJDEP reinjection limitations established for the receiving groundwater.

Alternative 4 will necessitate compliance with Federal, State and Local pretreatment requirements. However, based upon information provided by MCUA, discharge of treated groundwater to the sanitary sewer is not practicable from an administrative perspective. During discussions with EPA, MCUA has indicated that it would only be willing to accept the discharge from this site on an emergency basis, if no other alternatives were available, and even then, only on a limited, temporary basis. Consequently, Alternative 4 is not administratively implementable, since MCUA is not likely to accept the discharge.

In summary, Alternative 2 is implementable from both an administrative and technical perspective. Alternative 3 is implementable from an administrative perspective only, while Alternative 4 is only implementable from a technical perspective.

Cost: Cost includes capital and operation and maintenance costs.

Alternative 1, No Action, has an estimated present worth of $1,153,000. The primary constituents of this cost are monitoring. The present worth cost estimates of Alternatives 2, 3 and 4 are $7,700,000, $9,891,000 and $5,744,000, respectively.

The cost estimates are based on the assumption that approximately 72,000 gallons of groundwater per day will be treated.

State Acceptance: This criterion indicates whether, based on its review of the FFS and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative. Based on the comments received on the Proposed Plan, the State accepts Alternative 2.

Community Acceptance: Based on the comments received on the Proposed Plan, the community is concerned about the downstream effects that the treated groundwater discharge would have on the on-site stream. Consequently, the community prefers Alternative 4. However, the community has expressed acceptance of Alternative 2.

SELECTED REMEDY

The selected remedy is Alternative 2: groundwater extraction, treatment and disposal through discharge of the treated groundwater to an on-site surface water body. This interim remedy contains the following components:

- Installation of a groundwater collection trench along the northeast portion of Lot 1-B, which will extend from the surface of the site down to approximately 10 to 15 feet below the surface;
- Installation of groundwater extraction wells to a depth of approximately 130 feet. For design purposes, three extraction wells are proposed;
- Treatment of the contaminated groundwater by processes including air stripping, biological treatment and activated carbon adsorption;
- Treatment and off-site disposal of sludge generated by the treatment processes;
- Conveyance of the treated groundwater via an above-ground freeze-protected pipe to the surface water body (stream) flowing along the eastern property boundary of the site; and
- Implementation of a program for on-site and off-site groundwater and on-site surface water monitoring to measure the presence within and the potential migration of hazardous substances from the site, until such time that the final remedy is in place.

The goal of this interim remedy is to reduce the migration of contaminated groundwater off site until a permanent remedy is implemented. The cost estimates for Alternative 2 are as follows:

Capital Cost:	$ 3,833,000
Annual O & M Cost:	$ 915,000
Present Worth:	$ 7,700,000

Table 10 provides further detail regarding the components of this alternative and the cost estimate. It should be noted that the interim remedy presented in this ROD is based on a conceptual design and cost estimate, and that some changes may be made to the remedy as a result of the remedial design and construction process.

Alternative 2 best satisfies EPA's evaluation criteria for this interim remedy. While none of the interim remedial alternatives evaluated are fully protective of public health and the environment in and of themselves, Alternative 2 is more protective than Alternative 1, and is expected to be as protective as Alternative 4. As stated previously, additional information is required to evaluate the protectiveness of Alternative 3.

With respect to compliance with applicable or relevant and appropriate requirements, reduction in toxicity, mobility or volume through treatment and long-term effectiveness, Alternative 2 ranks equal to or higher than the other alternatives. While Alternative 4 would be more effective in the short term than Alternative 2 (since Alternative 4 would require less time to implement), Alternative 2 is more easily implementable than Alternative 4 (since MCUA has indicated that the Authority may not be willing to accept the discharge from this site). Alternative 2 is more costly than Alternatives 1 and 4; however, it is less costly than Alternative 3. Although some members of the community have expressed a preference for Alternative 4, the public is generally supportive of Alternative 2. Therefore, based upon the above considerations, EPA has selected Alternative 2 as the interim remedy for the site.

STATUTORY DETERMINATIONS

<u>Protection of Human Health and the Environment</u>

This interim remedy (Alternative 2) is part of an overall remedy for the site which will ultimately protect human health and the environment.

This interim remedy will restrict the migration of contaminated groundwater off the site until a permanent remedy is in place. This remedy is interim in nature and, as such, will not be protective in the long term. Although this interim remedy is not protective in and of itself, it will be consistent with an overall remedy which will attain the statutory requirement for protectiveness.

Compliance with Applicable or Relevant and Appropriate Requirements

Section 121 of CERCLA provides that interim measures which are part of a total remedial action do not have to meet ARARs, as long as these requirements will be achieved upon completion of the total remedy. Accordingly, this interim action does not have to achieve the cleanup goals for specific chemicals in the groundwater at the site which are set forth in those ARARs.

Those requirements which are applicable or relevant and appropriate to the interim remedy's implementation are provided in Table 11. During implementation of this interim remedy, compliance with the requirements listed in Table 11 will be achieved to the maximum extent practicable. Since this is an interim measure requiring expeditious implementation, any ARAR which cannot be achieved by the interim remedy may be waived and will be attained upon completion of the final remedy. As previously discussed, should any State-developed effluent limitation for discharge to the on-site stream not be technically achievable within the range of the treatment system identified in the FFS and ROD, the limit will be waived pursuant to Section 121(d)(4) of CERCLA.

Except as described above, this interim remedy is expected to comply with all Federal, State and Local requirements which are relevant and appropriate to its implementation.

Cost Effectiveness

Alternative 2 is cost effective. It is more cost effective than Alternative 3 in reducing risks to human health and the environment in the short term by restricting the migration of contaminated groundwater off the site.

Utilization of Permanent Solutions and Alternative Treatment (or resource recovery) Technologies to the Maximum Extent Practicable

Alternative 2 does not represent a permanent solution with respect to the principal threats posed by the site.

However, the selected interim remedy represents the best balance of tradeoffs among the alternatives evaluated with respect to the evaluation criteria, given the limited scope of the action.

The statutory preference for the use of permanent solutions and alternative treatment technologies will be addressed at the time of selection of a permanent remedy for the site.

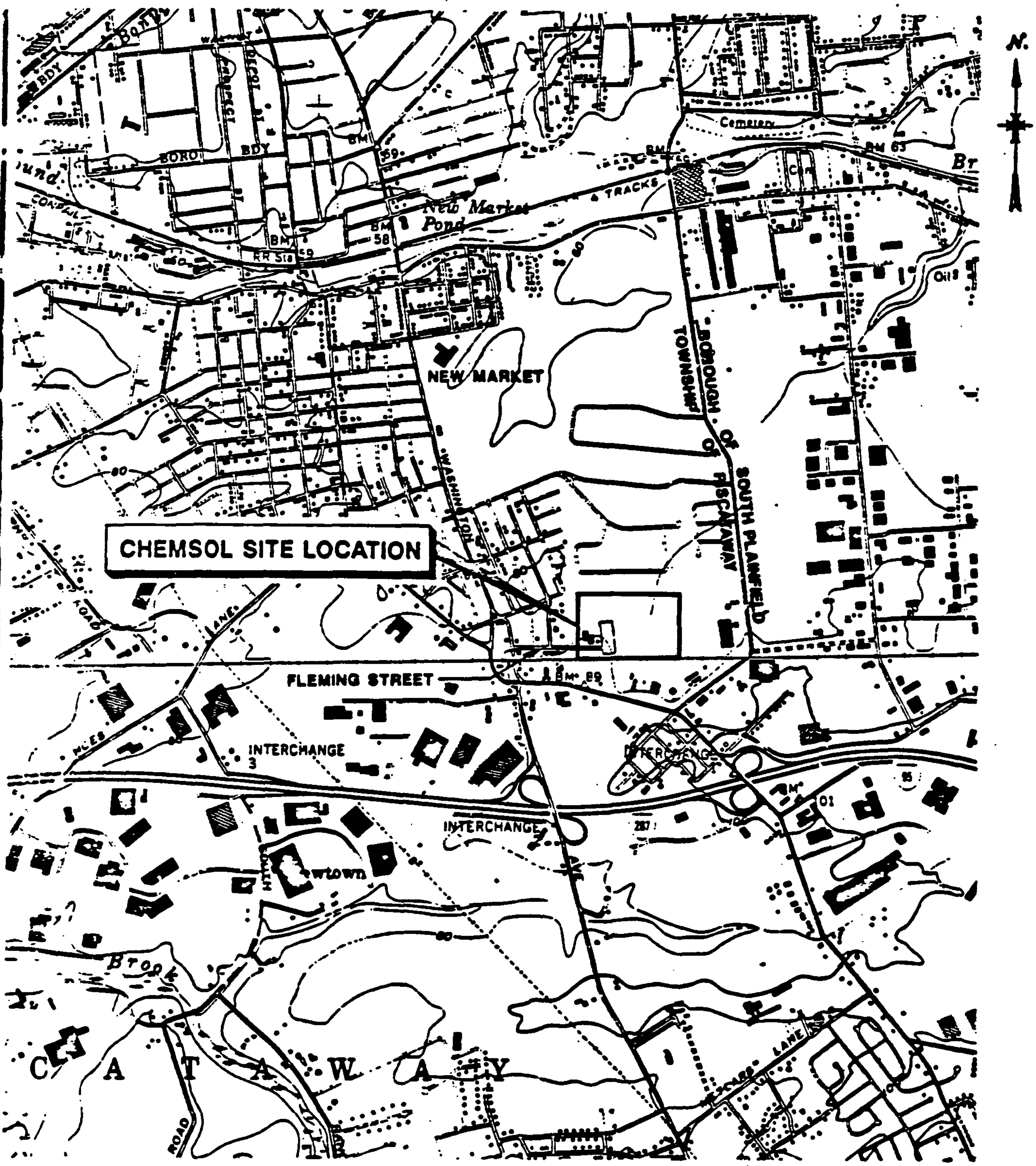
<u>Preference for Treatment as a Principal Element</u>

Alternative 2 utilizes treatment as a principal element, in that treatment is accomplished by extracting contaminated groundwater and treating and disposing of it on site. Given the interim nature of this action, Alternative 2 utilizes treatment as a principal element to the maximum extent practicable. This interim action constitutes a measure to restrict migration of contaminated groundwater from the site and does not constitute the final remedy for the site.

The statutory preference for treatment as a principal element will be fully addressed in the decision document(s) for the final remedy for the site.

DOCUMENTATION OF SIGNIFICANT CHANGES

There have been no significant changes in the selected interim remedy from the preferred interim remedy described in the Proposed Plan.



SOURCE: USGS TOPOGRAPHIC MAP, PLAINFIELD, NEW JERSEY, 1981.

1000 0 1000 2000

SCALE IN FEET

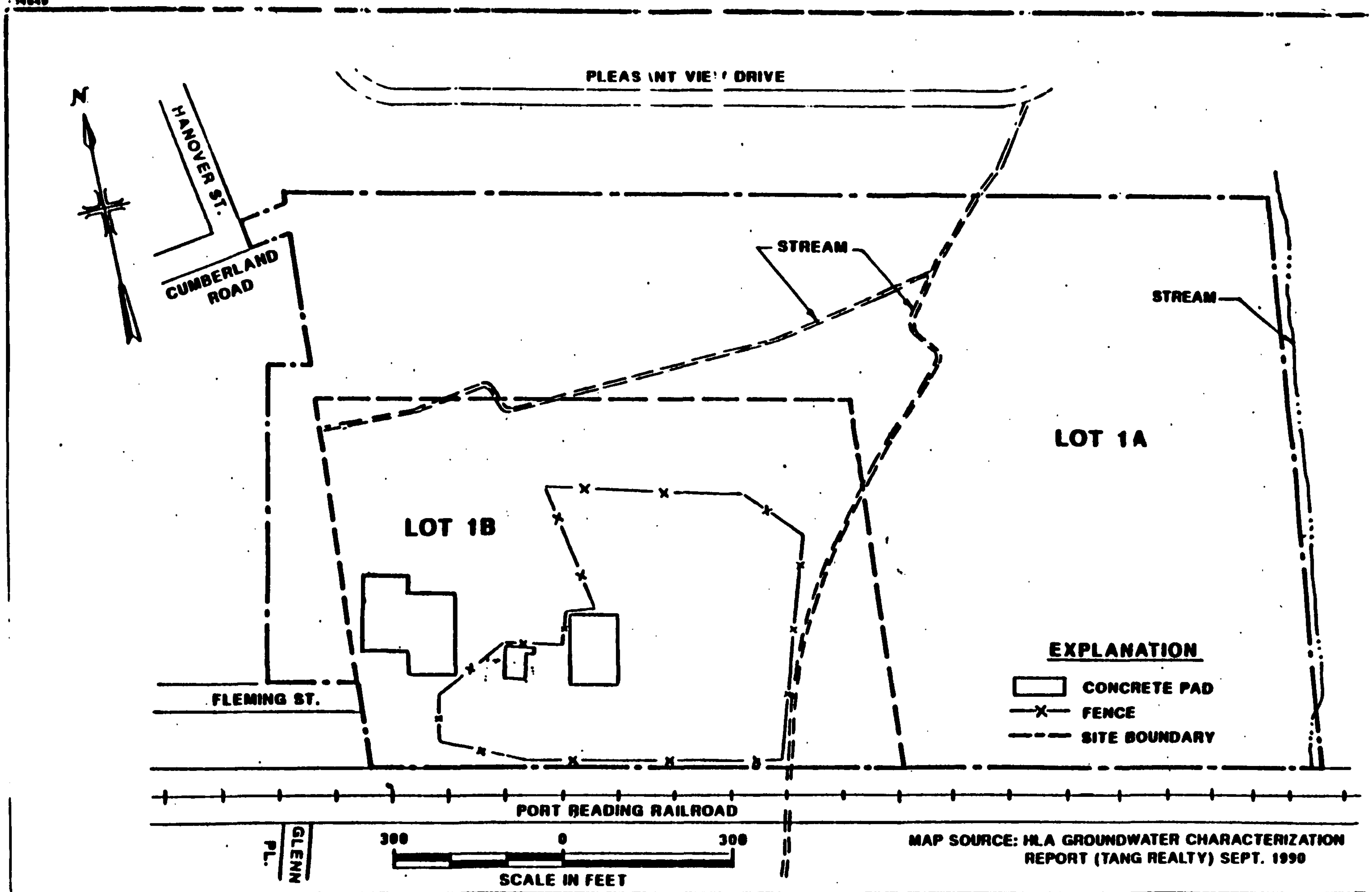
POOR QUALITY ORIGINAL

CHEMSOL INCORPORATED (TANG REALTY) SITE
PISCATAWAY TOWNSHIP, MIDDLESEX COUNTY, NEW JERSEY

SITE LOCATION MAP

MALCOLM PIRNIE, INC.

FIGURE - 2

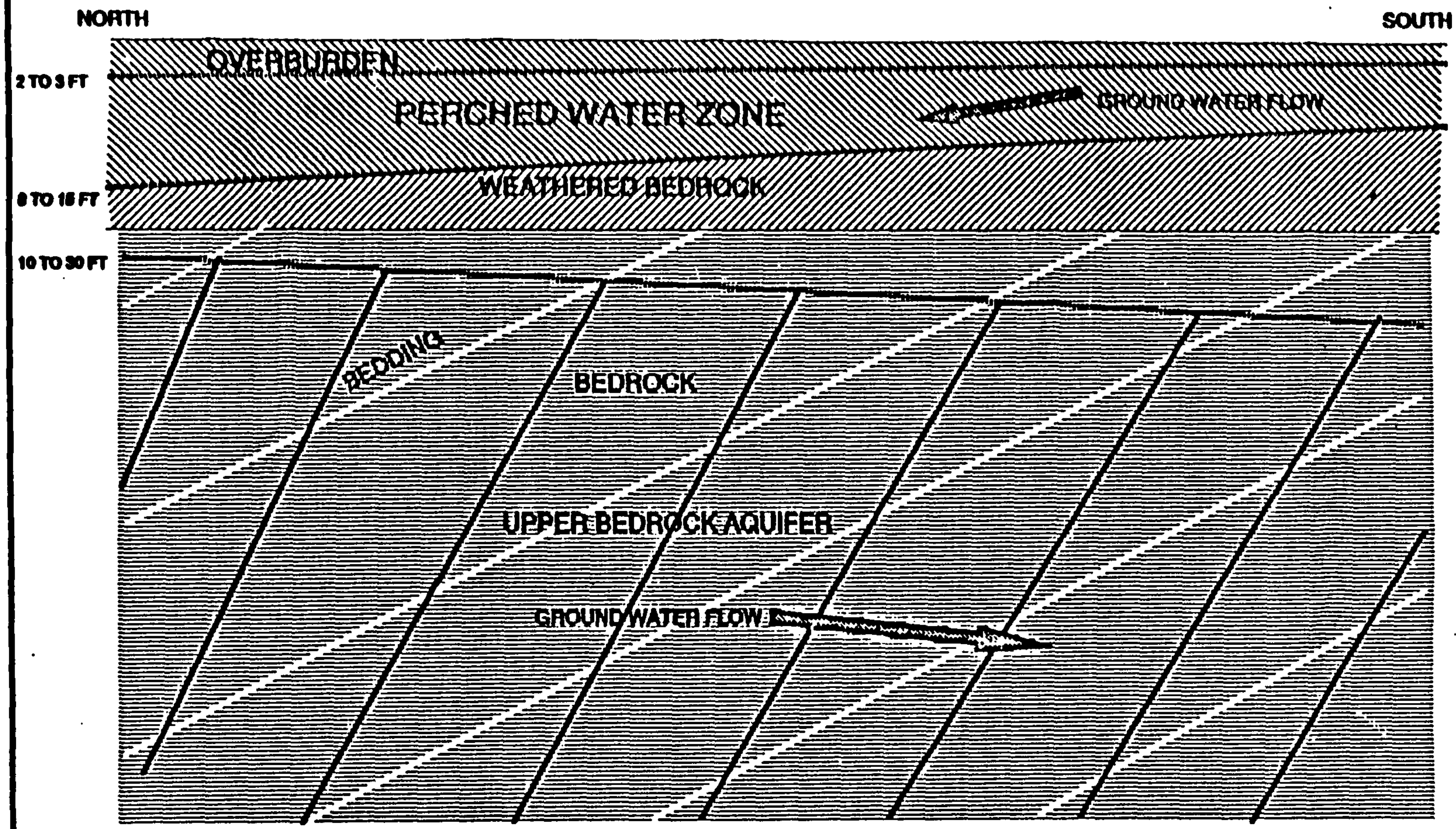


CHEMSOL, INC.
PISCATAWAY TOWNSHIP, NEW JERSEY

SITE PLAN

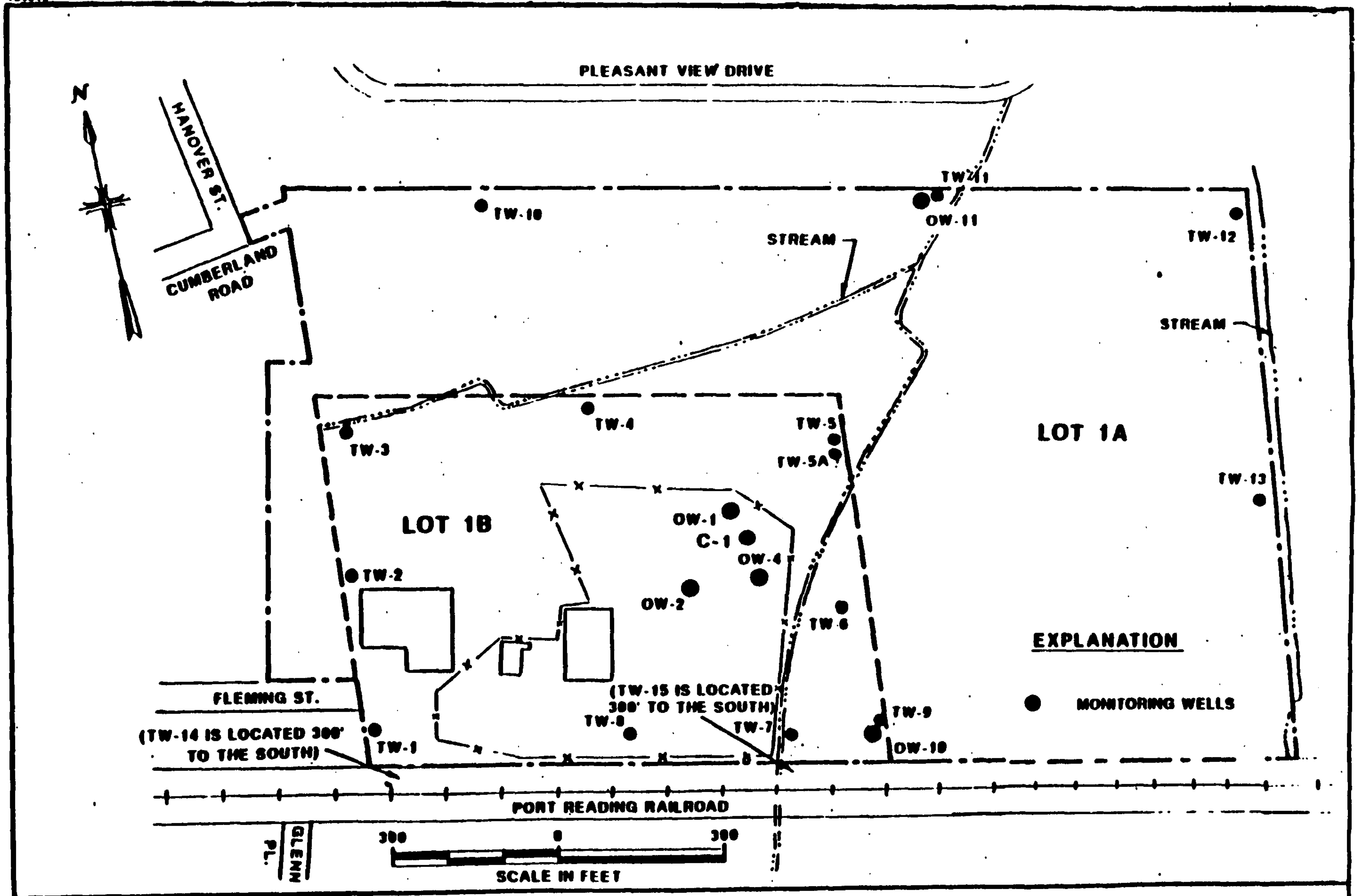
MALCOLM PIRNIE, INC.

FIGURE - 3



SCHEMATIC GEOLOGIC CROSS SECTION
CHEMSOL, INC.

FIGURE - 4



GROUND WATER SAMPLING LOCATIONS

FIGURE - 5

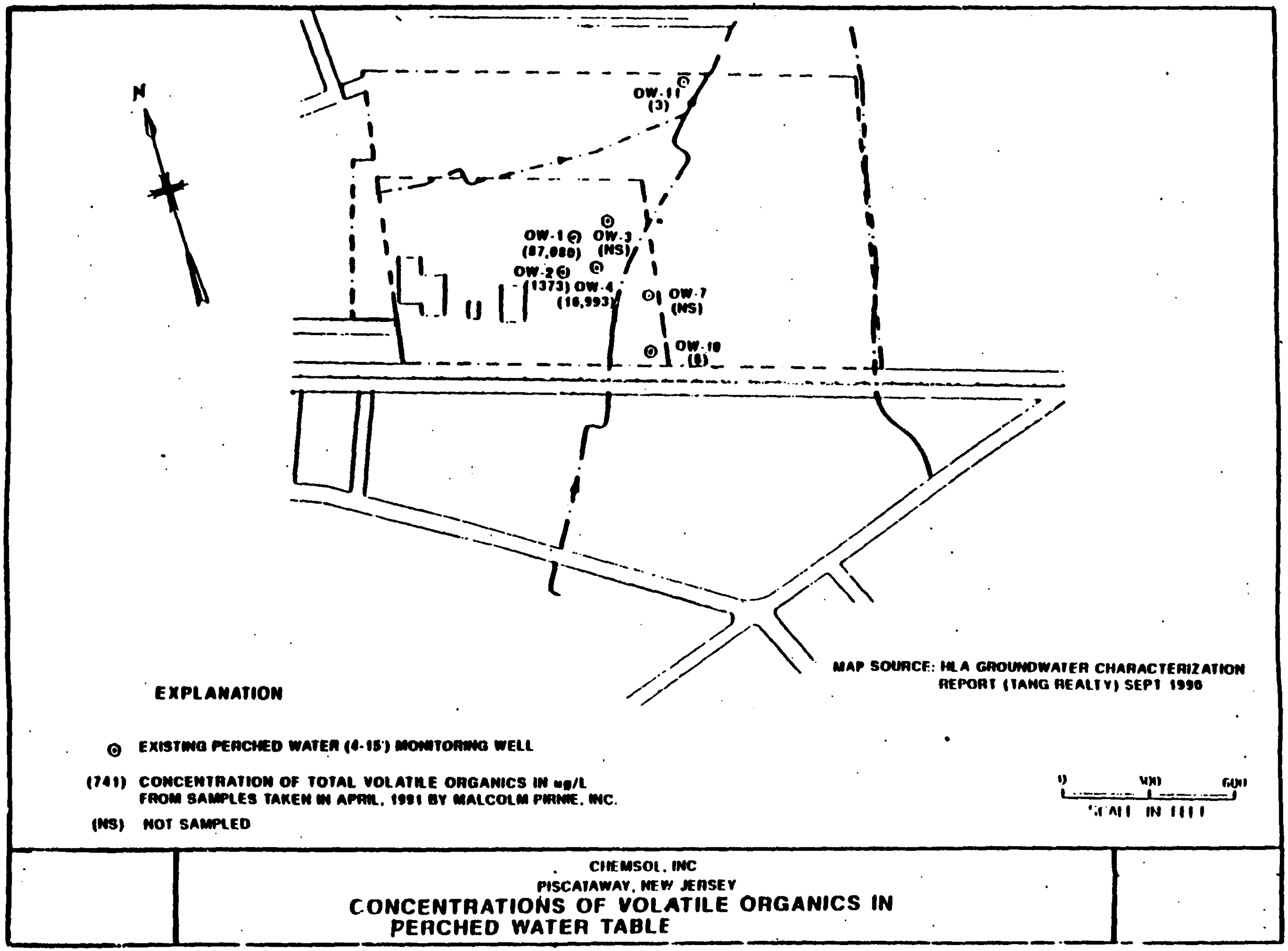
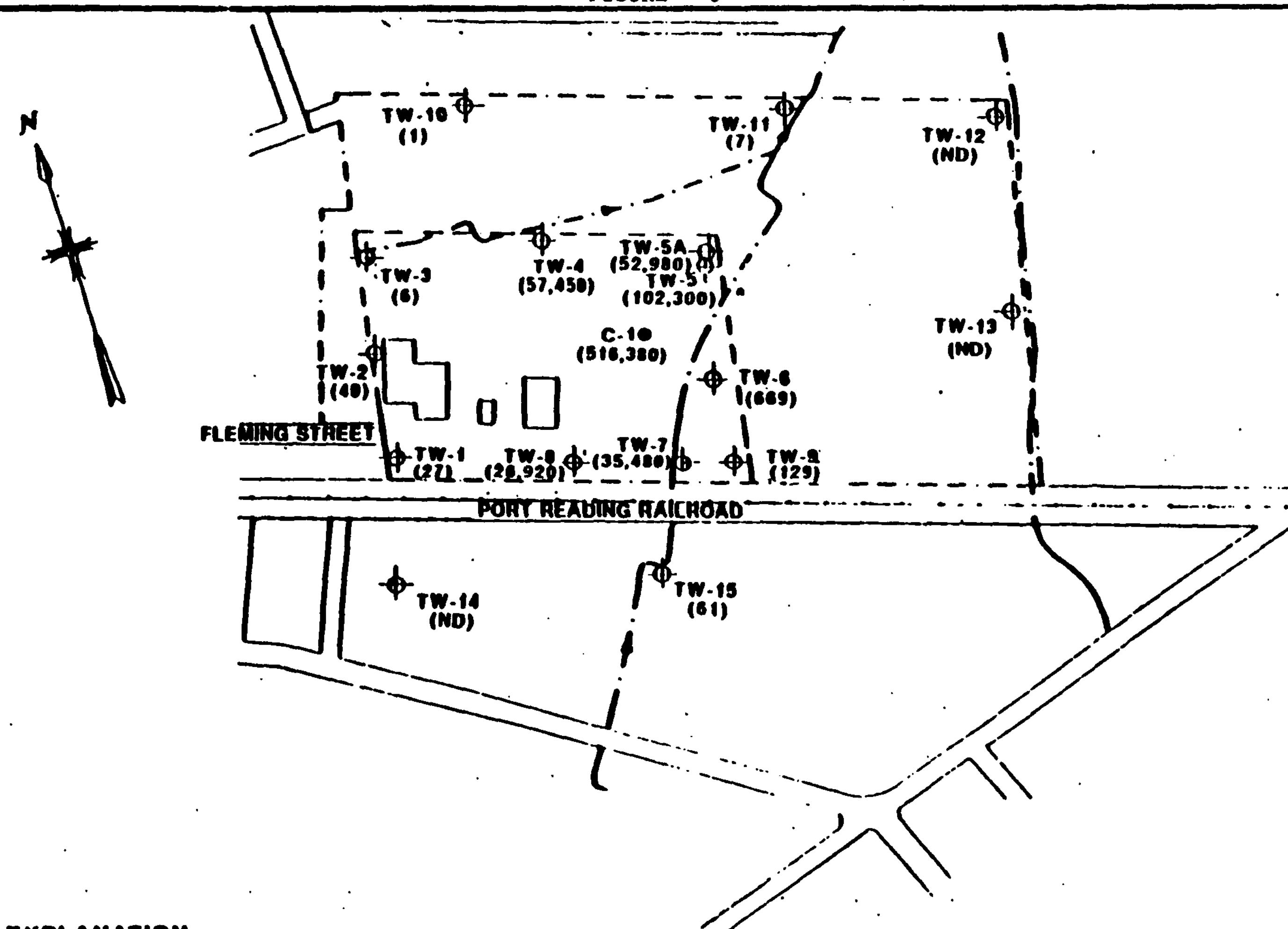

N
OW-11
(3)
OW-1
(87,080)
OW-3
(NS)
OW-2
(1373)
OW-4
(16,993)
OW-7
(NS)
OW-10
(0)
MAP SOURCE: HLA GROUNDWATER CHARACTERIZATION REPORT (TANG REALTY) SEPT 1990
EXPLANATION
EXISTING PERCHED WATER (4-15') MONITORING WELL
(741) CONCENTRATION OF TOTAL VOLATILE ORGANICS IN ug/L FROM SAMPLES TAKEN IN APRIL, 1991 BY MALCOLM PIRNIE, INC.
(NS) NOT SAMPLED
CHEMSOL, INC
PISCATAWAY, NEW JERSEY
CONCENTRATIONS OF VOLATILE ORGANICS IN PERCHED WATER TABLE

FIGURE - 6



EXPLANATION

EXISTING WATER TABLE MONITORING WELL

(2) CONCENTRATION OF TOTAL VOLATILE ORGANICS IN ug/L FROM SAMPLES TAKEN IN APRIL 1991 BY MALCOLM PIRNIE, INC.

C-1 ● WELL IS SCREENED FROM 50'-130'

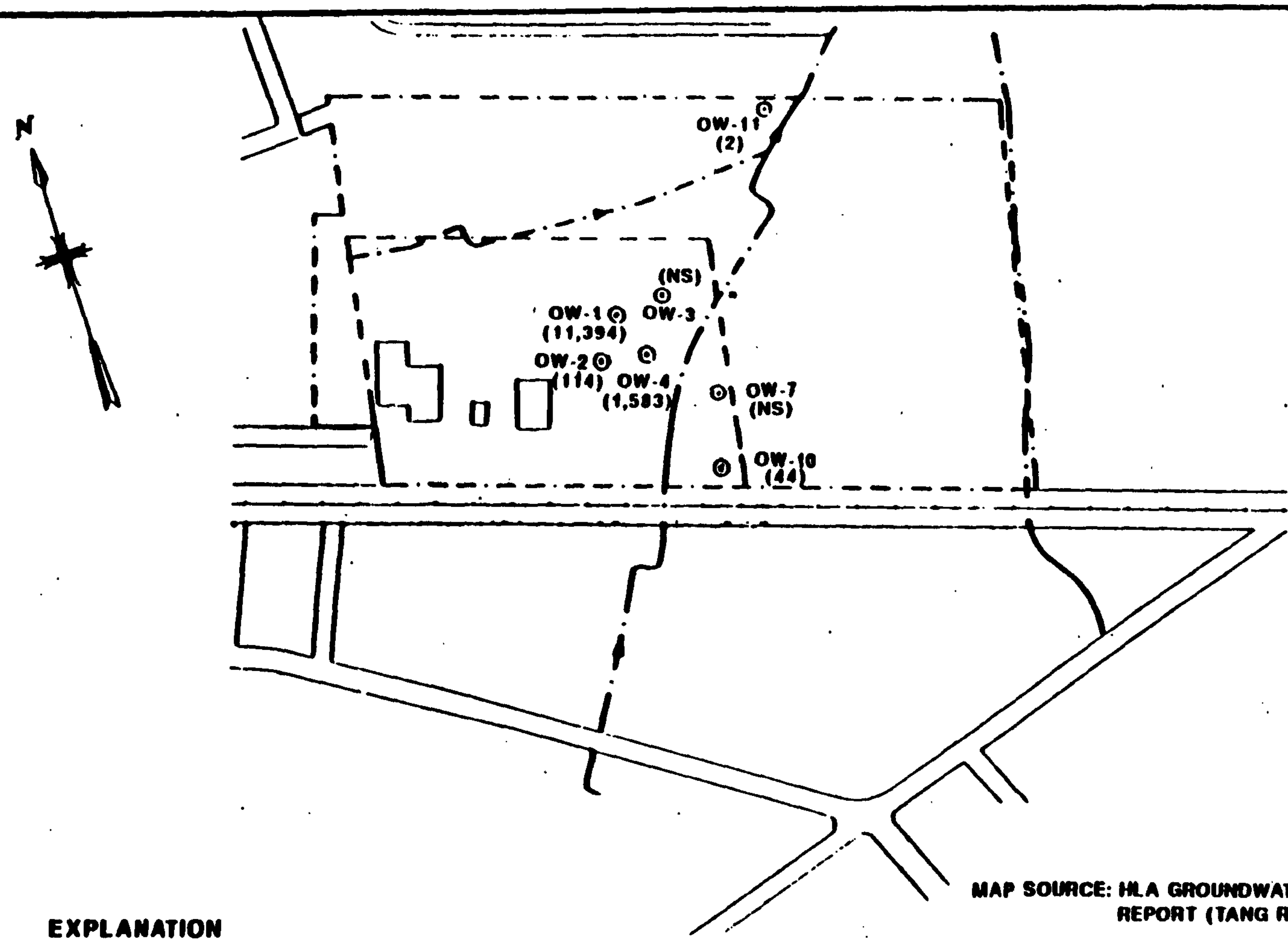
(ND) NO CONTAMINANTS DETECTED

MAP SOURCE: HLA ASSOCIATES GROUNDWATER CHARACTERIZATION REPORT TANG REALTY, SEP.1990

CHEMSOL, INC.
PISCATAWAY TOWNSHIP, NEW JERSEY

CONCENTRATIONS OF VOLATILE ORGANICS IN UPPER BEDROCK AQUIFER

FIGURE - 7



MAP SOURCE: HLA GROUNDWATER CHARACTERIZATION REPORT (TANG REALTY) SEPT 1990

EXPLANATION

⊙ EXISTING PERCHED WATER (4-15') MONITORING WELL

(NS) NOT SAMPLED

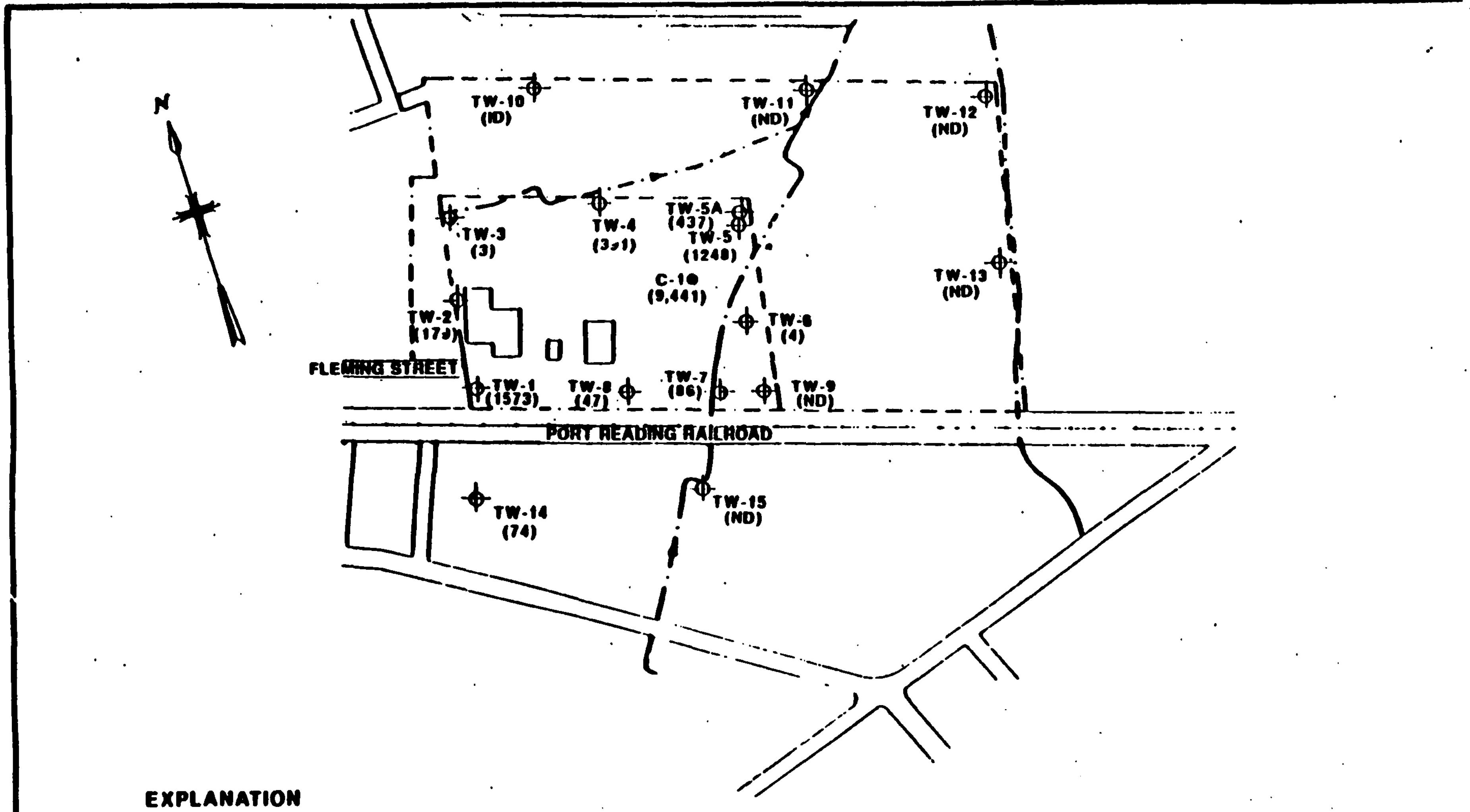
(44) CONCENTRATION OF TOTAL SEMI-VOLATILE ORGANICS IN ug/L FROM SAMPLES TAKEN IN APRIL 1991 BY MALCOLM PIRNIE, INC.

0 300 600
SCALE IN FEET

CHEMSOL, INC

CONCENTRATIONS OF SEMI-VOLATILE ORGANICS IN
PERCHED WATER TABLE

FIGURE - 8



EXPLANATION

⌖ EXISTING WATER TABLE MONITORING WELL

(50) CONCENTRATION OF TOTAL SEMI-VOLATILE ORGANICS IN ug/L FROM SAMPLES TAKEN IN APRIL 1991 BY MALCOLM PIRNIE, INC.

(ND) NO CONTAMINANTS DETECTED

(ID) INCOMPLETE DATA

MAP SOURCE: HLA ASSOCIATES GROUNDWATER CHARACTERIZATION REPORT
TANG REALTY, SEP.1990

CHEMSOL, INC.

PISCATAWAY TOWNSHIP, NEW JERSEY

CONCENTRATIONS OF SEMI-VOLATILE ORGANICS IN UPPER BEDROCK AQUIFER

TABLE 1 - TARGET COMPOUND LIST (TCL)
VOLATILE ORGANIC COMPOUND
RESULTS

WELL # / SAMPLE # / COMPOUND	TW-06 BHD26 (ug/L)	TW-07 BHD27 (ug/L)	TW-08 BHD28 (ug/L)	TW-09 BHD29 (ug/L)	TW-10 BHD30 (ug/L)	TW-11 BHD31 (ug/L)	TW-11 BHD31MS (ug/L)	TW-12 BHD32 (ug/L)	TW-13 BHD33 (ug/L)
Chloromethane	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	31 J	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	17 U	2900 U	1500 U	10 U	10 U	10 U	3 BJ	10 U	10 U
Acetone	17 U	3600 U	1300 U	10 U	14 U	R	10 U	R	10 U
Carbon Disulfide	17 U	2900 U	670 U	10 U	10 U	2 J	2 J	10 U	10 U
1,1-Dichloroethene	17 U	2900 U	200 J	10 U	10 U	10 U	48	10 U	10 U
1,1-Dichloroethane	18	2900 U	670 U	2 J	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene	120	2900 U	160 J	7 J	10 U	3 J	2 J	10 U	10 U
Chloroform	18	860 J	13000	10	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	94	2900 U	300 J	4 J	10 U	10 U	10 U	10 U	10 U
2-Butanone	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	17 U	2900 U	250 J	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Tetrachloride	290 J	33000 J	850 J	91 J	1 J	10 U	10 U	10 U	10 U
Bromodichloromethane	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	4 J	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	35	1200 J	9500	8 J	10 U	2 J	49	10 U	10 U
Dibromochloromethane	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	42	420 J	1400	1 J	10 U	10 U	51	10 U	10 U
trans-1,3-Dichloropropene	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	3 J	2900 U	120 J	4 J	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethene	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	17 U	2900 U	1000	2 J	10 U	10 U	50	10 U	10 U
Chlorobenzene	14 J	2900 U	670 U	10 U	10 U	10 U	47	10 U	10 U
Ethylbenzene	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	17 U	2900 U	670 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylene	17 U	2900 U	140 J	10 U	10 U	10 U	10 U	10 U	10 U

TABLE 1 (CONTINUED)

WELL #	TW-01	TW-02	TW-03	TW-04	TW-05	TW-05	TW-05	TW-5A
SAMPLE #	BHD20 (ug/l)	BHD21 (ug/l)	BHD22 (ug/l)	BHD23 (ug/l)	BHD24RE (ug/l)	BHD24 REMS (ug/l)	BHD24 REMSD (ug/l)	BHD25 (ug/l)
COMPOUND								
Chloromethane	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
Bromomethane	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
Vinyl Chloride	10 U	10 U	10 U	1000 U	1700 U	570 DJ	550 DJ	390 J
Chloroethane	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
Methylene Chloride	10 U	10 U	10 U	3200 BJ	5500 U	5600 BD	5500 BD	3100 U
Acetone	10 U	10 U	10 U	15000	9800 BD	8600 D	9800 D	1000 U
Carbon Disulfide	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
1,1-Dichloroethene	10 U	2 J	10 U	440 J	430 DJ	7600 D	7800 D	360 J
1,1-Dichloroethane	10 U	2 J	10 U	140 J	260 DJ	220 DJ	290 DJ	180 J
1,2-Dichloroethene	10 U	4 J	1 J	960 J	20000 D	1700 U	1700 U	18000
Chloroform	5 J	9 J	2 J	5300	13000 D	13000 D	13000 D	6900
1,2-Dichloroethane	2 J	2 J	10 U	760 J	5200 D	5100 D	5000 D	2900
2-Butanone	10 U	10 U	10 U	3600	3600 D	3200 D	3400 D	3400 U
1,1,1-Trichloroethane	10 U	10 U	10 U	190 J	530 DJ	590 DJ	620 DJ	310 J
Carbon Tetrachloride	10 U	4 J	10 U	7400	1700 D	2400 D	2500 D	600 J
Bromodichloromethane	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
1,2-Dichloropropane	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
Trichloroethene	7 J	15 B	3 J	5800	23000 BD	36000 DE	37000 DE	8500
Dibromochloromethane	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
1,1,2-Trichloroethane	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
Benzene	8 J	1 J	10 U	1200	7300 D	17000 D	17000 D	4800
trans-1,3-Dichloropropene	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
Bromoform	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	630 J	3900 D	3500 D	3700 D	2500
2-Hexanone	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
Tetrachloroethene	1 J	10 U	10 U	300 J	500 DJ	510 DJ	570 DJ	280 J
1,1,2,2-Tetrachloroethene	10 U	10 U	10 U	1000 U	470 DJ	450 DJ	460 DJ	180 J
Toluene	10 U	10 U	10 U	11000	8500 D	18000 D	18000 D	4900
Chlorobenzene	4 J	1 J	10 U	1000 U	1100 DJ	7800 D	8000 D	620 J
Ethylbenzene	10 U	10 U	10 U	230 J	510 DJ	550 DJ	580 DJ	260 J
Styrene	10 U	10 U	10 U	1000 U	1700 U	1700 U	1700 U	1000 U
Xylene	10 U	10 U	10 U	1300	2500 D	2700 D	2800 D	1300

TABLE 1 (CONTINUED)

COMPOUND	TW-14	TW-15	OW-01	OW-02	OW-04	OW-10	OW-11	C-1	FD-01
SAMPLE #	BHD34 (ug/L)	BHD35 (ug/L)	BHD36 (ug/L)	BHD37 (ug/L)	BHD38 (ug/L)	BHD39 (ug/L)	BHD45 (ug/L)	BHD46 (ug/L)	BHD40 (ug/L)
Chloromethane	10 U	10 U	420 U	42 U	100 U	10 U	10 U	670 U	1700 UJ
Bromomethane	10 U	10 U	420 U	42 U	100 U	10 U	10 U	670 U	1700 UJ
Vinyl Chloride	10 U	10 U	420 U	45	66 J	10 U	10 U	450 J	520 J
Chloroethane	10 U	10 U	420 U	42 U	100 U	10 U	10 U	670 U	1700 UJ
Methylene Chloride	10 U	10 U	3000	42 U	100 U	10 U	10 U	33000 DU	12000 BJ
Acetone	10 U	R	4400 U	60 U	220 U	10 U	10 U	81000 D	8100 BJ
Carbon Disulfide	10 U	10 U	46 J	42 U	100 U	10 U	1 J	310 J	1700 UJ
1,1-Dichloroethene	10 U	10 U	900	42 U	26 J	10 U	10 U	2300 J	760 J
1,1-Dichloroethane	10 U	10 U	630	12 J	370	10 U	10 U	680	300 J
1,2-Dichloroethene	10 U	10	2500	700	3400 D	10 U	10 U	12000	21000 J
Chloroform	10 U	1 J	25000 D	5 J	500	1 J	10 U	55000 D	14000 J
1,2-Dichloroethane	10 U	10 U	6000	42 U	46 J	10 U	10 U	21000 D	5900 J
2-Butanone	10 U	10 U	980	42 U	370	10 U	10 U	20000 D	3100 J
1,1,1-Trichloroethane	10 U	10 U	3900	42 U	43 J	10 U	10 U	8600 DJ	830 J
Carbon Tetrachloride	10 U	10 U	270 J	42 U	3 J	10 U	10 U	25000 D	3200 J
Bromodichloromethane	10 U	10 U	420 U	42 U	100 U	10 U	10 U	670 U	1700 UJ
1,2-Dichloropropane	10 U	10 U	420 U	42 U	100 U	10 U	10 U	300 J	1700 UJ
cis-1,3-Dichloropropene	10 U	10 U	420 U	42 U	100 U	10 U	10 U	670 U	1700 UJ
Trichloroethene	10 U	9 J	34000 D	56	1600 U	4 J	2 J	220000 D	27000 B
Dibromochloromethane	10 U	10 U	420 U	42 U	100 U	10 U	10 U	670 U	1700 UJ
1,1,2-Trichloroethane	10 U	10 U	68 J	42 U	25 J	10 U	10 U	150 J	1700 UJ
Benzene	10 U	10 U	3400	190	340	10 U	10 U	17000 D	8700 J
trans-1,3-Dichloropropene	10 U	10 U	420 U	42 U	100 U	10 U	10 U	670 U	1700 UJ
Bromoform	10 U	10 U	420 U	42 U	100 U	10 U	10 U	670 U	1700 UJ
4-Methyl-2-Pentanone	10 U	10 U	680	42 U	220	10 U	10 U	10000	3600 J
2-Hexanone	10 U	10 U	420 U	42 U	12 J	10 U	10 U	190 J	1700 UJ
Tetrachloroethene	10 U	41	88 J	42 U	180	3 J	10 U	1300	750 J
1,1,2,2-Tetrachloroethane	10 U	10 U	81 J	42 U	42 J	10 U	10 U	1400	480 J
Toluene	10 U	10 U	5000	39 J	5100 DJ	10 U	10 U	26000 D	10000 J
Chlorobenzene	10 U	10 U	46 J	9 J	450	10 U	10 U	5500	1200 J
Ethylbenzene	10 U	10 U	81 J	97	1100	10 U	10 U	1600	630 J
Styrene	10 U	10 U	420 U	42 U	100 U	10 U	10 U	670 U	1700 UJ
Xylene	10 U	10 U	410 J	220	4700 D	10 U	10 U	6600	2900 J

TABLE 1 (CONTINUED)

WELL #	FD-01	FD-02	TB-01	TB-02	TB-03	TB-04	TB-05	FB-01
SAMPLE #	BHD40RE	BHD47	BHD01	BHD02	BHD03	BHD04	BHD05	BHD10
COMPOUND	(ug/L)	(ug/L)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
Chloromethane	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Bromomethane	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Vinyl Chloride	280 DJ	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Chloroethane	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Methylene Chloride	5300 BD	10 U	3 BJ	7 BJ	2 BJ	12 BJ	3 BJ	130000 B
Acetone	6000 D	R	9 J	10 U	10 U	10 U	R	8300 U
Carbon Disulfide	1700 U	24	10 U	10 U	10 U	10 U	10 U	8300 U
1,1-Dichloroethene	370 DJ	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
1,1-Dichloroethane	200 DJ	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
1,2-Dichloroethene	16000 D	2 J	10 U	10 U	10 U	10 U	10 U	8300 U
Chloroform	11000 D	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
1,2-Dichloroethane	4500 D	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
2-Butanone	3200 D	10 U	10 U	7 J	8 J	10 U	10 U	8300 U
1,1,1-Trichloroethane	520 DJ	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Carbon Tetrachloride	1900 D	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Bromodichloromethane	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
1,2-Dichloropropane	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
cis-1,3-Dichloropropene	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Trichloroethene	23000 D	10 U	3 J	10 U	10 U	10 U	10 U	1000 BJ
Dibromochloromethane	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
1,1,2-Trichloroethane	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Benzene	8000 D	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
trans-1,3-Dichloropropene	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Bromoform	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
4-Methyl-2-Pentanone	3300 D	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
2-Hexanone	1700 U	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Tetrachloroethene	380 DJ	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
1,1,2,2-Tetrachloroethene	380 DJ	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Toluene	8600 D	10 U	3 J	10 U	10 U	10 U	10 U	8300 U
Chlorobenzene	950 DJ	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Ethylbenzene	440 DJ	10 U	10 U	10 U	10 U	10 U	10 U	8300 U
Styrene	1700 U	10 U	4 J	10 U	10 U	10 U	10 U	8300 U
Xylene	2200 D	10 U	10 U	10 U	10 U	10 U	10 U	8300 U

TABLE 1 (CONTINUED)

KEY TO QUALIFIERS	
U	COMPOUND WAS NOT DETECTED; NUMBER SHOWN IS THE QUANTITATION LIMIT OF THE ANALYSIS THIS QUANTITATION LIMIT IS ADJUSTED FOR DILUTION.
J	ESTIMATED VALUE
E	COMPOUND EXCEEDED THE CALIBRATION LIMIT OF THE DETECTOR
D	SAMPLE WAS ANALYZED USING A SECONDARY DILUTION FACTOR
B	CONTAMINANT WAS ALSO DETECTED IN BLANK; POSSIBLE BLANK CONTAMINATION
N	PRESUMPTIVE EVIDENCE OF A COMPOUND
R	DATA REJECTED BY VALIDATORS

KEY TO SAMPLE ID NUMBERS	
TB	TRIP BLANK
FB	FIELD BLANK
FD	FIELD DUPLICATE
REMS	REANALYZED WITH MATRIX SPIKE
REMSD	DUPLICATE OF MATRIX SPIKE SAMPLE

TABLE - 2

NON-TARGET COMPOUND LIST (TCL)
VOLATILE ORGANIC COMPOUNDS RESULTS
Groundwater, April 1991
Chemsol, Inc., Piscataway, New Jersey

WELL #	SAMPLE #	Acrolein (ug/L)	Acrylonitrile (ug/L)
TW-01 *	6142B-02-20	10 UJ	10 UJ
TW-02 *	6142B-02-21	10 UJ	10 UJ
TW-03	6142B-02-22	10 U	10 U
TW-04	6142B-02-23	10 UJ	10 UJ
TW-05 *	6142B-02-24	10 UJ	10 UJ
TW-5A	6142B-02-25	10 UJ	10 UJ
TW-06 *	6142B-02-26	10 UJ	10 UJ
TW-07	6142B-02-27	10 UJ	10 UJ
TW-08	6142B-02-28	10 UJ	10 UJ
TW-09	6142B-02-29	10 UJ	10 UJ
TW-10	6142B-02-30	10 U	10 U
TW-11	6142B-02-31	10 UJ	10 UJ
TW-12	6142B-02-32	10 UJ	10 UJ
TW-13	6142B-02-33	10 UJ	10 UJ
TW-14	6142B-02-34	10 UJ	10 UJ
TW-15	6142B-02-35	10 U	10 U
OW-01	6142B-02-36	100 UJ	100 UJ
OW-02 *	6142B-02-37	10 UJ	10 UJ
OW-04 *	6142B-02-38	10 [illegible]	10 UJ
OW-10 *	6142B-02-39	10 UJ	10 UJ
OW-11 *	6142B-02-45	10 U	10 U
C-1	6142B-02-46	1000 UJ	1000 UJ
FD-01 *	6142B-02-40	10 UJ	10 UJ
FD-02	6142B-02-47	10 UJ	10 UJ
TB-05	6142B-02-05	10 U	10 U
FB-01 *	6142B-02-10	R	R

U - Undetected at quantitation limits.
Quantitation limits were corrected for adjusted where necessary.
J - An estimated value
R - Data rejected by validators
TB - Trip blank
FB - Field Blank
FD - Field Duplicate
* - Indicates samples which were improperly preserved for Acrolein and Acrylonitrile

TABLE - 3

TARGET COMPOUND LIST (TCL) SEMI-VOLATILE

ORGANIC COMPOUNDS

WELL #	TW-01	TW-02	TW-03	TW-04	TW-05	TW-5A	TW-06	TW-07	TW-08
SAMPLE #	BHD20	BHD21	BHD22	BHD23	BHD24	BHD25	BHD26	BHD27	BHD28
COMPOUND	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
Phenol	10 U	30 U	10 U	42	160 D	58	R	3 J	1 J
bis(2-Chloroethyl)Ether	10 U	30 U	10 U	4 J	35	13 J	R	10 U	2 J
2-chlorophenol	10 U	30 U	10 U	10 U	3 J	30 U	R	10 U	10 U
1,3-Dichlorobenzene	13	8 J	10 U	10 U	5 J	30 U	R	10 U	10 U
1,4-Dichlorobenzene	96	11 J	10 U	10 U	30	7 J	R	10 U	10 U
1,2-Dichlorobenzene	1400 D	160	10 U	10 U	320 D	100	R	10 U	4 J
2-Methylphenol	10 U	30 U	10 U	70	540 D	230	R	10 U	10 U
2,2'-Oxybis(1-Chloropropane	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
4-Methylphenol	10 U	30 U	10 U	31	28	30 U	R	10 U	10 U
N-Nitroso-Di-n-Propylamine	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Hexachloroethane	10 U	30 U	10 U	10	10 U	30 U	R	79	10 U
Nitrobenzene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	25 J
Isophorone	10 U	30 U	10 U	11	18	5 J	R	10 U	13
2-Nitrophenol	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
2,4-Dimethylphenol	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
bis(2-Chloroethoxy)Methane	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
2,4-Dichlorophenol	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
1,2,4-Trichlorobenzene	61	30 U	10 U	10 U	50	11 J	R	10 U	10 U
Naphthalene	10 U	30 U	10 U	100 D	34	7 J	R	10 U	10 U
4-Chloroaniline	10 U	30 U	10 U	10 U	10 U	30 U	R	10 UJ	10 UJ
Hexachlorobutadiene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
4-Chloro-3-Methylphenol	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
2-Methylnaphthalene	10 U	30 U	10 U	9 J	3 J	30 U	R	10 U	10 U
Hexachlorocyclopenaldiene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
2,4,6-Trichlorophenol	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
2,4,5-Trichlorophenol	25 U	75 U	25 U	25 U	25 U	75 U	R	25 U	25 U
2-Chloronaphthalene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
2-Nitroaniline	25 U	75 U	25 U	25 U	25 U	75 U	R	25 U	25 U
Dimethyl Phthalate	10 U	30 U	10 U	10 U	4 J	30 U	R	10 U	10 U
Acenaphthylene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
2,6-Dinitrotoluene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
3-Nitroaniline	25 U	75 U	25 U	25 U	25 U	75 U	R	25 U	25 U
Acenaphthene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U

TABLE 3 (CONTINUED)

WELL #	TW-09	TW-11	TW-11	TW-11	TW-12	TW-13	TW-14	TW-15	OW-01	OW-02	OW-04
SAMPLE #	BHD29	BHD31	BHD31MS	BHD31MSD	BHD32	BHD33	BHD34	BHD35	BHD36	BHD37	BHD38
COMPOUND	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
Phenol	10 U	10 UJ	49	65	10 UJ	10 U	10 U	10 U	16 J	8 J	65
bis(2-Chloroethyl)Ether	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	11000 D	10 U	2 J
2-chlorophenol	10 U	10 UJ	47	62	10 UJ	10 U	10 U	10 U	140 U	10 U	6 J
1,3-Dichlorobenzene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	1 J	42
1,4-Dichlorobenzene	10 U	10 UJ	32	43	10 UJ	10 U	10 U	10 U	140 U	10	110 D
1,2-Dichlorobenzene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	36	1000 D
2-Methylphenol	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	4 J	69
2,2'-Oxybis(1-Chloropropane	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	170	10 U	10 U
4-Methylphenol	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	2 J	47 DJ
N-Nitroso-Di-n-Propylamine	10 U	10 UJ	34	44	10 UJ	10 U	10 U	10 U	140 U	10 U	1 J
Hexachloroethane	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	75
Nitrobenzene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	5 J
Isophorone	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	35 J	4 J	3 J
2-Nitrophenol	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	28 J	10 U	10 U
2,4-Dimethylphenol	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	7 J	29
bis(2-Chloroethoxy)Methane	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	3 J
2,4-Dichlorophenol	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	7 J
1,2,4-Trichlorobenzene	10 U	10 UJ	32	44	10 UJ	10 U	10 U	10 U	140 U	1 J	15
Naphthalene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	24	35
4-Chloroaniline	10 UJ	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Hexachlorobutadiene	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	140 U	10 U	10 U
4-Chloro-3-Methylphenol	10 U	10 UJ	53	66	10 UJ	10 U	10 U	10 U	140 U	10 U	4 J
2-Methylnaphthalene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	11
Hexachlorocyclopenatdiene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
2,4,5-Trichlorophenol	25 U	25 UJ	25 U	25 U	25 UJ	25 U	25 U	25 U	360 U	25 U	25 U
2-Chloronaphthalene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
2-Nitroaniline	25 U	25 UJ	25 U	25 U	25 UJ	25 U	25 U	25 U	360 U	25 U	6 J
Dimethyl Phthalate	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	21 J	10 U	1 J
Acenaphthylene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	2 J
3-Nitroaniline	25 U	25 UJ	25 U	25 U	25 UJ	25 U	25 U	25 U	360 U	25 U	7 J
Acenaphthene	10 U	10 UJ	33	42	10 UJ	10 U	10 U	10 U	140 U	2 J	2 J

Note: Results from well TW-10 missing due to breakage during shipping

TABLE 3 (CONTINUED)

COMPOUND	WELL # / SAMPLE #	OW-10 BHD39 (ug/L)	OW-11 BHD45 (ug/L)	C-1 BHD46 (ug/L)	FD-02 BHD47 (ug/L)	FB-01 BHD10 (ug/L)	FB-01 BHD10MS (ug/L)	FB-01 BHD10MSD (ug/L)	FD-01 BHD40 (ug/L)
Phenol		R	10 U	1500	10 U	10 U	57	56	160 D
bis(2-Chloroethyl)Ether		R	10 U	3100 D	10 U	10 U	10 U	10 U	32
2-chlorophenol		R	10 U	200 U	10 U	10 U	57	59	10 U
1,3-Dichlorobenzene		R	10 U	200 U	10 U	10 U	10 U	10 U	5 J
1,4-Dichlorobenzene		R	10 U	44 J	10 U	10 U	39	39	30
1,2-Dichlorobenzene		R	10 U	660	10 U	10 U	10 U	10 U	360 D
2-Methylphenol		R	10 U	580	10 U	10 U	10 U	10 U	570 D
2,2'-Oxybis(1-Chloropropane		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol		R	10 U	450	10 U	10 U	10 U	10 U	28
N-Nitroso-Di-n-Propylamine		R	10 U	200 U	10 U	10 U	10 U	40	10 U
Hexachloroethane		R	10 U	64 J	10 U	10 U	39	10 U	10 U
Nitrobenzene		R	10 U	580	10 U	10 U	10 U	10 U	10 U
Isophorone		R	10 U	230	10 U	10 U	10 U	10 U	18
2-Nitrophenol		R	10 U	220	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol		R	10 U	38 J	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)Methane		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol		R	10 U	960	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene		R	10 U	120 J	10 U	10 U	41	40	50
Naphthalene		R	10 U	110 J	10 U	10 U	10 U	10 U	33
4-Chloroaniline		R	10 UJ	200 U	10 U	10 U	10 U	10 U	10 UJ
Hexachlorobutadiene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-Methylphenol		R	10 U	200 U	10 U	10 U	64	62	10 U
2-Methylnaphthalene		R	10 U	200 U	10 U	10 U	10 U	10 U	3 J
Hexachlorocyclopenatdiene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol		R	25 U	500 U	25 U	25 U	25 U	25 U	25 U
2-Chloronaphthalene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline		R	25 U	500 U	25 U	25 U	25 U	25 U	25 U
Dimethyl Phthalate		R	10 U	63 J	10 U	10 U	10 U	10 U	4 J
Acenaphthylene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline		R	25 U	500 U	25 U	25 U	25 U	25 U	25 U
Acenaphthene		R	10 U	200 U	10 U	10 U	38	37	10 U

TABLE 3 (CONTINUED)

WELL #	TW-01	TW-02	TW-03	TW-04	TW-05	TW-5A	TW-06	TW-07	TW-08
SAMPLE #	BHD20	BHD21	BHD22	BHD23	BHD24	BHD25	BHD26	BHD27	BHD28
COMPOUND	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
2,4-Dinitrophenol	25 U	75 U	25 U	25 U	25 U	75 U	R	25 U	25 U
4-Nitrophenol	25 U	75 U	25 U	R	25 U	75 UJ	R	25 U	25 U
Dibenzofuran	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
2,4-Dinitrotoluene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Diethylphthalate	10 U	30 U	10 U	110 D	18 B	6 J	R	10 U	10 U
4-Chlorophenyl-phenylether	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Fluorene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
4-Nitroaniline	25 U	75 U	25 U	25 U	25 U	75 U	R	25 U	25 U
4,6-Dinitro-2-Methylphenol	25 U	75 U	25 U	25 U	25 U	75 U	R	25 U	25 U
N-Nitrosodiphenylamine	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
4-Bromophenyl-phenylether	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Hexachlorobenzene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Pentachlorophenol	25 U	75 U	25 U	25 U	25 U	75 U	R	25 U	25 U
Phenanthrene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Anthracene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Carbazole	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Di-n-Butylphthalate	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Fluoranthene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Pyrene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Butylbenzylphthalate	10 U	30 U	3 J	10 U	10 U	30 U	R	4 J	2 J
3,3'-Dichlorobenzidine	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Benzo (a) Anthracene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Chrysene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
bis(2-Ethylhexyl) Phthalate	3 J	30 U	10 U	4 J	10 U	30 U	4 J	10 U	10 U
Di-n-Octyl Phthalate	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Benzo (b) Fluoranthene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Benzo (k) Fluoranthene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Benzo (a) Pyrene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Indeno (1,2,3-cd) Pyrene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Dibenz (a,h) Anthracene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U
Benzo (g,h,i) Perylene	10 U	30 U	10 U	10 U	10 U	30 U	R	10 U	10 U

TABLE 3 (CONTINUED)

COMPOUND	WELL # TW-09 SAMPLE # BHD29 (ug/L)	TW-11 BHD31 (ug/L)	TW-11 BHD31MS (ug/L)	TW-11 BHD31MSD (ug/L)	TW-12 BHD32 (ug/L)	TW-13 BHD33 (ug/L)	TW-14 BHD34 (ug/L)	TW-15 BHD35 (ug/L)	OW-01 BHD36 (ug/L)	OW-02 BHD37 (ug/L)	OW-04 BHD38 (ug/L)
2,4-Dinitrophenol	25 U	25 UJ	25 U	25 U	25 UJ	25 U	25 U	25 U	360 U	25 U	4 J
4-Nitrophenol	25 U	25 UJ	49	59	25 UJ	25 UJ	25 UJ	25 UJ	360 UJ	14 J	25 U
Dibenzofuran	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 UJ	33	42	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Diethylphthalate	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	91 J	10 U	13 B
4-Chlorophenyl-phenylether	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Fluorene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
4-Nitroaniline	25 U	25 UJ	25 U	25 U	25 UJ	25 U	25 U	25 U	360 U	25 U	25 U
4,6-Dinitro-2-Methylphenol	25 U	25 UJ	25 U	25 U	25 UJ	25 U	25 U	25 U	360 U	25 U	25 U
N-Nitrosodiphenylamine	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
4-Bromophenyl-phenylether	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Hexachlorobenzene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Pentachlorophenol	25 U	25 UJ	52	67	25 UJ	25 U	25 U	25 U	360 U	25 U	25 U
Phenanthrene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Anthracene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Carbazole	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Di-n-Butylphthalate	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	1 J	19
Fluoranthene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Pyrene	10 U	10 UJ	39	49	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Butylbenzylphthalate	10 U	10 UJ	10 U	10 U	10 UJ	10 U	73	10 U	140 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 UJ
Benzo (a) Anthracene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Chrysene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
bis(2-Ethylhexyl) Phthalate	10 U	10 UJ	2 J	1 J	10 UJ	10 U	1 J	10 U	33 J	10 U	10 U
Di-n-Octyl Phthalate	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Benzo (b) Fluoranthene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Benzo (k) Fluoranthene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Benzo (a) Pyrene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Indeno (1,2,3-cd) Pyrene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Dibenz (a,h) Anthracene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U
Benzo (g,h,i) Perylene	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	140 U	10 U	10 U

Note: Results from well TW-10 missing due to breakage during shipping

TABLE 3 (CONTINUED)

COMPOUND	WELL # / SAMPLE #	OW-10 BHD39 (ug/L)	OW-11 BHD45 (ug/L)	C-1 BHD46 (ug/L)	FD-01 BHD40 (ug/L)	FD-02 BHD47 (ug/L)	FB-01 BHD10 (ug/L)	FB-01 BHD10MS (ug/L)	FB-01 BHD10MSD (ug/L)
2,4-Dinitrophenol		R	25 U	500 U	25 U	25 U	25 U	25 U	25 U
4-Nitrophenol		R	25 U	500 UJ	25 U	25 UJ	25 U	66	66
Dibenzofuran		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene		R	10 U	200 U	10 U	10 U	10 U	39	38
Diethylphthalate		R	10 U	530	18 B	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Fluorene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline		R	25 U	500 U	25 U	25 U	25 U	25 U	25 U
4,6-Dinitro-2-Methylphenol		R	25 U	500 U	25 U	25 U	25 U	25 U	25 U
N-Nitrosodiphenylamine		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol		R	25 U	500 U	25 U	25 U	25 U	45	47
Phenanthrene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Anthracene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Carbazole		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Di-n-Butylphthalate		R	10 U	160 J	10 U	10 U	10 U	10 U	10 U
Fluoranthene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Pyrene		R	10 U	200 U	10 U	10 U	10 U	36	36
Butylbenzylphthalate		44 J	2 J	200 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Benzo (a) Anthracene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Chrysene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl) Phthalate		R	10 U	32 J	10 U	2 J	10 U	10 U	10 U
Di-n-Octyl Phthalate		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Benzo (b) Fluoranthene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Benzo (k) Fluoranthene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Benzo (a) Pyrene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Indeno (1,2,3-cd) Pyrene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Dibenz (a,h) Anthracene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U
Benzo (g,h,i) Perylene		R	10 U	200 U	10 U	10 U	10 U	10 U	10 U

QUALIFIER LEGEND

U	UNDETECTED; QUANTITATION LIMIT GIVEN, ADJUSTED FOR DILUTION WHERE NECESSARY.
J	APPROXIMATE CONCENTRATION
D	ANALYZED AT A SECONDARY DILUTION FACTOR
B	CONTAMINANT ALSO IDENTIFIED IN THE BLANK
E	EXCEEDED DETECTION LIMIT
R	DATA REJECTED BY VALIDATORS

SAMPLE ID # LEGEND

TB	TRIP BLANK	MS	REANALYZED WITH MATRIX SPIKE
FB	FIELD BLANK	MSD	DUPLICATE OF MATRIX SPIKE ANALYSIS
DL	DUPLICATE	FD	FIELD DUPLICATE

TABLE - 4

NON-TARGET COMPOUND LIST
SEMIVOLATILE ORGANIC COMPOUNDS RESULTS
Groundwater, April 1991
Chemsol Inc, Piscataway, New Jersey

WELL #	Sample #	N-Nitroso dimethyl amine (ug/L)		Azobenzene (ug/L)		Benzidine (ug/L)	
TW-02	6142B-02-21	20	U	20	U	50	U
TW-03	6142B-02-22	20	U	20	U	50	U
TW-04	6142B-02-23	20	U	20	U	50	U
TW-05	6142B-02-24	200	U	200	U	500	U
TW-5A	6142B-02-25	200	U	200	U	500	U
TW-06	6142B-02-26	20	U	20	U	50	U
TW-07	6142B-02-27	20	U	20	U	50	U
TW-08	6142B-02-28	100	U	100	U	250	U
TW-09	6142B-02-29	20	U	20	U	50	U
TW-10	6142B-02-30	20	U	20	U		R
TW-11	6142B-02-31	20	U	20	U	50	U
TW-12	6142B-02-32	20	U	20	U	50	U
TW-13	6142B-02-33	20	U	20	U	50	U
TW-14	6142B-02-34	20	U	20	U	50	U
TW-15	6142B-02-35		R	20	U	50	U
OW-02	6142B-02-37	100	UJ	100	UJ	250	UJ
OW-04	6142B-02-38	20	UJ	20	UJ	50	UJ
OW-10	6142B-02-39	20	UJ	20	UJ	50	UJ
OW-11	6142B-02-45	20	UJ	20	UJ	50	UJ
C-1	6142B-02-46		R	200	U	500	U
FD-01	6142B-02-40	20	UJ	20	UJ	50	UJ
FD-02	6142B-02-47		R	20	U	50	U
FB-01	6142B-02-10	20	U	20	U	50	U

Note: Missing data from wells TW-1 and OW-1 due to breakage during shipping.

U - Undetected at quantitation limits given.
Quantitation limits are adjusted for dilution.
J An estimated concentration
R - Data rejected by validators
FD - indicates a field duplicate.
FB - indicates a field blank.

TABLE - 5

PESTICIDES/PCBs RESULTS

Groundwater, April 1991

Chemsol Inc, Piscataway, New Jersey

WELL #	TW-01		TW-02		TW-03		TW-04		TW-05		TW-05		TW-05		TW-5A		TW-06		TW-07		TW-08	
SAMPLE #	BHD20		BHD21		BHD22		BHD23		BHD24		BHD24MS		BHD24MSD		BHD25		BHD26		BHD27		BHD28	
Compound	(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)	
alpha-BHC	0.05	UJ	0.05	UJ	0.0028	JN	0.034	JP	0.058	N	0.072	P	0.069	P	0.014	JP	0.05	UJ	0.05	UJ	0.05	UJ
beta-BHC	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
delta-BHC	0.05	UJ	0.05	UJ	0.05	U	0.014	JP	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
gamma-BHC	0.05	UJ	0.05	UJ	0.05	U	0.025	JP	0.01	JN	0.40		0.37		0.015	JP	0.05	UJ	0.05	UJ	0.05	UJ
Heptachlor	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	UJ	0.41		0.38		0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
Aldrin	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	UJ	0.35		0.29		0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
Heptachlor epoxide	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	UJ	0.050	U	0.021	JP	0.0096	JP	0.05	UJ	0.009	JN	0.05	UJ
Endosulfan I	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.0087	JN	0.011	JP	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
Dieldrin	0.10	UJ	0.10	UJ	0.10	U	0.0061	JP	0.10	UJ	0.720	P	0.65	P	0.05	J	0.10	UJ	0.10	UJ	0.10	UJ
4,4' - DDE	0.10	UJ	0.10	UJ	0.10	U	0.10	UJ	0.0086	JN	0.1	U	0.1	U	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ
Endrin	0.10	UJ	0.10	UJ	0.10	U	0.10	UJ	0.10	UJ	1.0		0.94		0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ
Endosulfan II	0.10	UJ	0.10	UJ	0.10	U	0.10	UJ	0.10	UJ	0.1	U	0.1	U	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ
4,4'-DDD	0.10	UJ	0.10	UJ	0.0062	JN	0.10	UJ	0.10	UJ	0.1	U	0.1	U	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ
Endosulfan sulfate	0.10	UJ	0.10	UJ	0.10	U	0.10	UJ	0.10	UJ	0.1	U	0.1	U	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ
4,4'-DDT	0.10	UJ	0.10	UJ	0.10	U	0.10	UJ	0.10	UJ	1.1		1.0		0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ
Methoxychlor	0.50	UJ	0.50	UJ	0.50	U	0.057	JP	0.50	UJ	0.5	U	0.5	U	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ
Endrin ketone	0.10	UJ	0.10	UJ	0.10	U	0.10	UJ	0.10	UJ	0.1	U	0.1	U	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ
Endrin Aldehyde	0.10	UJ	0.10	UJ	0.10	U	0.10	UJ	0.10	UJ	0.1	U	0.1	U	0.10	UJ	0.10	UJ	0.10	UJ	0.10	UJ
alpha-Chlordane	0.05	UJ	0.05	UJ	0.05	U	0.011	JP	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
gamma-Chlordane	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
Toxaphene	5.00	UJ	5.00	UJ	5.00	U	5.0	UJ	5.00	UJ	5.0	U	5.0	U	5.0	UJ	5.00	UJ	5.00	UJ	5.00	UJ
Aroclor-1016	1.00	UJ	1.00	UJ	1.00	U	1.0	UJ	1.00	UJ	1.0	U	1.0	U	1.0	UJ	1.00	UJ	1.00	UJ	1.00	UJ
Aroclor-1221	2.00	UJ	2.00	UJ	2.00	U	2.0	UJ	2.00	UJ	2.0	U	2.0	U	2.0	UJ	2.00	UJ	2.00	UJ	2.00	UJ
Aroclor-1232	1.00	UJ	1.00	UJ	1.00	U	1.0	UJ	1.00	UJ	1.0	U	1.0	U	1.0	UJ	1.00	UJ	1.00	UJ	1.00	UJ
Aroclor-1242	1.00	UJ	1.00	UJ	1.00	U	1.0	UJ	1.00	UJ	1.0	U	1.0	U	1.0	UJ	1.00	UJ	1.00	UJ	1.00	UJ
Aroclor-1248	1.00	UJ	1.00	UJ	1.00	U	1.0	UJ	1.00	UJ	1.0	U	1.0	U	1.0	UJ	1.00	UJ	1.00	UJ	1.00	UJ
Aroclor-1254	1.00	UJ	1.00	UJ	1.00	U	1.0	UJ	1.00	UJ	1.0	U	1.0	U	1.0	UJ	1.00	UJ	1.00	UJ	1.00	UJ
Aroclor-1260	1.00	UJ	1.00	UJ	1.00	U	1.0	UJ	1.00	UJ	1.0	U	1.0	U	1.0	UJ	1.00	UJ	1.00	UJ	1.00	UJ

TABLE - 5

PESTICIDES/PCBs RESULTS

Groundwater, April 1991

Chemsol Inc, Piscataway, New Jersey

WELL #	TW-09	TW-11	TW-11	TW-11	TW-12	TW-13	TW-14	TW-15	OW-01	OW-02	OW-04
SAMPLE #	BHD29	BHD31	BHD31MS	BHD31MSD	BHD32	BHD33	BHD34	BHD35	BHD36	BHD37	BHD38
Compound	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
alpha-BHC	0.05 U	0.05 U	0.050 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ
beta-BHC	0.05 U	0.05 U	0.050 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.034 J	0.05 UJ
delta-BHC	0.05 U	0.05 U	0.050 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.011 JN	0.05 UJ	0.015 JN
gamma-BHC	0.05 U	0.05 U	0.410	0.47	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.008 JN	0.01 JN
Heptachlor	0.05 U	0.05 U	0.078 P	0.15 P	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ
Aldrin	0.05 U	0.05 U	0.230	0.043 JP	0.05 U	0.05 U	0.05 U	0.05 U	0.008 JN	0.013 JN	0.05 UJ
Heptachlor epoxide	0.05 U	0.05 U	0.050 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.011 JN	0.05 UJ	0.05 UJ
Endosulfan I	0.05 U	0.05 U	0.050 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ
Dieldrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.1 UJ	0.008 JN	0.017 JN
4,4' - DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.1 UJ	0.1 UJ	0.1 UJ
Endrin	0.10 U	0.10 U	0.650 P	0.25 P	0.10 U	0.10 U	0.10 U	0.10 U	0.1 UJ	0.1 UJ	0.1 UJ
Endosulfan II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.1 UJ	0.1 UJ	0.0079 J
4,4'-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.0087 U	0.10 U	0.0096 U	0.1 UJ	0.1 UJ	0.1 UJ
Endosulfan sulfate	0.10 U	0.10 U	0.10 P	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.1 UJ	0.1 UJ	0.1 UJ
4,4'-DDT	0.10 U	0.10 U	0.34 U	0.83	0.10 U	0.10 U	0.10 U	0.10 U	0.1 UJ	0.1 UJ	0.029 JN
Methoxychlor	0.50 U	0.50 U	0.50 U	0.50 U	0.10 U	0.50 U	0.50 U	0.50 U	0.5 UJ	0.5 UJ	0.5 UJ
Endrin ketone	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.1 UJ	0.1 UJ	0.1 UJ
Endrin Aldehyde	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.1 UJ	0.1 UJ	0.1 UJ
alpha-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ
gamma-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 UJ	0.05 UJ	0.05 UJ
Toxaphene	5.00 U	5.0 U	5.0 U	5.00 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 UJ
Aroclor-1016	1.00 U	1.0 U	1.0 U	1.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
Aroclor-1221	2.00 U	2.0 U	2.0 U	2.00 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 UJ	2.0 UJ
Aroclor-1232	1.00 U	1.0 U	1.0 U	1.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
Aroclor-1242	1.00 U	1.0 U	1.0 U	1.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
Aroclor-1248	1.00 U	1.0 U	1.0 U	1.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
Aroclor-1254	1.00 U	1.0 U	1.0 U	1.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
Aroclor-1260	1.00 U	1.0 U	1.0 U	1.00 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ

TABLE - 5

PESTICIDES/PCBs RESULTS
Groundwater, April 1991
Chemsol Inc, Piscataway, New Jersey

WELL #	OW-10		OW-11		C-1		FD-01		FB-01		FD-02	
SAMPLE #	BHD39		BHD45		BHD46		BHD40		BHD10		BHD47	
Compound	(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)	
alpha-BHC	0.05	U	0.05	U	0.43	N	0.062	N	0.05	U	0.05	U
beta-BHC	0.05	U	0.05	U	0.05	UJ	0.050	UJ	0.05	U	0.05	U
delta-BHC	0.05	U	0.05	U	0.094	N	0.050	UJ	0.05	U	0.05	U
gamma-BHC	0.05	U	0.05	U	0.023	JN	0.0097	JN	0.05	U	0.05	U
Heptachlor	0.05	U	0.05	U	0.05	UJ	0.050	UJ	0.05	U	0.05	U
Aldrin	0.05	U	0.05	U	0.05	UJ	0.050	UJ	0.05	U	0.05	U
Heptachlor epoxide	0.05	U	0.05	U	0.05	UJ	0.050	UJ	0.05	U	0.05	U
Endosulfan I	0.05	U	0.05	U	0.05	UJ	0.0094	JN	0.05	U	0.05	U
Dieldrin	0.1	U	0.1	U	0.5	N	0.10	UJ	0.10	U	0.1	U
4,4'-DDE	0.1	U	0.1	U	0.1	UJ	0.0093	JN	0.10	U	0.1	U
Endrin	0.1	U	0.1	U	0.21	N	0.10	UJ	0.10	U	0.1	U
Endosulfan II	0.1	U	0.1	U	0.16	N	0.10	UJ	0.10	U	0.1	U
4,4'-DDD	0.019	U	0.1	U	0.1	UJ	0.10	UJ	0.10	U	0.1	U
Endosulfan sulfate	0.1	U	0.1	U	0.1	UJ	0.10	UJ	0.0095	JN	0.1	U
4,4'-DDT	0.1	U	0.1	U	0.1	UJ	0.10	UJ	0.10	U	0.1	U
Methoxychlor	0.5	U	0.5	U	0.5	UJ	0.50	UJ	0.50	U	0.5	U
Endrin ketone	0.1	U	0.1	U	0.083	J	0.10	UJ	0.10	U	0.1	U
Endrin Aldehyde	0.1	U	0.1	U	0.035	JN	0.10	UJ	0.10	U	0.1	U
alpha-Chlordane	0.05	U	0.05	U	0.05	UJ	0.050	UJ	0.05	U	0.05	U
gamma-Chlordane	0.05	U	0.05	U	0.11	J	0.050	UJ	0.05	U	0.05	U
Toxaphene	5.0	U	5.0	U	5.0	UJ	5.0	UJ	5.00	U	5.0	U
Aroclor-1016	1.0	U	1.0	U	1.0	UJ	1.0	UJ	1.00	U	1.0	U
Aroclor-1221	2.0	U	2.0	U	2.0	UJ	2.0	UJ	2.00	U	2.0	U
Aroclor-1232	1.0	U	1.0	U	1.0	UJ	1.0	UJ	1.00	U	1.0	U
Aroclor-1242	1.0	U	1.0	U	1.0	UJ	1.0	UJ	1.00	U	1.0	U
Aroclor-1248	1.0	U	1.0	U	1.0	UJ	1.0	UJ	1.00	U	1.0	U
Aroclor-1254	1.0	U	1.0	U	1.0	UJ	1.0	UJ	1.00	U	1.0	U
Aroclor-1260	1.0	U	1.0	U	1.0	UJ	1.0	UJ	1.00	U	1.0	U

QUALIFIER LEGEND

- U Indicates compound was analyzed for but not detected. Quantitation limits are adjusted for dilution.
- J Indicates an estimated value.
- P This flag is used for a pesticide target analyte when there is greater than 25% difference for detected concentrations between the two GC columns. The lower concentration is reported the 'P' flag.
- B Analyte was found in the associated blank as well as the sample.
- N - Indicates a presumptive evidence of a compound

NOTE:
Sample ID BHD30 (well TW-10) was not analyzed due to breakage during shipping.

TABLE 6
2,3,7,8-TETRACHLORODIBENZO-para-DIOXIN RESULTS
Groundwater, April 1991
Chemsol Inc, Piscataway, New Jersey

WELL #	Sample ID	2,3,7,8-TCDD DETECTED (ng/L)	2,3,7,8-TCDD DETECTED (ng/g)	DETECTION LIMIT
TW-01	6142B-01-20	ND		0.83
TW-02	6142B-01-21	ND		1.07
TW-03	6142B-01-22	ND		0.87
TW-04	6142B-01-23	ND		0.9
TW-05	6142B-01-24	ND		0.69
TW-05	6142B-01-24 MS	6.89		
TW-05	6142B-01-24 MSD	12.48		
TW-5A	6142B-01-25	ND		1.73
TW-06	6142B-01-26	ND		0.8
TW-07	6142B-01-27	ND		0.89
TW-08	6142B-01-28	ND		0.9
TW-09	6142B-01-29	ND		0.9
TW-10	6142B-01-30	ND		0.94
TW-11	6142B-01-31	ND		0.66
TW-11	6142B-01-31 MS	8.87		
TW-11	6142B-01-31 MSD	6.42		
TW-12	6142B-01-32	ND		2.33
TW-13	6142B-01-33	ND		0.61
TW-14	6142B-01-34	ND		2.85
TW-15	6142B-01-35	ND		0.64
C-1	6142B-01-46	ND		1.64
OW-02	6142B-01-37	ND		1.12
OW-04	6142B-01-38	ND		1.07
OW-10	6142B-01-39	ND		0.73
OW-11	6142B-01-45	ND		0.72
FB-01	6142B-01-10	ND		1.86
FD-02	6142B-01-47	ND		0.72
FD-01	6142B-01-40	ND		1.16
PEM SAMPLE	6142B-01-48		0.73	
PEM SAMPLE	6142B-01-49		0.81	
PEM SAMPLE	6142B-01-50		ND	0.17
PEM SAMPLE	6142B-01-51		ND	0.13
PEM SAMPLE	6142B-01-41		0.72	
PEM SAMPLE	6142B-01-42		0.74	
PEM SAMPLE	6142B-01-43		ND	0.38
PEM SAMPLE	6142B-01-44		ND	0.08

ND - Not Detected
PEM - Performance evaluation analysis
MS - Matrix Spike Sample
MSD - Matrix Spike Sample Duplicate
Note : OW-1 not analyzed due to breakage in shipping

TABLE 7 - INORGANICS ANALYSIS

Groundwater, April 1991

Chemsol, Inc., Piscataway, New Jersey

Compound	TW-01 MBFZ20 (ug/L)		TW-02 MBFZ21 (ug/L)		TW-03 MBFZ22 (ug/L)		TW-04 MBFZ23 (ug/L)		TW-05 MBFZ24 (ug/L)		TW-5A MBFZ25 (ug/L)	
Aluminum	7200.0	*J	4210	*J	1700.00	*J	380	*J	1450.0	*J	755.0	*J
Antimony	17.0	U	17	U	17.00	U	17.0	U	17.0	U	17.0	U
Arsenic	2.0	U/W	2	U/W	2.00	U	2.0	U	2.1	B	2.0	U/W
Barium	992.0		1060		734.00		2830.0		330.0		309.0	
Beryllium	1.0	U	1	U	1.00	U	1.0	U	1.0	U	1.0	U
Cadmium	3.0	U	3	U	3.00	U	3.0	U	3.0	U	3.0	U
Calcium	73600.0		46600		34400.00		141000.0		134000		104000.0	
Chromium	15.8		11.6		5.00	B	5.0	B	8.1	B	3.0	U
Cobalt	6.9	B	6.1	B	4.00	U	4.0	U	4.0	U	4.0	U
Copper	4.0	U	5.2	B	4.00	U	4.0	U	4.0	U	4.0	U
Iron	23000.0		11400		7450.00		7730.0		16400.0		13000.0	
Lead	22.0		13.7		5.60		4.2		9.1		2.5	B
Magnesium	14800.0		11200		6710.00		24600.0		11700.0		9310.0	
Manganese	1020.0		336		1100.00		1010.0		2930.0		3310.0	
Mercury	0.2	U	0.2	U	0.20	U	0.2	U	0.2	U	0.2	U
Nickel	19.0	B	15.3	B	6.90	B	709.0	B	16.1	B	7.4	B
Potassium	3110.0	B/J	2560	B/J	1540.00	B/J	1480.0	B/J	1360.0	B/J	1050.0	B/J
Selenium	4.0	U/NWJ	4	U/NWJ	4.00	U/NW/J	4.0	U/NWJ	4.0	U/NWJ	4.0	U/NWJ
Silver	5.0	U	5	U	5.00	U	5.0	U	5.0	U	5.0	U
Sodium	9480.0	J	8650	J	9720.00	J	13100.0	J	19600.0	J	17100.0	J
Thallium	2.0	U/NWJ	2	U/NWJ	2.00	U/NJ	2.0	U/NWJ	2.0	U/NW/J	2.0	U/NWJ
Vanadium	29.2	B	22.5	B	11.00	B	9.7	B	8.1	B	4.1	B
Zinc	45.7	J	42.7	J	60.00	J	28.2	J	43.4	J	14.7	B/J
Cyanide	10.0	U/N*J	10	U/N*J	12.50	U/N*J	10.0	U/N*J	10.0	U/N*J	76.0	N*J

TABLE 7 - INORGANICS ANALYSIS

Groundwater, April 1991

Chemsol, Inc., Piscataway, New Jersey

Compound	TW-06 MBFZ26 (ug/L)		TW-07 MBFZ27 (ug/L)		TW-08 MBFZ28 (ug/L)		TW-09 MBFZ29 (ug/L)		TW-10 MBFZ30 (ug/L)		TW-11 MBFZ31 (ug/L)	
Aluminum	1910.0	*J	509.0	NJ	5410.0	NJ	827.0	NJ	1370.0	N/J	182.0	B/*J
Antimony	17.0	U	17.0	U	17.0	U	17.0	U/J	17.0	U/J	17.0	U
Arsenic	2.0	U	2.8	B	2.3	B	2.0	U	2.4	B/J	4.2	B
Barium	314.0		1250.0		503.0		954.0		486.0		340.0	
Beryllium	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Cadmium	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U	3.0	U
Calcium	65500.0		86400.0		87600.0		60100.0		38500.0		108000.0	
Chromium	7.3	B	3.0	U	14.0		5.9	B	5.4	B	3.9	B
Cobalt	4.0	U	4.0	U	4.7	B	4.0	U	4.0	U	4.0	U
Copper	29.5		6.7	B/J	14.1	B/J	4.3	B/J	4.0	U	4.0	U
Iron	18000.0		2080.0		18900.0		12900.0		26400.0		84600.0	J
Lead	10.1		1.9	B/J	8.1		6.0		7.8		3.2	J
Magnesium	8810.0		8570.0		12400.0		7930.0		7010.0		13000.0	
Manganese	651.0		2380.0		1650.0		288.0		891.0		103.0	J
Mercury	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.4	J
Nickel	9.5	B	5.8	B	12.7	B	9.7	B	5.0	U	9.0	B
Potassium	1030.0	B	1050.0	B	3640.0	B	1260.0	B	1090.0	B	965.0	B
Selenium	4.0	U/NWJ	4.0	U/WJ	4.0	U/WJ	4.0	U/WJ	4.0	U/WJ	4.0	U/NWJ
Silver	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Sodium	14200.0	J	11800.0	J	11000.0	J	10600.0	J	14300.0	J	19000.0	J
Thallium	2.0	U/NJ	3.0	U/W	3.0	U/W	3.0	U/W	3.0	U	2.0	U/NJ
Vanadium	17.6	B	12.9	B	13.5	B	8.9	B	20.4	B	30.2	B
Zinc	23.4	J	14.2	B/J	44.8	J	28.8	J	15.4	B/J	7.0	U/J
Cyanide	43.0	N*J	12.5	U	12.5	U	10.0	U	10.0	U	10.0	U/N*J

TABLE 7 - INORGANICS ANALYSIS

Groundwater, April 1991

Chemsol, Inc., Piscataway, New Jersey

Compound	TW-12 MBFZ32 (ug/L)		TW-13 MBFZ33 (ug/L)		TW-14 MBFZ34 (ug/L)		TW-15 MBFZ35 (ug/L)		OW-02 MBFZ37 (ug/L)		OW-04 MBFZ38 (ug/L)	
Aluminum	268.0	*J	790.0	*J	8320	*J	1350	*J	7260	*J	21100	*J
Antimony	17.0	U	17.0	U	17.0	U	17	U	17.0	U	17.0	U
Arsenic	3.6	B	2.0	U	5.4	B	2	U	18.3		10.8	
Barium	399.0		406.0		543.0		428		410		530	
Beryllium	1.0	U	1.0	U	1.0	U	1	U	1.0	U	1.3	B
Cadmium	3.0	U	3.0	U	3.0	U	3	U	3.0	U	3.0	U
Calcium	71400		63700		60000		77100		34500		37300	
Chromium	6.6	B	4.2	B	15.3		5.6	B	31.4		46.5	
Cobalt	4.0	U	4.0	U	9.1	B	4	U	6.5	B	42.9	B
Copper	4.0	U	4.0	U	864.0		4	U	4.0	U	17.2	B
Iron	60100		6580		13600		3630		10200		26200	
Lead	6.7		3.8	JS	18.1		4.8		33.4		27.0	S
Magnesium	4520	B	11200		14400		9470		9550		17400	
Manganese	213		412		518		363		6230		7270	
Mercury	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Nickel	6.6	B	5.0	U	19.6	B	5.8	B	15.9	B	77.8	
Potassium	678	B	1090	B	3610	B	1220	B	5110		8010	
Selenium	4.0	U/NW/J	4.0	U/NW/J		R	4	U/NWJ	4.0	U/NWJ	4.0	U/NWJ
Silver	5.0	U	5.0	U	5.0	U	5	U	5.0	U	5.0	U
Sodium	11000	J	18500	J	9780	J	11800	J	26100	J	34200	J
Thallium	2.0	U/NJ	2.0	U/NWJ	2.0	U/NWJ	2	U/NW/J	2.0	U/NWJ	2.4	B/NW/J
Vanadium	40.0	B	8.2	B	25.3	B	8.7	B	20.4	B	50.2	
Zinc	115.0		15.1	B/J	58.6	J	18.1	B/J	34.9	J	163.0	
Cyanide	10.0	U/N*J	10.0	U/N*J	26.1	N*J	10	U/N*J	10.0	U/N*J	50.7	N*J

Note: OW-1 was not analyzed due to breakage during shipping

TABLE 7 - INORGANICS ANALYSIS

Groundwater, April 1991

Chemsol, Inc., Piscataway, New Jersey

Compound	OW-10 MBFZ39 (ug/L)		OW-11 MBFZ45 (ug/L)		C-1 MBFZ46 (ug/L)		FB-01 MBFZ10 (ug/L)		FD-01 MBFZ40 (ug/L)		FD-02 MBFZ47 (ug/L)	
Aluminum	557.0	*J	9430.0	*J	235.0	*J	27.40	B/*J	1090.0	*J	112	B/NJ
Antimony	17.0	U	17.0	U	47.5	B	17.00	U	17.0	U	17	U/J
Arsenic	2.0	U	2.0	U	4.7	B	2.00	U	4.0	B	6.5	B/J
Barium	217.0		111.0	B	1000.0		2.50	B	306.0		514	
Beryllium	1.0	U	1.0	U	1.0	U	1.00	U	1.0	U	1	U
Cadmium	3.0	U	3.0	U	3.0	U	3.00	U	3.0	U	3	U
Calcium	51000.0		14400.0		250000.0		55.70	B	126000.0		107000	
Chromium	3.0	U	14.5		3.5	B	3.00	U	3.9	B	4.4	B
Cobalt	4.0	U	5.0	B	4.0	U	4.00	U	4.0	U	4	U
Copper	4.0	U	4.6	B	4.0	U	4.00	U	5.2	B	4	U
Iron	743.0		18400.0		9140.0		144.00		12400.0		150000	J
Lead	7.6	W	5.8		5.1	JS	2.60	B	6.5	M	4	J
Magnesium	8610.0		10800.0		24600.0		40.10	B	11500.0		12400	
Manganese	29.6		198.0		3980.0		2.10	B	2770.0		207	J
Mercury	0.2	U	0.2	U	0.2	U	0.20	U	0.2	U	0.99	J
Nickel	5.0	U	22.5	B	11.4	B	5.00	U	12.4	B	7.5	B
Potassium	1690.0	B	2700.0	B	1600.0	B	72.00	U	1250.0	B	936	B
Selenium	4.0	U/NWJ	4.0	U/NWJ	4.0	U/NWJ	4.00	U/NJ	4.0	U/NJ	20	U/WJ
Silver	5.0	U	5.0	U	5.0	U	5.00	U	5.0	U	5	U
Sodium	8490.0	J	14800.0	J	30000.0	J	203.00	BJ	19700.0	J	18300	J
Thallium	2.0	U/NWJ	2.0	U/NWJ	2.0	U/NWJ	2.00	U/NJ	2.0	U/NWJ	3	U
Vanadium	3.0	U	20.5	B	6.8	B	3.00	U/NJ	6.7	B	36.6	B
Zinc	30.4	J	50.2	J	32.4	J	12.80	BJ	31.6	J	24.2	J
Cyanide	21.9	N*J	10.0	U/N*J	65.5	N*J	10.00	U/N*J	10.0	U/N*J	10	U

TABLE 1 - INORGANICS ANALYSIS
Groundwater, April 1991
Chemsol, Inc., Piscataway, New Jersey

Key to Qualifiers
M - The duplicate injection precision was not met.
N - The spiked sample recovery was not within control limits.
W - The post-digestion spike for furnace AA analysis is outside of the 85-115% control limits, while sample absorbance is less than 50% of the spike absorbance.
S - The value reported was determined by the Method of Standard Additions (MSA).
* - Duplicate analysis was not within control limits.
U - Not detected at quantitation limits. Quantitation limits are adjusted for dilution.
J - Estimated value
B - The reported value is less than the CRDL, but greater than the IDL
"R" - The results rejected by the validators

Key to Sample ID Numbers
OW - Sample taken from perched water zone well
TW - Sample taken from bedrock water table well
C - Sample from the deep well
FB - Sample was a field blank
FD - Sample was a field duplicate

TABLE - 8

CONVENTIONAL WATER QUALITY PARAMETERS RESULTS

Ground Water, April 1991

Chemsol Inc., Piscataway, New Jersey

Parameter	OW-02		OW-04		OW-10		OW-11		TW-1		TW-2		TW-3		TW-4		TW-5	
	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Alkalinity	134	10	153	10	153	10	23.8	10	178	10	145	10	100	10.00	121	10	216	10
Ammonia	0.7	0.2	1.69	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.20	U	0.2	U	0.2
BOD	5	2	32	2	U	2	U	2	4	2	4	2	U	2.00	38	2	184	2
COD	124	50	139	50	5.2	5	26.4	5	16	5	16.4	5	7.2	5.00	458	50	450	50
TOC	31.2	1	38.8	1	1.4	1	26.5	1	4.5	1	2.8	1	U	1.00	92.5	1	110	1
MBAs	0.5	0.1	0.86	0.1	0.19	0.1	0.13	0.1	0.11	0.1	U	0.1	U	0.10	0.16	0.1	0.38	0.1
Chloride	12.3	1	34.7	1	7.9	1	8.7	1	40.2	1	11.3	1	10.9	1.00	277	10	121	5
Sulfate	13.5	1	29.2	1	27.2	1	67.5	5	16.6	1	7.8	1	13.9	1.00	1.8	1	31.8	1
Hardness	120	10	172	10	196	10	80	10	252	10	164	10	128	10.00	500	10	432	10
Bromide	U	2	U	2	U	2	U	2	U	2	U	2	U	2.00	U	2	2.7	2
Total Phosphorus	0.051	0.05	0.41	0.05	0.054	0.05	0.9	0.05	0.157	0.05	0.098	0.05	0.088	0.05	U	0.05	0.069	0.05
Oil & Grease	2.14	0.45	6.03	0.62	U	0.41	U	0.43	0.4	0.4	1.63	0.47	1.22	0.40	5.98	0.41	5.6	0.51
Total Petroleum Hydrocarbons	0.57	0.45	2.72	0.62	U	0.41	U	0.43	U	0.4	0.93	0.47	U	0.47	2.25	0.4	4.58	0.51
TSS	340	2	345	2	9	2	403	2	281	2	168	2	132	2.00	39	2	54	2
TDS	275	10	305	10	227	10	203	10	295	10	203	10	178	10.00	805	10	510	10
Total Residual Chlorine	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.10	U	0.1	U	0.1

U - Contaminant was undetected
MDL - Minimum Detection Limit

TABLE - 8

CONVENTIONAL WATER QUALITY PARAMETERS RESULTS

Ground Water, April 1991

Chemsol Inc., Piscataway, New Jersey

Parameter	TW-5A		TW-06		TW-7		TW-8		TW-9		TW-10		TW-11		TW-12		TW-13	
	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Alkalinity	187	10.00	188	10.00	237	10.00	165	10.00	181	10	127	10.00	313	10	174	10	201	10
Ammonia	U	0.20	U	0.20	U	0.20	U	0.20	U	0.2	U	0.20	U	0.20	U	0.2	U	0.2
BOD	40	2.00	7	2.00	3	2.00	16	2.00	2	2	2	2.00	36	2.00	9	2	U	2
COD	263	50.00	16.8	5.00	5.2	5.00	67.7	50.00	U	5	6.8	5.00	104	50	24.4	5	7.6	5
TOC	64	1.00	4	1.00	4	1.00	12	1.00	1.8	1	3.2	1.00	4	1.00	2.6	1	1.4	1
MBAs	0.58	0.10	0.2	0.10	U	0.10	0.12	0.10	U	0.1	U	0.10	0.1	0.10	U	0.1	U	0.1
Chloride	84.1	1.00	11.2	1.00	18.7	1.00	18.2	1.00	10.3	1	7.8	1.00	16.7	1.00	17.6	1	25.7	1
Sulfate	21.2	1.00	26.6	1.00	15.5	1.00	29.9	1.00	11.8	1	15.2	1.00	45	5.00	32.6	1	25.1	1
Hardness	320	10.00	208	10.00	268	10.00	248	10.00	196	10	128	10.00	328	10.00	212	10	228	10
Bromide	U	2.00	U	2.00	U	2.00	U	2.00	U	2	U	2.00	U	2.00	U	2	U	2
Total Phosphorus	U	0.05	0.091	0.05	0.056	0.05	0.213	0.05	0.053	0.05	0.475	0.05	0.31	0.05	U	0.05	0.072	0.05
Oil & Grease	5.64	0.40	0.89	0.42	0.57	0.46	2.08	0.40	1.13	0.43	0.54	0.40	0.65	0.42	1.37	0.82	0.43	0.4
Total Petroleum Hydrocarbons	1	0.47	U	0.41	U	0.53	U	0.41	U	0.5	U	0.43	U	0.42	U	0.4	U	0.41
TSS	70	2.00	78	2.00	38	2.00	233	2.00	60	2	92	2.00	278	2.00	153	2	34	2
TDS	483	10.00	275	10.00	318	10.00	255	10.00	238	10	181	10.00	398	10.00	277	10	292	10
Total Residual Chlorine	U	0.10	U	0.10	U	0.10	U	0.10	U	0.1	U	0.10	U	0.10	U	0.1	U	0.1

U - Contaminant was undetected

MDL - Minimum Detection Lim

TABLE - 8

CONVENTIONAL WATER QUALITY PARAMETERS RESULTS

Ground Water, April 1991

Chemsol Inc., Piscataway, New Jersey

Parameter	TW-14		TW-15		C-1		FB-1		FD-1		FD-2	
	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Alkalinity	126	10.00	209	10.0	242	10	U	10.00	223	10	311	10
Ammonia	U	0.20	U	0.2	0.5	0.2	U	0.20	U	0.2	U	0.2
BOD	10	2.00	2	2.0	792	2	U	2.00	95	2	55	2.0
COD	75.7	50.00	8.8	5.0	2470	50	U	5.00	474	50	143	50
TOC	2.3	1.00	2.4	1.0	445	1	U	1.00	124	1	3.4	1.0
MBAs	U	0.10	U	0.1	1.62	0.1	U	0.10	0.68	0.1	U	0.1
Chloride	39.1	1.00	39.7	1.0	369	5	U	1.00	132	5	17.2	1.0
Sulfate	28.9	1.00	20.2	1.0	123	5	U	1.00	37.4	1	38	1.0
Hardness	260	10.00	268	10.0	900	10	U	10.00	416	10	324	10.0
Bromide	U	2.00	U	2.0	U	2	U	2.00	U	2	2.2	2.0
Total Phosphorus	0.95	0.05	0.065	0.050	0.076	0.05	U	0.05	U	0.05	0.385	0.05
Oil & Grease	8.21	0.51	1.82	0.450	36.8	0.43	U	0.41	11.3	0.46	0.48	0.48
Total Petroleum Hydrocarbons	1.67	0.48	U	0.410	20.7	0.42	U	0.41	4.92	0.46	U	0.47
TSS	698	2.00	84	2.0	62	2	U	2.00	78	2	340	2
TDS	258	10.00	347	10.0	1460	10	U	10.00	638	10	413	10
Total Residual Chlorine	U	0.10	U	0.1	U	0.1	U	0.10	U	0.1	U	0.1

U - Contaminant was undetected

MDL - Minimum Detection Limit

TABLE 9

COMPARISON OF GROUNDWATER DATA TO ARARs AND OTHER CRITERIA

Chemical	FFS DATA April, 1991 Frequency of Detection	Highest Concentration (ug/l)	Well Location	FEDERAL SDWA Value (ug/l)	Criterion	NJ SDWA MCL (ug/l)	USEPA Health Advisory (ug/l)
VOLATILE ORGANICS							
Acetone	2/22	51,000 D	C-1				
Benzene	14/22	17,000 D	C-1	5	MCL	1	
2-Butanone	6/22	20,000 D	C-1				
Carbon Disulfide	4/22	310 J	C-1				
Carbon Tetrachloride	12/22	33,000 J	TW-7	5	MCL	2	
Chlorobenzene	6/22	5,600	C-1	100	MCL	4	100
Chloroethane	0/22	—	—				
Chloroform	10/22	55,000	C-1	100 a	MCL	100 a	
1,1-Dichloroethane	10/22	690	C-1				
1,2-Dichloroethane	11/22	21,000	C-1	5	MCL	2	
1,1-Dichloroethene	8/22	2,300 J	C-1	7	MCL	2	7
trans-1,2-Dichloroethene	NA	—	—	100	MCL	10 b	100
1,2-Dichloroethene (total)	14/22	20,000 D	TW-06	70 c	MCL	10	70 c
1,2-Dichloropropane	2/22	300 J	C-1	5	MCL	5	
Ethylbenzene	7/22	1600	C-1	700	MCL		700
2-Hexanone	2/22	100 J	C-1				
4-Methyl-2-Pentanone	5/22	10,000	C-1				
Methylene Chloride	2/22	3,200 BJ	TW-04	5	pMCL	2	
1,1,2,2-Tetrachloroethane	5/22	1,400	C-1				
Tetrachloroethene	12/22	1,300	C-1	5	MCL	1	
Toluene	9/22	20,000 D	C-1	1,000	MCL		1,000
1,1,1-Trichloroethane	7/22	6,600 DJ	C-1	200	MCL	26	200
1,1,2-Trichloroethane	3/22	150 J	C-1	5	pMCL		3
Trichloroethene	17/22	220,000 D	C-1	5	MCL	1	
Trichlorofluoromethane	NA	—	—				
Vinyl Chloride	5/22	460 J	C-1	2	MCL	2	
Xylenes (total)	8/22	6,600 J	C-1	10,000	MCL	44	10,000
SEMIVOLATILE ORGANICS							
Acenaphthene	0/21	—	—				
Acrolein	0/21	—	—				
Benzoic Acid	0/21	—	—				
Butylbenzylphthalate	6/21	73	TW-14	100	pMCL		
2-Chlorophenol	2/21	3 J	TW-06				40
Dibenzofuran	0/21	—	—				
1,2-Dichlorobenzene	8/21	1400	TW-01	600	MCL	600	600

POOR QUALITY ORIGINAL

TABLE 9 (CONTINUED)

Chemical	FFS DATA April, 1991			FEDERAL SDWA		NJ SDWA	USEPA Health Advisory
	Frequency of Detection	Highest Concentration (ug/l)	Well Location	Value (ug/l)	Criterion	MCL (ug/l)	(ug/l)
SEMIVOLATILE ORGANICS							
1,3-Dichlorobenzene	5/21	42	OW-04	600	MCL	600	
1,4-Dichlorobenzene	9/21	110	OW-04	75	MCL		75
2,4-Dichlorophenol	2/21	900	C-1				20
Diethylphthalate	6/21	530	C-1				5,000
Dimethyl Phthalate	3/21	63 J	C-1				
2,4-Dimethylphenol	3/21	30 J	C-1				
Di-n-Butylphthalate	3/21	100 J	C-1				
Di-n-Octylphthalate	0/21	—	—				
1,2-Diphenylhydrazine	NA	—	—				
bis (2-Chloroethyl) Ether	7/21	3,100 D	C-1				
Hexachloroethane	4/21	70	TW-07				1
Isophorone	8/21	230	C-1				100
2-Methylnaphthalene	3/21	11	OW-04				
2-Methylphenol	6/21	500	C-1				
4-Methylphenol	5/21	450	C-1				
Methyl Isobutyl Ketone	NA	—	—				
Naphthalene	6/21	110 J	C-1				20
Nitrobenzene	3/21	500	C-1				
2-Nitrophenol	2/21	220	C-1				
4-Nitrophenol	1/21	14 J	OW-02				
Phenol	8/21	1500	C-1				4,000
bis (2-Ethylhexyl) Phthalate	6/21	23 J	OW-01	4	pMCL		
1,2,3-Trichlorobenzene	NA	—	—			8 d	
1,2,4-Trichlorobenzene	8/21	120 J	C-1	9	pMCL	9	9
2,4,6-Trichlorophenol	0/16	—	—				
PESTICIDES AND PCBs							
a-BHC	6/21	0.43 N	C-1				
b-BHC	1/21	0.034 J	OW-02				
d-BHC	4/21	0.004 N	C-1				
g-BHC	6/21	0.025 JP	TW-04	0.2	MCL	0.2	0.2
4,4'-DDD	1/21	0.0062 JN	TW-03				
4,4'-DDE	1/21	0.0060 JN	TW-05				
Endosulfan I	1/21	0.0087 JN	TW-05				
Heptachlor epoxide	3/21	0.011 JN	OW-01	0.2	MCL	0.2	
PCB-1248	0/21	—	—	0.5	MCL	0.5	

TABLE 9 (CONTINUED)

Chemical	FFS DATA April, 1991 Frequency of Detection	Highest Concentration (ug/l)	Well Location	FEDERAL SDWA Present Value (ug/l)	Criterion	NJ SDWA MCL (ug/l)	USEPA Health Advisory (ug/l)
INORGANICS							
Aluminum	21/21	21,100	OW-04	50	psMCL		
Antimony	1/21	47.5 J	C-1	10/5	pMCL		3
Arsenic	12/21	18.3	OW-02	50	MCL	50	
Barium	21/21	2830	TW-04	1,000	MCL	1,000	2,000
Calcium	21/21	250,000	C-1				
Chromium	18/21	46.5	OW-04	100	MCL	50	100
Cobalt	7/21	42.9	OW-04				
Copper	5/21	864	TW-14	1,300	AL	1,000	
Cyanide	6/21	76 NJ	TW-05A	200	pMCL		200
Iron	21/21	84,800 J	TW-11	300	sMCL	300	
Lead	21/21	33.4	OW-02	15	AL	50	
Magnesium	21/21	24,600	TW-04, C-1				
Manganese	21/21	7,270	OW-04	50	sMCL	50	
Mercury	2/21	0.4	TW-11	2	MCL	2	2
Nickel	18/21	700 J	TW-04	100	pMCL		100
Potassium	21/21	8010	OW-04				
Selenium	0/21			50	MCL	10	
Sodium	21/21	34,200 J	C-1			50,000	
Vanadium	20/21	80.2	OW-04				20
Zinc	20/21	163	OW-04	5,000	sMCL	5,000	2,000

MCL – Maximum Contaminant Level
pMCL – Proposed Maximum Contaminant Level
sMCL – Secondary Maximum Contaminant Level
psMCL – Proposed Secondary Maximum Contaminant Level
AL – Action Level

J – estimated value
P – estimated value for pesticides
NA – not analyzed
N – presumptive evidence
B – compound also detected in the blank
D – a secondary dilution factor was used

Notes:
(a) as total Trihalomethanes
(b) as 1,2-Dichloroethene (cis + trans)
(c) as cis-1,2-Dichloroethene
(d) as Trichlorobenzenes (1,2,4-Trichlorobenzene)

POOR QUALITY ORIGINAL

TABLE 10

ALTERNATIVE 2 - EXTRACTION AND TREATMENT WITH DISCHARGE TO SURFACE WATER

Summary of Costs to Implement

	Capital	O&M
EXTRACTION SYSTEM		
Installation and Development of Extraction Wells	$253,500	
Installation and Development of Trenches		
Trenches and Fill	$118,320	
Sumps and Collection system	$156,000	$1,000
Disposal of excavated soils	$448,000	
Monitoring	$12,800	$228,500
Subtotal 1	$989,000	$229,500
TREATMENT SYSTEM		
Air stripper	$45,000	$40,000
Off-gas carbon bed	$26,000	$312,000
Bio-treatment	$140,000	$7,400
Clarifier	$45,000	$10,000
Filtration	$140,000	$10,000
Carbon polishing	$20,000	$25,000
Sludge treatment and disposal	$127,000	$42,000
Subtotal 2	$543,000	$446,000
DISPOSAL		
Discharge pipe	$19,000	
Temp. MCUA Use	$6,400	$1,910
Discharge Monitoring	$100,000	$54,500
Subtotal 3	$125,400	$56,410
Sum of subtotals(1+2+3)	$1,657,400	$731,910
APPURTENANCES		
Building	$200,000	
Fencing	$40,000	
Electrical (20.5%)	$339,767	
Instrumentation (8%)	$132,592	
Piping (10%)	$165,740	
Pipe Insulation/Heating	$20,000	
Appurtenance Subtotal	$898,099	
Subtotal	$2,555,000	$732,000
ALLOWANCES		
Engineering (25%)	$638,750	
Contingency (25%)	$638,750	$183,000
Economic Analysis		
Total	$3,833,000	$915,000
Present worth of O&M	$3,867,000	
Total present worth	$7,700,000	

Major Cost Assumptions for All Cost Analyses:

[1] For present worth calculations: interest rate=10%, inflation=6% and project life = 5 years

[2] Where needed, costs were updated using the ENR forecasted construction cost index for December 1991 (4895)

[3] Totals were rounded to the nearest thousand

[4] Contingencies were applied to both capital costs and O&M costs

TABLE 11 - APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

- Air Emissions Requirements (EPA Offices of Solid Waste and Emergency Response (OSWER) Directive 9355.0-28)
- Clean Water Act, Water Quality Criteria (33 U.S.C. §1314) (May 1, 1987 - Gold Book)
- Clean Water Act, Protection of Wetlands (33 U.S.C. §1344)
- National Ambient Air Quality Standards (NAAQS) (40 CFR 50)
- New Jersey Surface Water Quality Standards (NJAC 7:9-4 et seq.) (August 1989)
- New Jersey Ambient Air Quality Standards (NJAC 7:27-13)
- Executive Order on Wetlands Protection (CERCLA Wetlands Assessments) # 11990
- Fish and Wildlife Coordination Act (16 USC §661 et seq.)
- Wetlands Construction and Management Procedures (40 CFR 6, Appendix A)
- New Jersey Freshwater Wetlands Act and Requirements (NJSA 13:98-1)
- Flood Hazard Control Act Requirements (Stream Encroachment) (NJAC 7:8-3.15 and NJSA 58:16A-15 et seq.)
- RCRA Manifesting, Transport and Recordkeeping Requirements (40 CFR 262)
- RCRA Wastewater Treatment System Standards (40 CFR 264, Subpart X)
- RCRA Corrective Action (40 CFR 264.101)
- RCRA Storage Requirements (40 CFR 264; 40 CFR 265, Subparts I and J)
- Off-Site Transport of Hazardous Waste (EPA OSWER Directive 98[illegible]4.11)
- RCRA Excavation and Fugitive Dust Requirements (40 CFR 264.251 and 264.254)

TABLE 11 (CONTINUED)

- RCRA Land Disposal Restrictions (40 CFR 268) (On and off-site disposal of sludges or excavated soil)
- Clean Water Act — NPDES Permitting Requirements for Discharge of Treatment System Effluent (40 CFR 122-125)
- Clean Water Act Discharge to Publicly-Owned Treatment Works (POTW) (40 CFR 403)
- National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR 61)
- DOT Rules for Hazardous Materials Transport (49 CFR 107, 171.1-171.500)
- Occupational Safety and Health Standards for Hazardous Responses and General Construction Activities (29 CFR 1940, 1910, 1926)
- New Jersey Volatile Organic Substances Air Emissions Control Requirements (NJAC 7:27-16)
- New Jersey Pollution Discharge Elimination System (NJPDES) and Effluent Limitations
- New Jersey Water Supply Management Act (N.J.S.A. 58:1A-1)
- New Jersey Well Drillers and Pump Installers Act (N.J.S.A. 58:4A-4.1 et seq.)
- New Jersey Toxic Substances Air Pollution Control Requirements (NJAC 7:27-17)
- New Jersey Pretreatment Requirements for Sanitary Sewer Discharges
- New Jersey Soil Erosion and Sediment Control Act Requirements (NJSA 4:24-42 and NJAC 2:90-1.1 et seq.)
- New Jersey Air Pollution Definitions and General Provisions (NJAC 7:27-5)
- National Historic Preservation Act
- MCUA Pretreatment Requirements